TEST REPORT

Report Number: 14144423-E4V2

Applicant	:	COGNYTE SOFTWARE LP 35 PINELAWN ROAD, SUITE 204 MELVILLE, NEW YORK 11747 USA
Model	:	Series02 Box
FCC ID	:	2A7A2-S2
EUT Description	:	PORTABLE TDD BTS
Test Standard(s)	:	FCC CFR 47 Part 27

Date Of Issue:
2022-12-01

Prepared by:
UL LLC
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	2022-11-11	Initial Review	--
V2	2022-12-01	Updated Section 6.2 and 6.3	K.Kedida

TABLE OF CONTENTS

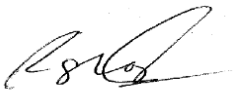
1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	COGNYTE 35 PINELAWN ROAD, SUITE 204 MELVILLE, NEW YORK 11747 USA
Model	Series02 Box
FCC ID	2A7A2-S2
EUT Description	PORTABLE TDD BTS
Serial Number	214A117100032
Date Tested	OCTOBER 19, 2022 to OCTOBER 27, 2022
Applicable Standards	FCC CFR 47
Test Results	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, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released By:	Reviewed By:	Prepared By:
		
Dan Coronia Operations Leader Consumer Technology Division UL Verification Services Inc.	Kiya Kedida Senior Project Engineer Consumer Technology Division UL Verification Services Inc.	Rolly Alegre Laboratory Engineer Consumer Technology Division 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 LLC is only responsible for the validity of results after the integration of the data provided by the customer.

Requirement Description	Band	Requirement Clause Number (FCC)	Result	Remarks
Equivalent Isotropic Radiated Power	77 and 78	27.50 (j) (2), 27.50 (k)(2)	Complies	

Requirement Description	Requirement Clause Number (FCC)	Result	Remarks
Occupied Bandwidth	2.1049, 27.53	Complies	
Band Edge and Emission Mask	27.53 (n)(1), 27.53 (l)(1)	Complies	
Out of Band Emissions	27.53 (n)(1), 27.53 (l)(1)	Complies	
Frequency Stability	27.54	Complies	
Peak-to-Average Ratio	27.50 (k) (4), 27.50 (j) (4),	Complies	
Field Strength of Spurious Radiation	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 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 #0751.05, 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	208313
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA	US0104	22541	208313
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA	US0104	2324B	208313

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
Occupied Channel Bandwidth	±1.22 %
Temperature	±2.26%
Supply voltages	±0.57 %
Time	±3.39 %

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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 base station and support 5G NR n77 and n78.

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 n77 (FCC Part 27 3450-3550MHz)

Part 27	
EIRP Limit (W)/MHz	1640.00
Antenna Gain (dBi)	13.00
Antenna Cable Loss (dB)	-1.85

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
20.0	QPSK	3460.8	3540.0	18.84	29.99	0.998	18457	18M5W7W

5G NR n77 (FCC Part 27 3700-3980MHz)

Part 27	
EIRP Limit (W)/MHz	1640.00
Antenna Gain (dBi)	13.00
Antenna Cable Loss (dB)	-1.90

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
20.0	QPSK	3711.4	3789.1	28.87	39.97	9.931	18442	18M4W7W

5G NR n78 (FCC Part 27 3450-3550MHz)

Part 27	
EIRP Limit (W)/MHz	1640.00
Antenna Gain (dBi)	13.00
Antenna Cable Loss (dB)	-1.85

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
20.0	QPSK	3460.8	3540.0	18.66	29.81	0.957	18456	18M5W7W

6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version MIG2_v6.59_RevX

The EUT software used during testing was version v58.1.116

The EUT board used during the testing was version BTS RevD.

.

6.4. MAXIMUM ANTENNA GAIN

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

LTE Bands	Frequency Range (MHz)	Antenna Type	Antenna Gain (dBi)
5G NR n77 (FCC)	3450 – 3550	Directional	13
5G NR n77 (FCC)	3700 – 3980		13
5G NR n78 (FCC)	3450 – 3550		13

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports the following 5G NR:
Band n77 and n78 (20MHz Bandwidths, QPSK only)

All measurements is tested on QPSK modulation.

The EUT can only be setup in desktop orientation; therefore, all radiated testing was performed with the EUT in desktop orientation. Radiated spurious emissions were investigated from 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 18GHz to 40GHz.

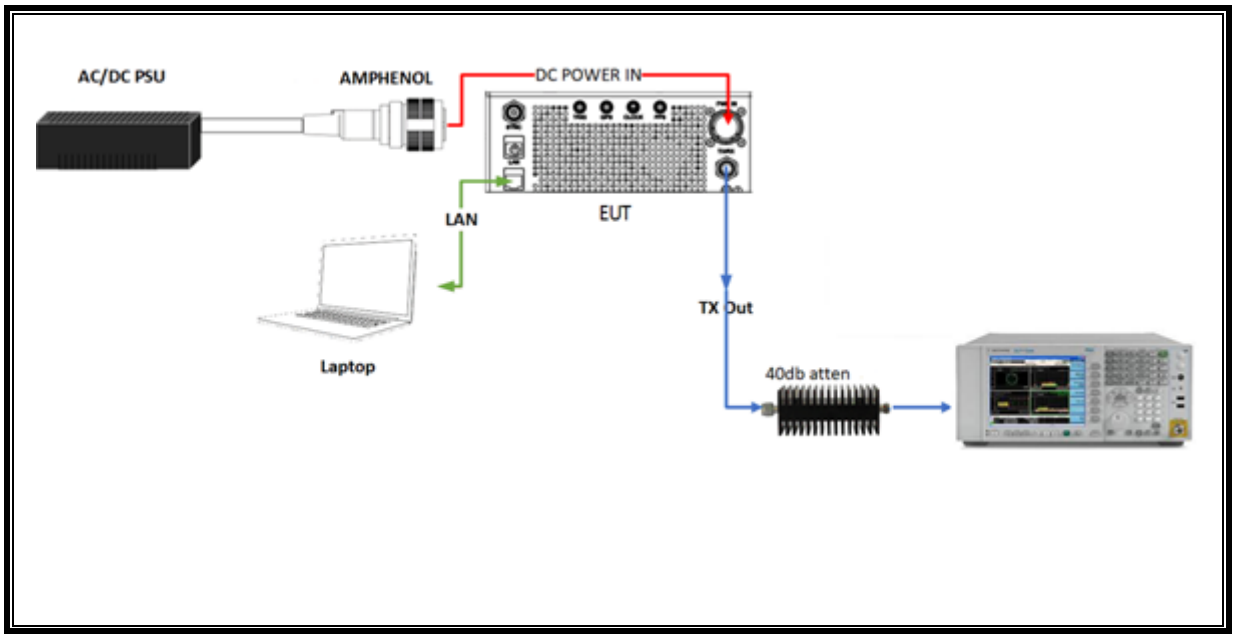
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**
Laptop	Lenovo	ThinkPad T14 Gen 2, Intel Core i7-1185G7 Processor	N/A	N/A
AC/DC adapter	Relec Electronics	EA12501Q(TD03)	N/A	N/A
AC/DC PSU (AMPHENOL) to EUT	EDACPOWER ELEC.	EA12501Q-240	N/A	N/A

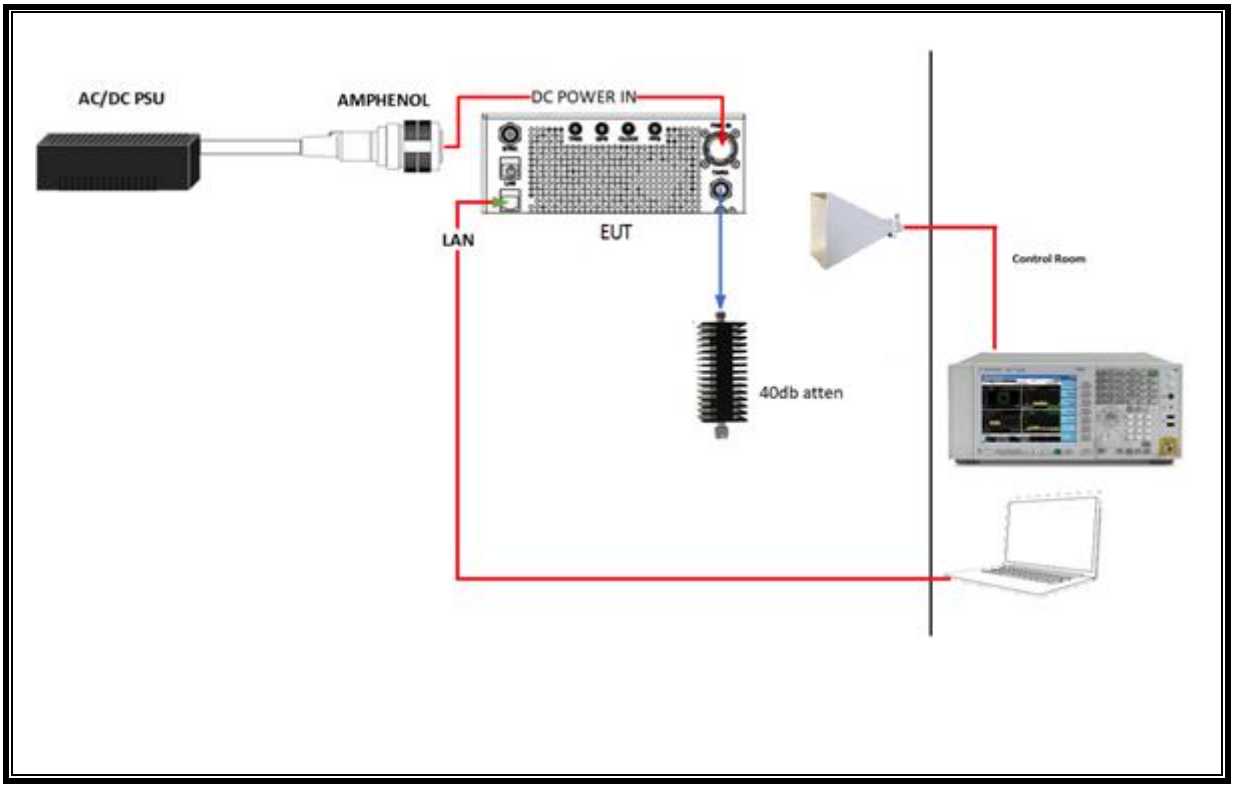
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC/DC PSU	1	AMPHENOL	Shielded	1.2	N/A
2	RF In/Out	1	40dB attenuator	N/A	N/A	N/A
3	RF In/Out	1	20dB attenuator	N/A	N/A	N/A
4	RF In/Out	1	RF cable QN to Ntype Male	Shielded	3.0	N/A
5	LAN	1	RJ-45 CAT6	Shielded	1.0	N/A
6	RF In/Out	1	SMA cable	Shielded	0.5	N/A

I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC/PSU	1	AMPHENOL	Shielded	0.7	To AC Mains
2	DC/PSU	1	AMPHENOL	Shielded	0.5	To EUT
3	RF In/Out	1	RF cable QN to Ntype Male	Shielded	3.0	To 40dB attenuator
4	RF In/Out	1	40dB attenuator	N/A	N/A	To SMA cable
5	RF In/Out	1	SMA cable	Shielded	0.5	To EUT
6	LAN	1	RJ-45 CAT6	Shielded	1.0	From Laptop to EUT

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, Horn 1-18GHz	ETS Lindgren	3117	80402	7/5/2023
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	80813	6/8/2023
RF Filter Box, 1 to 18GHz	UL FREMONT	SAC-L1	197920	4/19/2023
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	175953	2/8/2023
ESW EMI Test Receiver, 2Hz to 44GHz	ROHDE & SCHWARZ	ESW44	169927	2/16/2023
Power Meter, P-series single channel	Keysight	N1912A	90630	1/24/2023
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	81319	1/24/2023
Spectrum Analyzer, PXA, 3Hz to 50GHz	Keysight	N9030A	80400	2/1/2023
Chamber, Environmental	Thermotron	29800	T80	11/11/2022
PSA Spectrum Analyzer	Agilent	E4440A	80386	3/2/2023
UL AUTOMATION SOFTWARE				
Radiated test software	UL	UL EMC	Ver 9.5 April 30, 2020	

8. RF OUTPUT POWER VERIFICATION

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 36.101 specification.

The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS 36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 38.521-1 specification.

The allowed MPR for SRS, PUCCH formats 0, 1, 3 and 4, and PRACH shall be as specified for QPSK modulated DFTs-OFDM of equivalent RB allocation. The allowed MPR for PUCCH format 2 shall be as specified for QPSK modulated CP-OFDM of equivalent RB allocation.

Table 6.2.2.3-1: Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5[1]	≤ 1.2[1]	≤ 0.2[1]
		≤ 0.5[2]		0[2]
	Pi/2 BPSK w Pi/2 BPSK DMRS	≤ 0.5[2]	0[2]	
	QPSK	≤ 1		0
	16 QAM	≤ 2		≤ 1
	64 QAM	≤ 2.5		
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0dB MPR is 26dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE *powerBoostPi2BPSK* is set to 0 and if more than 40% of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

Table 6.2.2.3-2: Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5	≤ 2.5	
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS 36.101 are in addition to the allowed MPR requirements.

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2, 6.6.3.3.19	41	5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	

RESULTS

8.1. 5G NR n77 (FCC Part 27 3450-3550MHz)

Test Engineer ID:	39005	Test Date:	10/27/2022

OUTPUT POWER FOR 5G n77 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Conducted Average (dBm)		
				630720	633312	636000
				3460.8 MHz	3499.68 MHz	3540.0 MHz
20.0	QPSK	50	0	**18.84**	18.36	18.64

8.2. 5G NR n77 (FCC Part 27 3700-3980MHz)

Test Engineer ID:	39005	Test Date:	10/27/2022

OUTPUT POWER FOR 5G n77 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Conducted Average (dBm)		
				647424	650016	652608
				3711.36 MHz	3750.24 MHz	3789.12 MHz
20.0	QPSK	50	0	**28.87**	28.20	**28.87**

8.3. 5G NR n78 (FCC Part 27 3450-3550MHz)

Test Engineer ID:	39005	Test Date:	10/27/2022

OUTPUT POWER FOR 5G n78 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Conducted Average (dBm)		
				630720	633312	636000
				3460.8 MHz	3499.68 MHz	3540.0 MHz
20.0	QPSK	50	0	**18.66**	18.34	18.60

9. CONDUCTED TEST RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049, §27.53

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.

5G NR n77 (FCC Part 27 3450-3550MHz)

Band	Mode	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
5G NR n77	20MHz, QPSK	3499.68	18.457	20.54

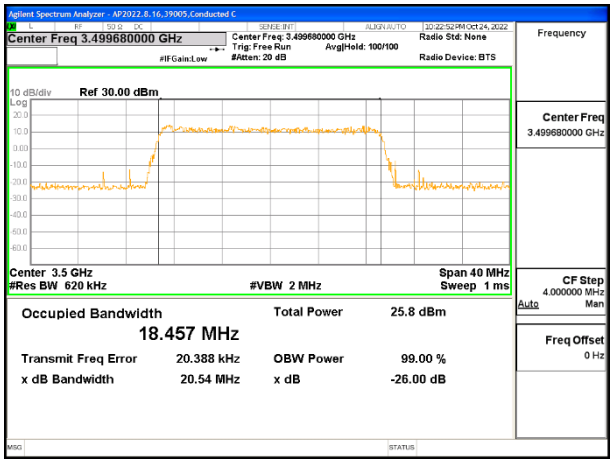
5G NR n77 (FCC Part 27 3700-3980MHz)

Band	Mode	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
5G NR n77	20MHz, QPSK	3750.24	18.442	20.03

5G NR n78 (FCC Part 27 3450-3550MHz)

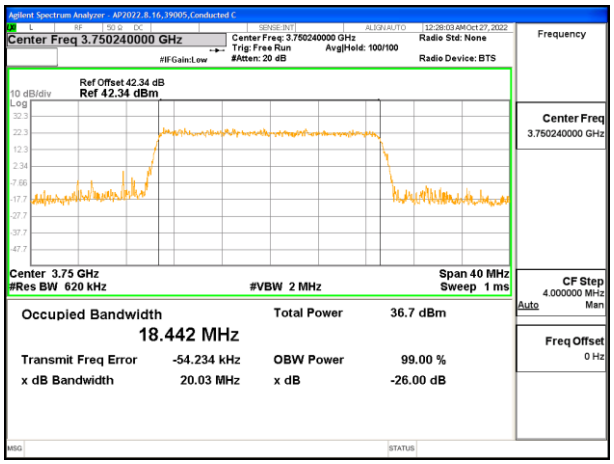
Band	Mode	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
5G NR n78	20MHz, QPSK	3499.68	18.456	21.18

9.1.1. 5G NR n77 (FCC Part 27 3450-3550MHz)



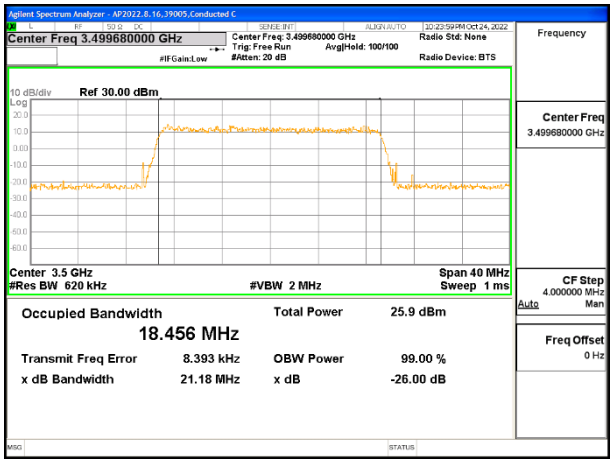
5G NR m77 20MHz QPSK Middle Channel RB50-0

9.1.2. 5G NR n77 (FCC Part 27 3700-3980MHz)



5G NR m77 20MHz QPSK Middle Channel RB50-0

9.1.3. 5G NR n78 (FCC Part 27 3450-3550MHz)



5G NR m78 20MHz QPSK Middle Channel RB50-0

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 connected to a CMW500Test Set and 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, -25, -40 dBm
4. Set resolution bandwidth to at least 1% of emission bandwidth.

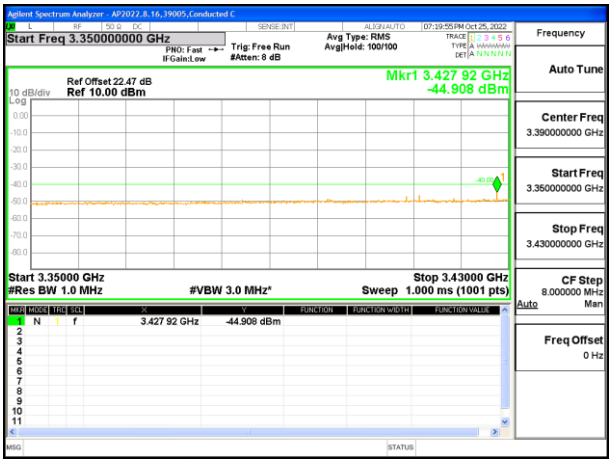
RESULTS

9.2.1. 5G NR n77 EMISSION MASK (FCC Part 27 3450-3550MHz)

LIMITS

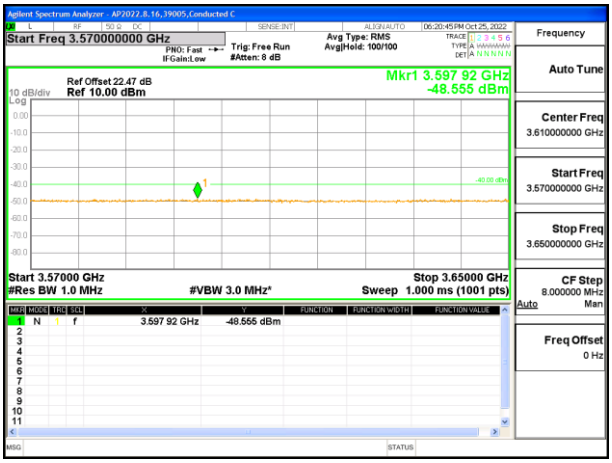
FCC: §27.53
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) For base station operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Notwithstanding the channel edge requirement of −13 dBm per megahertz, for base station operations in the 3450-3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed −25 dBm/MHz, and the conducted power of emissions below 3430 MHz or above 3570 MHz shall not exceed −40 dBm/MHz.

5G NR n77 20MHz QPSK Low Channel RB50-0

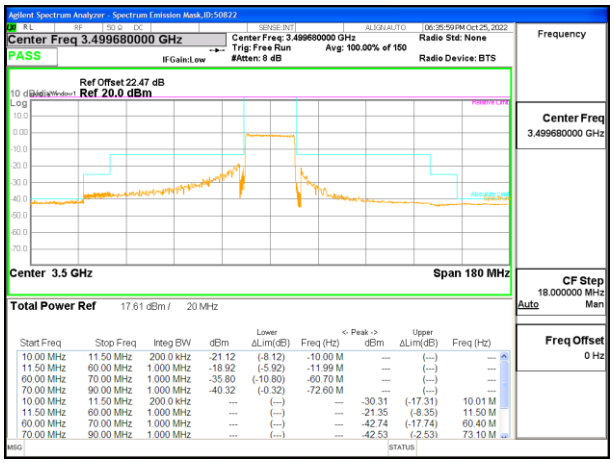


5G NR n77 20MHz QPSK Low channel second segment

5G NR n77 20MHz QPSK High Channel RB50-0



5G NR n77 20MHz QPSK High channel second segment



5G NR n77 20MHz QPSK Middle Channel RB50-0

9.2.2. 5G NR n77 EMISSION MASK (FCC Part 27 3700-3980MHz)

LIMITS

FCC: §27.53
(l) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:
(1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with the provisions of this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power..

5G NR n77 20MHz QPSK Low Channel RB50-0

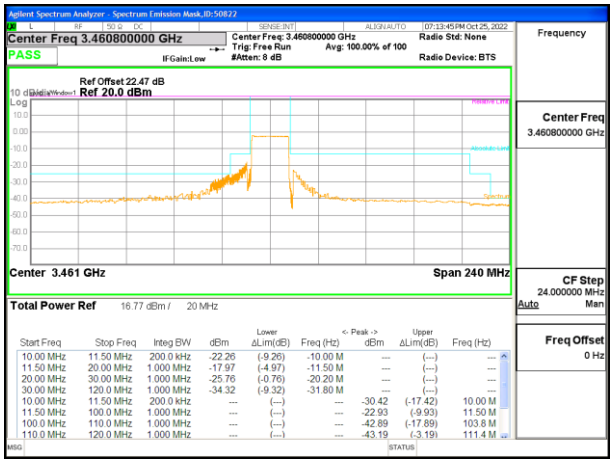
5G NR n77 20MHz QPSK Middle Channel RB50-0

5G NR n77 20MHz QPSK High Channel RB50-0

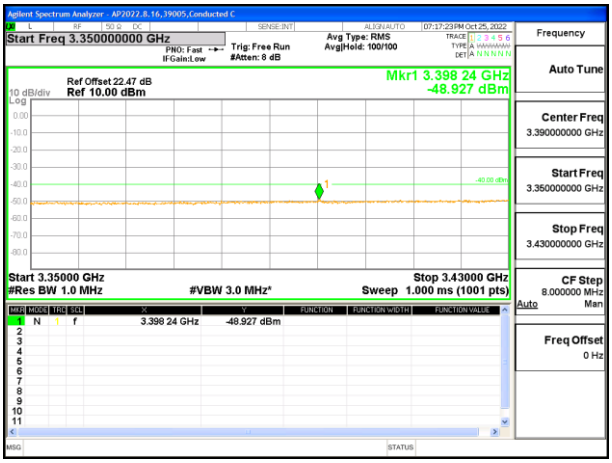
9.2.3. 5G NR n78 EMISSION MASK (FCC Part 27 3450-3550MHz)

LIMITS

FCC: §27.53
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) For base station operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Notwithstanding the channel edge requirement of −13 dBm per megahertz, for base station operations in the 3450-3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed −25 dBm/MHz, and the conducted power of emissions below 3430 MHz or above 3570 MHz shall not exceed −40 dBm/MHz

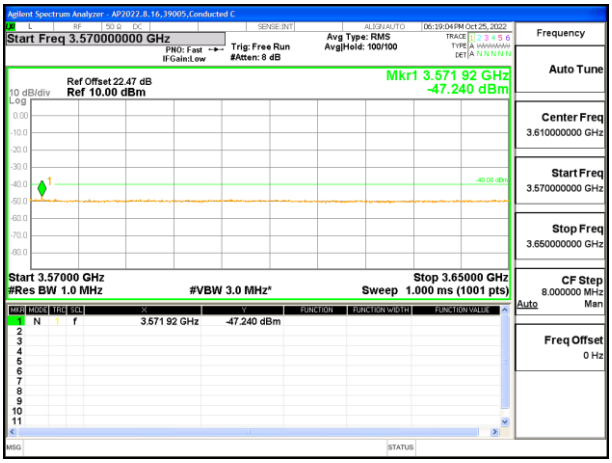


5G NR n78 20MHz QPSK Low Channel RB50-0

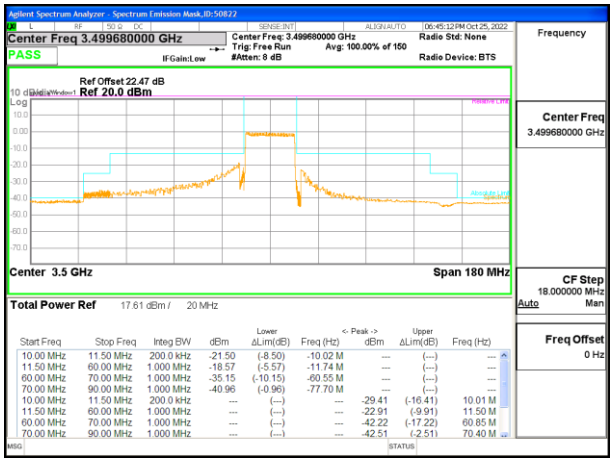


5G NR n78 20MHz QPSK Low Channel second segment

5G NR n78 20MHz QPSK High Channel RB50-0



5G NR n78 20MHz QPSK High Channel second segment



5G NR n78 20MHz QPSK Middle Channel RB50-0

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:

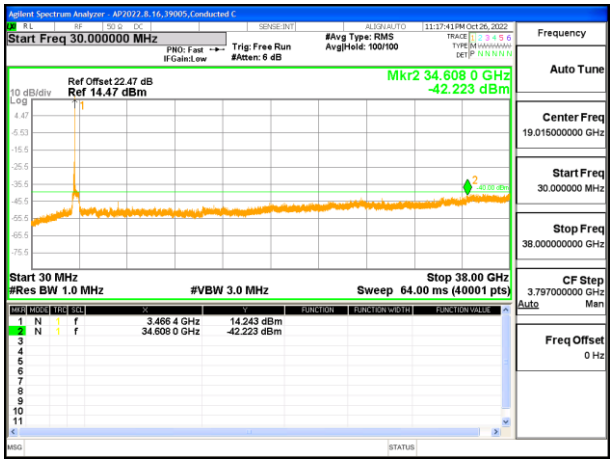
- Set display line at -13, -40dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

RESULTS

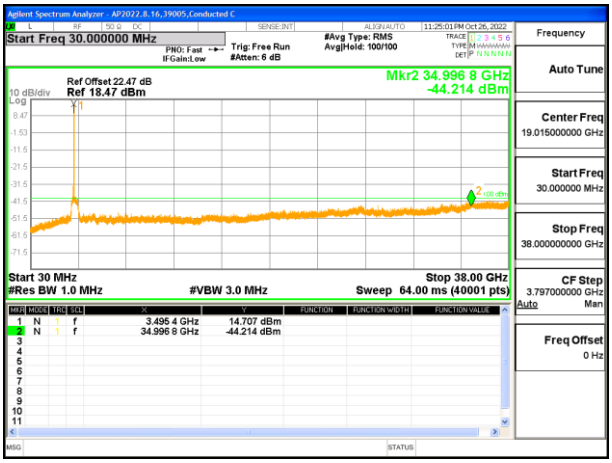
9.3.1. 5G NR n77 (FCC Part 27 3450-3550MHz)

LIMITS

FCC: §27.53
Emission limits
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) The minimum permissible conducted power of emissions is -40dBm/MHz.



5G NR n77 20MHz QPSK Low Channel



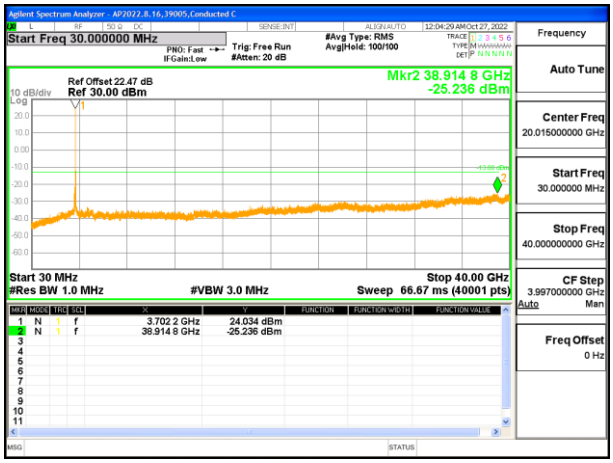
5G NR n77 20MHz QPSK Middle Channel

5G NR n77 20MHz QPSK High Channel

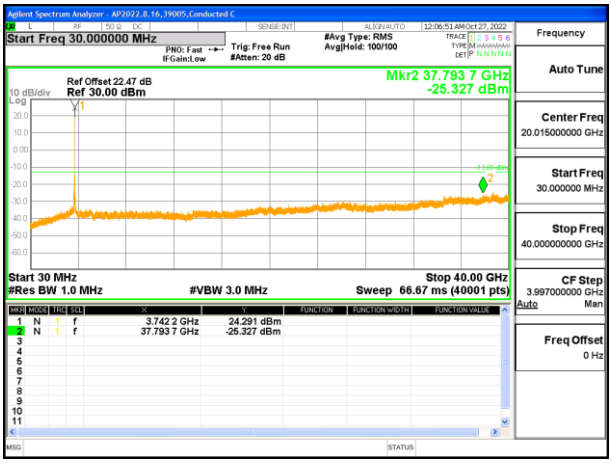
9.3.2. 5G NR n77 (FCC Part 27 3700-3980MHz)

LIMITS

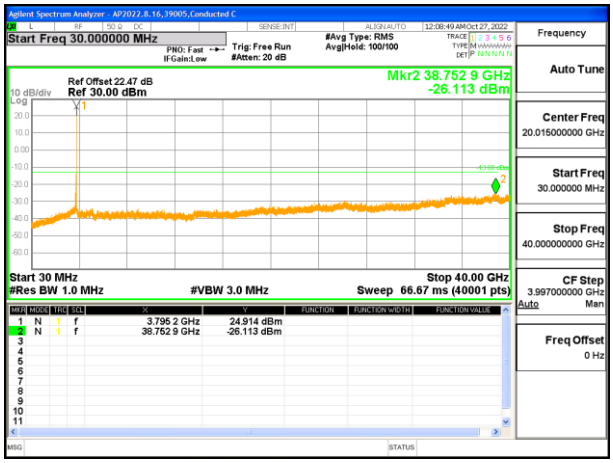
FCC: §27.53
Emission limits
(l) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:
(1) The minimum permissible conducted power of emissions is -13dBm/MHz.



5G NR n77 20MHz QPSK Low Channel



5G NR n77 20MHz QPSK Middle Channel



5G NR n77 20MHz QPSK High Channel

9.3.3. 5G NR n78 (FCC Part 27 3450-3550MHz)

LIMITS

FCC: §27.53
Emission limits
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) The minimum permissible conducted power of emissions is -40dBm/MHz.

5G NR n78 20MHz QPSK Low Channel

5G NR n78 20MHz QPSK Middle Channel

5G NR n78 20MHz QPSK High Channel

9.4. FREQUENCY STABILITY

TEST PROCEDURE

- Temp. = −30°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.

9.4.1. 5G NR n77 (FCC Part 27 3450-3550MHz)

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:	39005	Test Date:	10/26/2022

5G NR n77 QPSK (20MHz BANDWIDTH)

Band	77	Frequency Range		Delta	Limit	
Condition		3450	3550		NA	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	3451.6400	3549.1700			
Extreme (50°C)		3451.5900	3549.1800	-0.02	NA	Yes
Extreme (40°C)		3451.5800	3549.1700	-0.03	NA	Yes
Extreme (30°C)		3451.5800	3549.1800	-0.025	NA	Yes
Extreme (10°C)		3451.5800	3549.1600	-0.035	NA	Yes
Extreme (0°C)		3451.5500	3549.1900	-0.035	NA	Yes
20°C	15%	3451.5600	3549.1500	-0.05	NA	Yes
	-15%	3451.5900	3549.1800	-0.02	NA	Yes

9.4.2. 5G NR n77 (FCC Part 27 3700-3980MHz)

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:	39005	Test Date:	10/26/2022

5G NR n77 QPSK (20MHz BANDWIDTH)

Band	77	Frequency Range		Delta	Limit	
Condition		3700	3980		NA	
Temperature	Voltage	Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Normal (20°C)	Normal	3702.1700	3798.2100			
Extreme (50°C)		3702.1700	3798.2500	0.02	NA	Yes
Extreme (40°C)		3702.1700	3798.2800	0.035	NA	Yes
Extreme (30°C)		3702.1800	3798.2200	0.01	NA	Yes
Extreme (10°C)		3702.1600	3798.2500	0.015	NA	Yes
Extreme (0°C)		3702.1500	3798.2700	0.02	NA	Yes
20°C	15%	3702.1800	3798.2300	0.015	NA	Yes
	-15%	3702.1900	3798.2500	0.03	NA	Yes

9.4.3. 5G NR n78 (FCC Part 27 3450-3550MHz)

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:	39005	Test Date:	10/26/2022

5G NR n78 QPSK (20MHz BANDWIDTH)

Band	78	Frequency Range		Delta	Limit	
Condition		3450	3550		NA	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	3451.5600	3549.1700			
Extreme (50°C)		3451.6100	3549.1800	0.03	NA	Yes
Extreme (40°C)		3451.5800	3549.1700	0.01	NA	Yes
Extreme (30°C)		3451.5700	3549.1700	0.005	NA	Yes
Extreme (10°C)		3451.5700	3549.1600	0	NA	Yes
Extreme (0°C)		3451.5500	3549.1900	0.005	NA	Yes
20°C	15%	3451.5500	3549.1900	0.005	NA	Yes
	-15%	3451.5700	3549.1700	0.005	NA	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.

RESULT

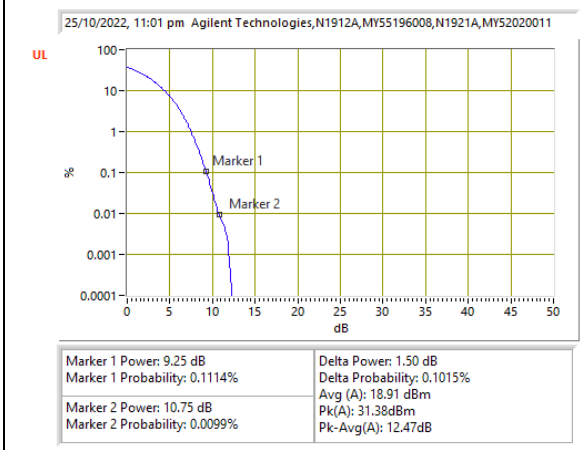
Full resource block (FRB) for each bandwidth was used to measure as the worst case. The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

9.5.1. 5G NR n77 (FCC Part 27 3450-3550MHz)

LIMITS

FCC: §27.50
(4)Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (k)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Engineer ID:	39005	**Test Date:**	10/25/2022



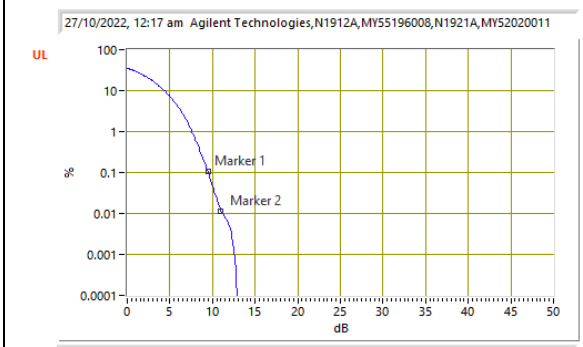
5G NR n77 20MHz QPSK Middle Channel RB50-0

9.5.2. 5G NR n77 (FCC Part 27 3700-3980MHz)

LIMITS

FCC: §27.50
(4)Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (k)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Engineer ID:	39005	Test Date:	10/25/2022



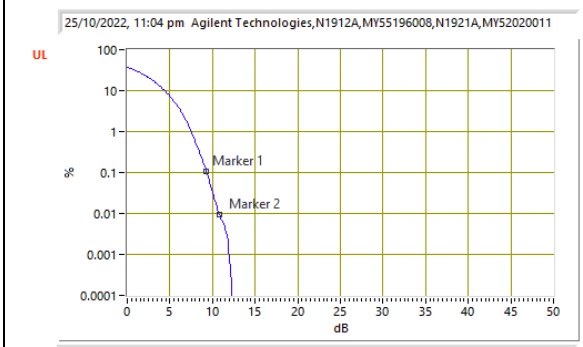
5G NR n77 20MHz QPSK Middle Channel RB50-0

9.5.3. 5G NR n78 (FCC Part 27 3450-3550MHz)

LIMITS

FCC: §27.50
(4)Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (k)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Engineer ID:	39005	Test Date:	10/25/2022



5G NR n78 20MHz QPSK Middle Channel RB50-0

10. RADIATED TEST RESULTS

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

Only QPSK and 20MHz bandwidth is tested.

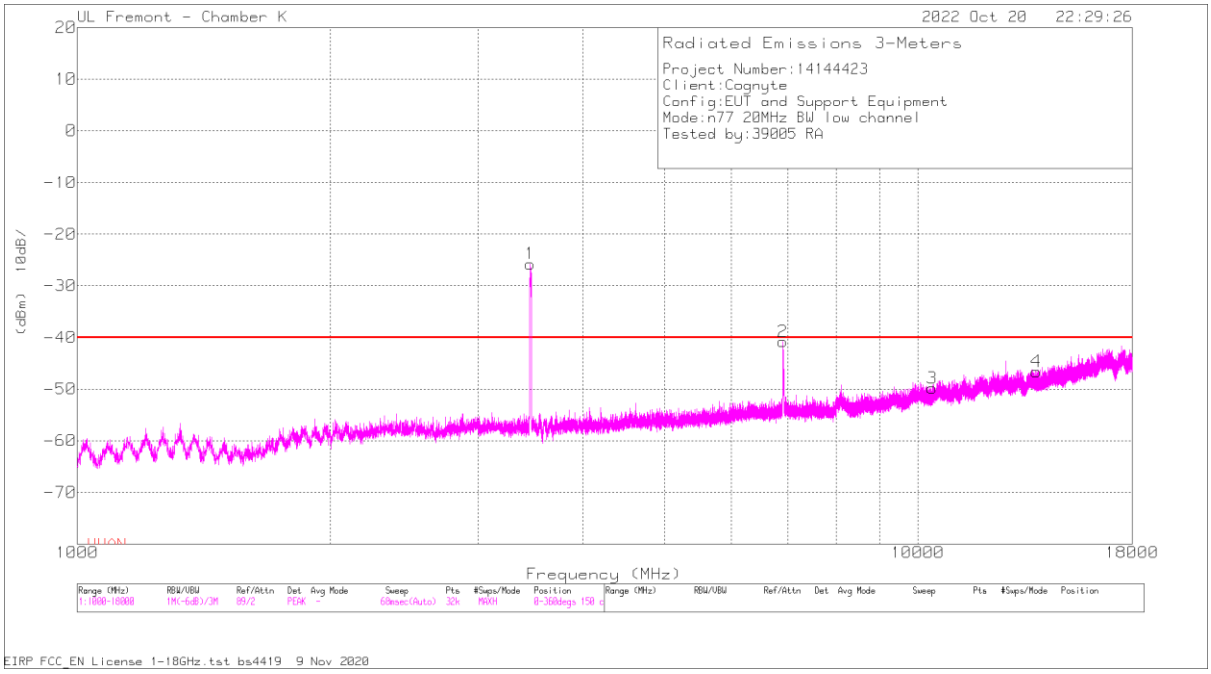
10.1.1. 5G NR n77 (FCC Part 27 3450-3550MHz)

LIMITS

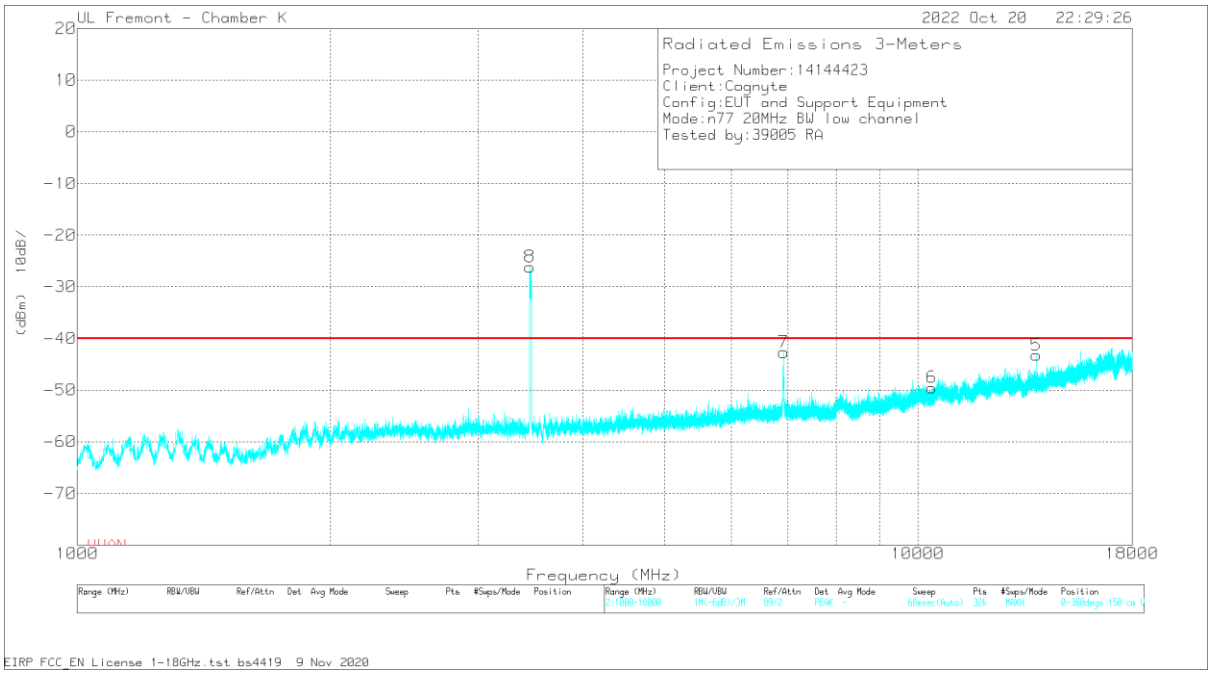
FCC: §27.53
Emission limits
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) The minimum permissible conducted power of emissions is -40dBm/MHz.

5G NR n77 QPSK (20.0MHZ BANDWIDTH)

LOW CHANNEL RESULTS



HORIZONTAL



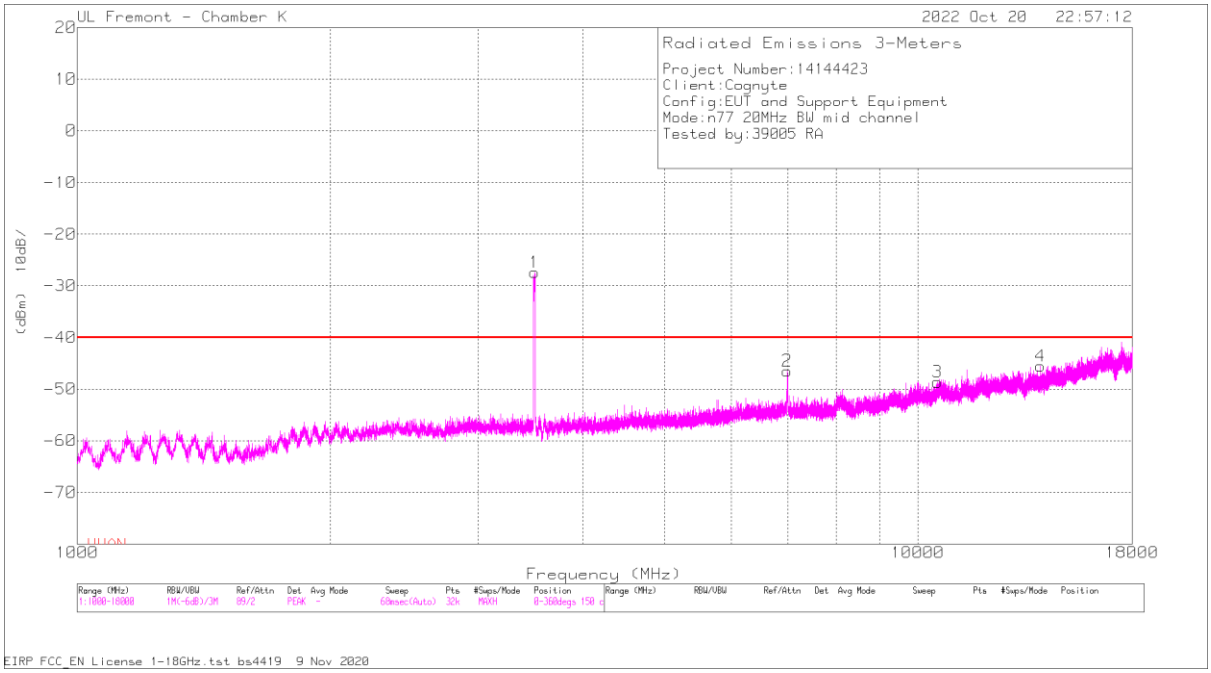
VERTICAL

Trace Markers

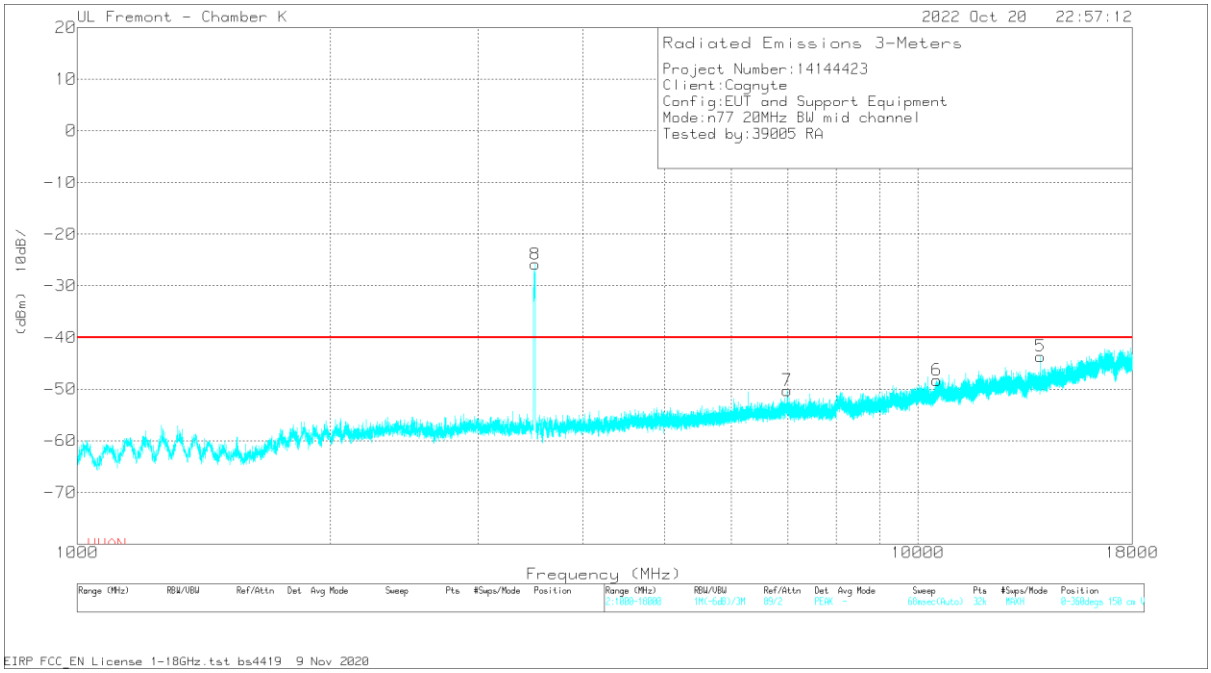
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3460.219	79.15	PK	32.9	-42.6	-95.2	-25.75	-	-	0-360	150	H
2	6914.406	56.99	PK	35.7	-38.3	-95.2	-40.81	-40	-0.81	360	150	H
	6915.957	47.94	RMS	35.7	-38.3	-95.2	-49.86	-40	-9.86	234	157	H
3	10403.641	47.53	PK	37.7	-37.2	-95.2	-47.17	-40	-7.17	234	151	H
	10401.805	35.59	RMS	37.7	-37.3	-95.2	-59.21	-40	-19.21	234	151	H
4	13842.699	45.2	PK	38.8	-35.4	-95.2	-46.6	-40	-6.6	234	151	H
	13843.243	35.69	RMS	38.8	-35.4	-95.2	-56.11	-40	-16.11	234	151	H
5	13843.228	48.54	PK	38.8	-35.4	-95.2	-43.26	-40	-3.26	334	196	V
	13843.24	45.25	RMS	38.8	-35.4	-95.2	-46.55	-40	-6.55	334	196	V
6	10397.058	46.81	PK	37.7	-37.3	-95.2	-47.99	-40	-7.99	334	150	V
	10396.598	35.68	RMS	37.7	-37.3	-95.2	-59.12	-40	-19.12	334	150	V
7	6927.156	55.13	PK	35.7	-38.3	-95.2	-42.67	-40	-2.67	360	150	V
	6926.92	45.42	RMS	35.7	-38.3	-95.2	-52.38	-40	-12.38	254	248	V
8	* 3456.5	78.67	Pk	32.9	-42.5	-95.2	-26.13	-	-	0-360	150	V

* Fundamental Frequency
PK - Peak detector
RMS – RMS detector

MID CHANNEL RESULTS



HORIZONTAL



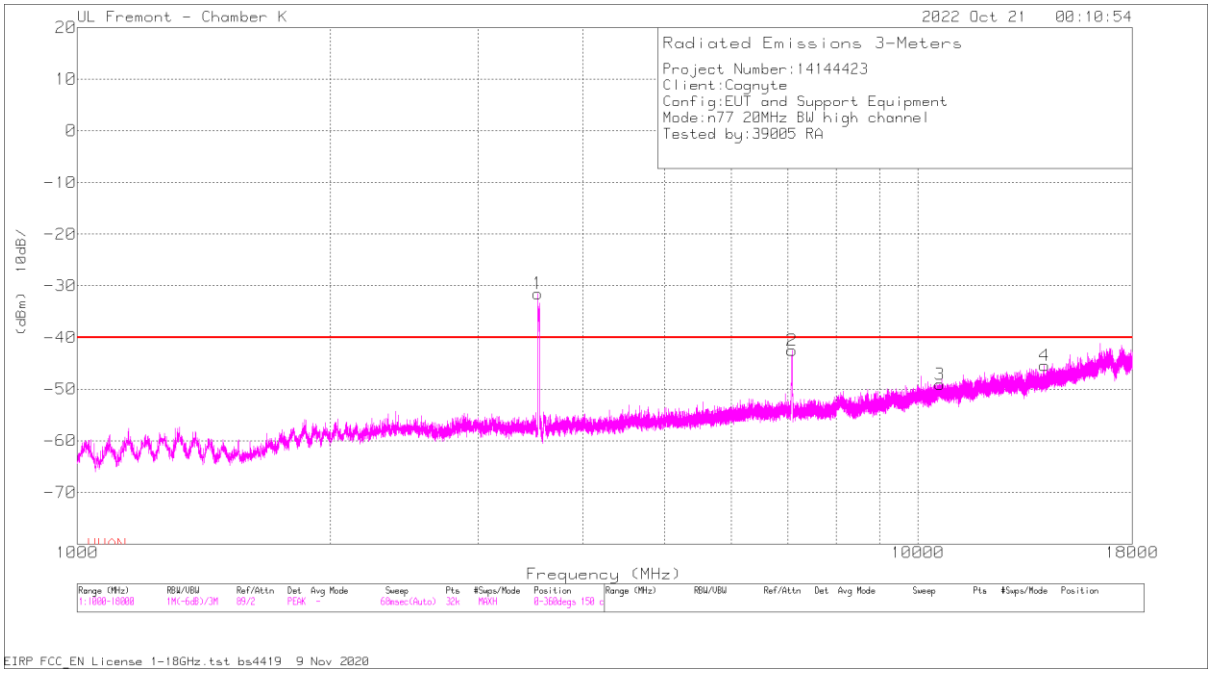
VERTICAL

Trace Markers

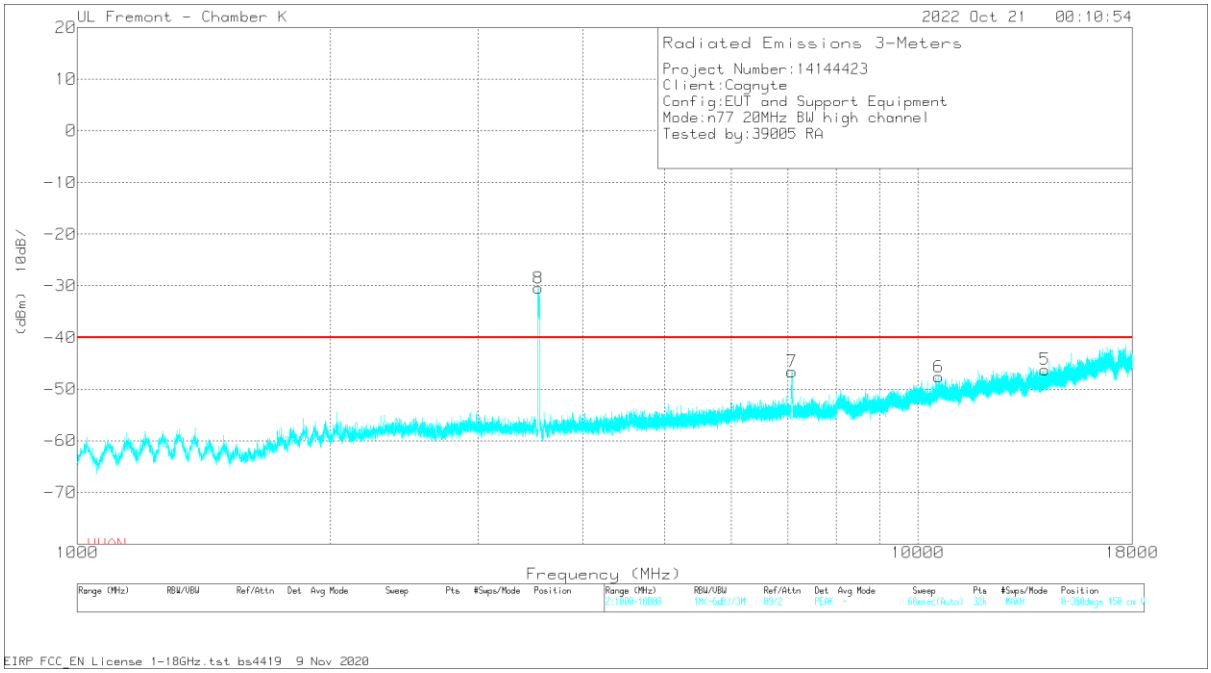
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3501.125	77.29	PK	33	-42.5	-95.2	-27.41	-	-	0-360	150	H
2	6999.766	48	PK	35.8	-38.7	-95.2	-50.1	-40	-10.1	360	150	H
	6999.057	36.59	RMS	35.8	-38.7	-95.2	-61.51	-40	-21.51	360	150	H
3	10549.78	47.53	PK	37.9	-37.3	-95.2	-47.07	-40	-7.07	360	150	H
	10550.243	36.53	RMS	37.9	-37.3	-95.2	-58.07	-40	-18.07	360	150	H
4	13998.681	46.25	PK	38.9	-35.5	-95.2	-45.55	-40	-5.55	360	150	H
	13998.711	40.95	RMS	38.9	-35.5	-95.2	-50.85	-40	-10.85	360	150	H
5	13998.797	48.14	PK	38.9	-35.5	-95.2	-43.66	-40	-3.66	154	254	V
	13998.757	44.66	RMS	38.9	-35.5	-95.2	-47.14	-40	-7.14	154	254	V
6	10541.616	48.23	PK	37.8	-37.2	-95.2	-46.37	-40	-6.37	154	150	V
	10539.061	36.22	RMS	37.8	-37.3	-95.2	-58.48	-40	-18.48	154	150	V
7	6990.519	54.07	PK	35.8	-38.7	-95.2	-44.03	-40	-4.03	220	184	V
	6992.357	40.46	RMS	35.8	-38.7	-95.2	-57.64	-40	-17.64	220	184	V
8	* 3508.031	78.76	PK	33	-42.4	-95.2	-25.84	-	-	0-360	150	V

* Fundamental Frequency
PK - Peak detector
RMS – RMS detector

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3532.469	73.29	PK	32.9	-42.5	-95.2	-31.51	-	-	0-360	150	H
2	7085.469	55.7	PK	35.9	-38.9	-95.2	-42.5	-40	-2.5	360	150	H
	7084.17	47.52	RMS	35.9	-38.8	-95.2	-50.58	-40	-10.58	219	153	H
3	10624.857	47.95	PK	37.9	-37.1	-95.2	-46.45	-40	-6.45	219	150	H
	10626.584	36.63	RMS	37.9	-37.1	-95.2	-57.77	-40	-17.77	219	150	H
4	14152.452	46.07	PK	39	-35.3	-95.2	-45.43	-40	-5.43	360	150	H
	14152.688	34.74	RMS	39	-35.3	-95.2	-56.76	-40	-16.76	219	150	H
5	14160.189	45.18	PK	39	-35.2	-95.2	-46.22	-40	-6.22	360	150	V
	14160.017	43.44	RMS	39	-35.2	-95.2	-47.96	-40	-7.96	222	200	V
6	10597.902	48.22	PK	37.9	-37	-95.2	-46.08	-40	-6.08	222	150	V
	10596.689	36.75	RMS	37.9	-37.2	-95.2	-57.75	-40	-17.75	222	150	V
7	7086.531	51.57	PK	35.9	-38.9	-95.2	-46.63	-40	-6.63	360	150	V
	7084.793	45.1	RMS	35.9	-38.8	-95.2	-53	-40	-13	230	303	V
8	* 3539.375	74.33	PK	32.9	-42.5	-95.2	-30.47	-	-	0-360	150	V

* Fundamental Frequency
PK - Peak detector
RMS – RMS detector

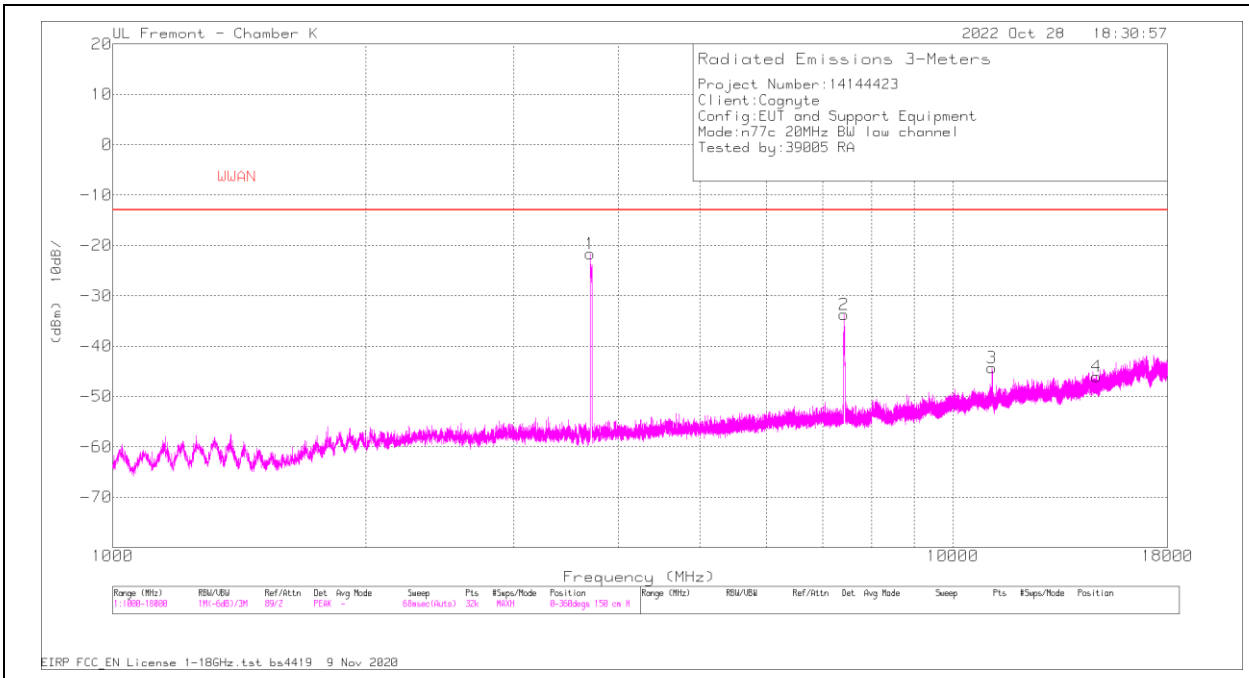
10.1.2. 5G NR n77 (FCC Part 27 3700-3980MHz)

LIMITS

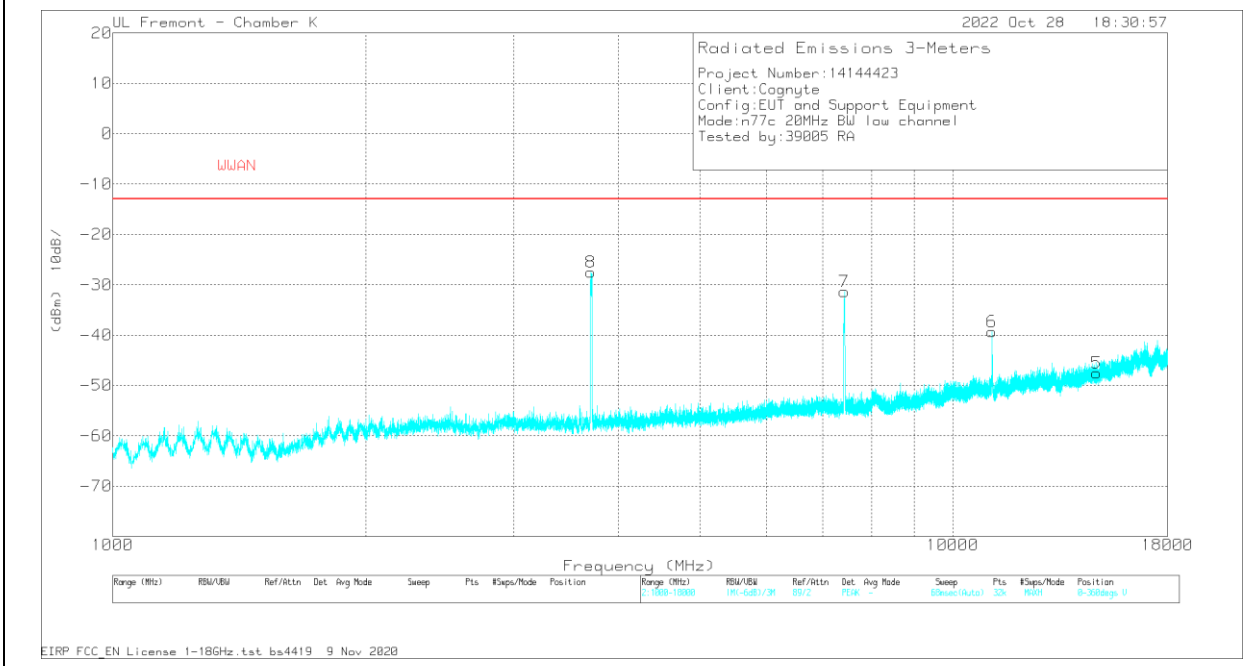
FCC: §27.53
Emission limits
(l) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:
(1) The minimum permissible conducted power of emissions is -13dBm/MHz.

5G NR n77 QPSK (20.0MHZ BANDWIDTH)

LOW CHANNEL RESULTS



HORIZONTAL



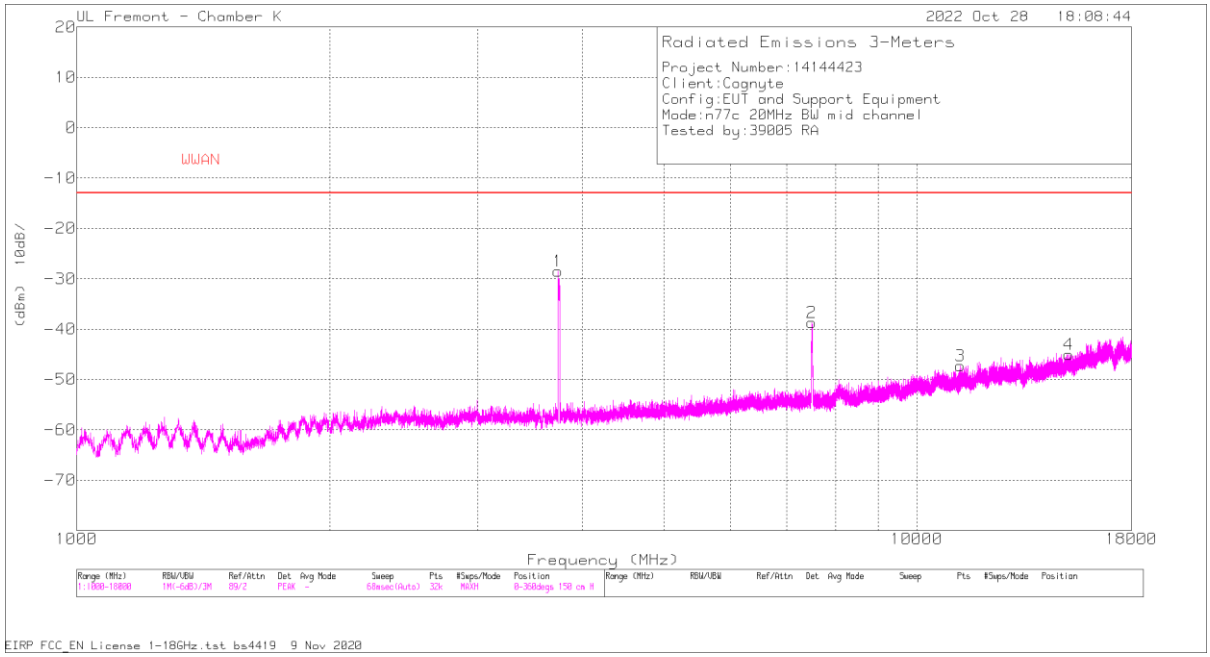
VERTICAL

Trace Markers

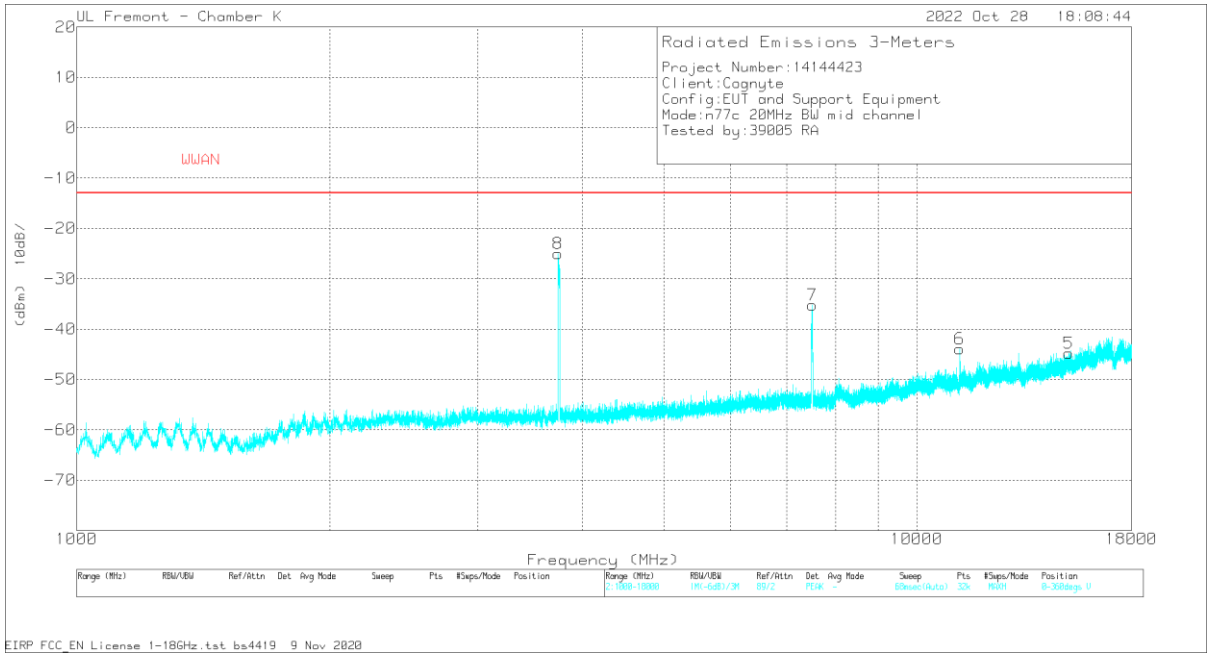
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3703	82.57	Pk	33.3	-42.3	-95.2	-21.63	-13	-8.63	0-360	150	H
2	7424.938	63.72	Pk	35.8	-38	-95.2	-33.68	-13	-20.68	0-360	150	H
3	11119.25	49.85	Pk	37.9	-36.8	-95.2	-44.25	-13	-31.25	0-360	150	H
4	14821	44.36	Pk	39.8	-35	-95.2	-46.04	-13	-33.04	0-360	150	H
5	14824.188	42.87	Pk	39.8	-35	-95.2	-47.53	-13	-34.53	0-360	150	V
6	11133.063	54.63	Pk	38	-36.7	-95.2	-39.27	-13	-26.27	0-360	150	V
7	7426.531	66.03	Pk	35.8	-38	-95.2	-31.37	-13	-18.37	0-360	150	V
8	* 3709.906	76.68	Pk	33.3	-42.3	-95.2	-27.52	-13	-14.52	0-360	150	V

* Fundamental Frequency
Pk - Peak detector

MID CHANNEL RESULTS



HORIZONTAL



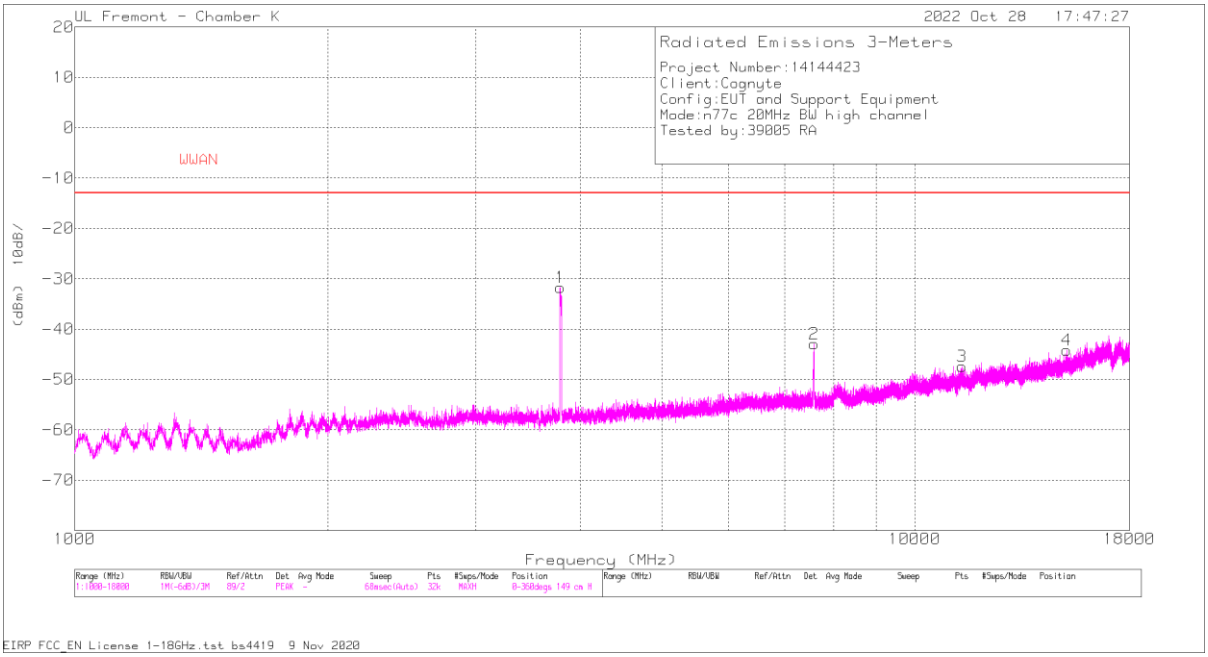
VERTICAL

Trace Markers

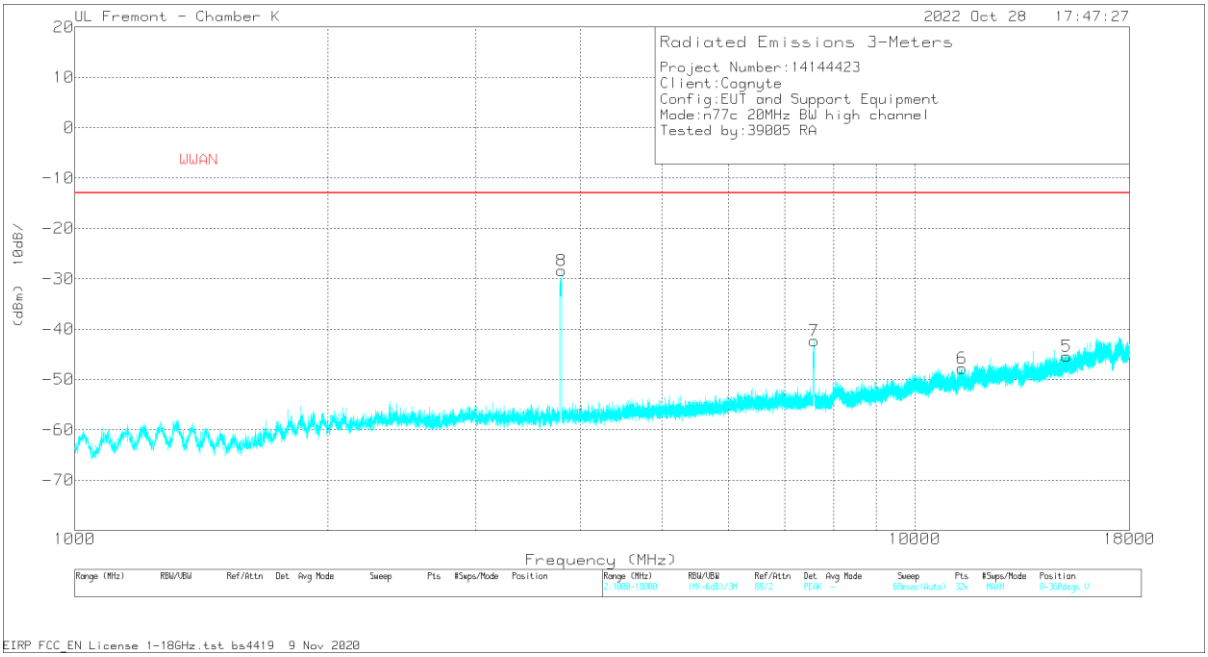
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3741.25	75.46	Pk	33.4	-42.2	-95.2	-28.54	-13	-15.54	0-360	150	H
2	7498.781	58.65	Pk	35.8	-38	-95.2	-38.75	-13	-25.75	0-360	150	H
3	11253.656	46.4	Pk	38.1	-36.6	-95.2	-47.3	-13	-34.3	0-360	150	H
4	15154.625	44.53	Pk	39.9	-34.3	-95.2	-45.07	-13	-32.07	0-360	150	H
5	15157.813	44.75	Pk	39.9	-34.3	-95.2	-44.85	-13	-31.85	0-360	150	V
6	11243.031	49.81	Pk	38	-36.5	-95.2	-43.89	-13	-30.89	0-360	150	V
7	7505.422	62.34	Pk	35.8	-38.1	-95.2	-35.16	-13	-22.16	0-360	150	V
8	* 3742.313	79.02	Pk	33.4	-42.2	-95.2	-24.98	-13	-11.98	0-360	150	V

* Fundamental Frequency
Pk - Peak detector

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3782.156	72.19	Pk	33.5	-42.2	-95.2	-31.71	-13	-18.71	0-360	149	H
2	7584.313	54.87	Pk	35.7	-38.3	-95.2	-42.93	-13	-29.93	0-360	149	H
3	11371.594	45.98	Pk	38.1	-36.3	-95.2	-47.42	-13	-34.42	0-360	149	H
4	15156.219	45.5	Pk	39.9	-34.4	-95.2	-44.2	-13	-31.2	0-360	149	H
5	15153.031	44.23	Pk	39.9	-34.4	-95.2	-45.47	-13	-32.47	0-360	150	V
6	11381.688	45.73	Pk	38.1	-36.4	-95.2	-47.77	-13	-34.77	0-360	150	V
7	7583.25	55.46	Pk	35.7	-38.3	-95.2	-42.34	-13	-29.34	0-360	150	V
8	* 3795.438	75.36	Pk	33.5	-42	-95.2	-28.34	-13	-15.34	0-360	150	V

* Fundamental Frequency
Pk - Peak detector

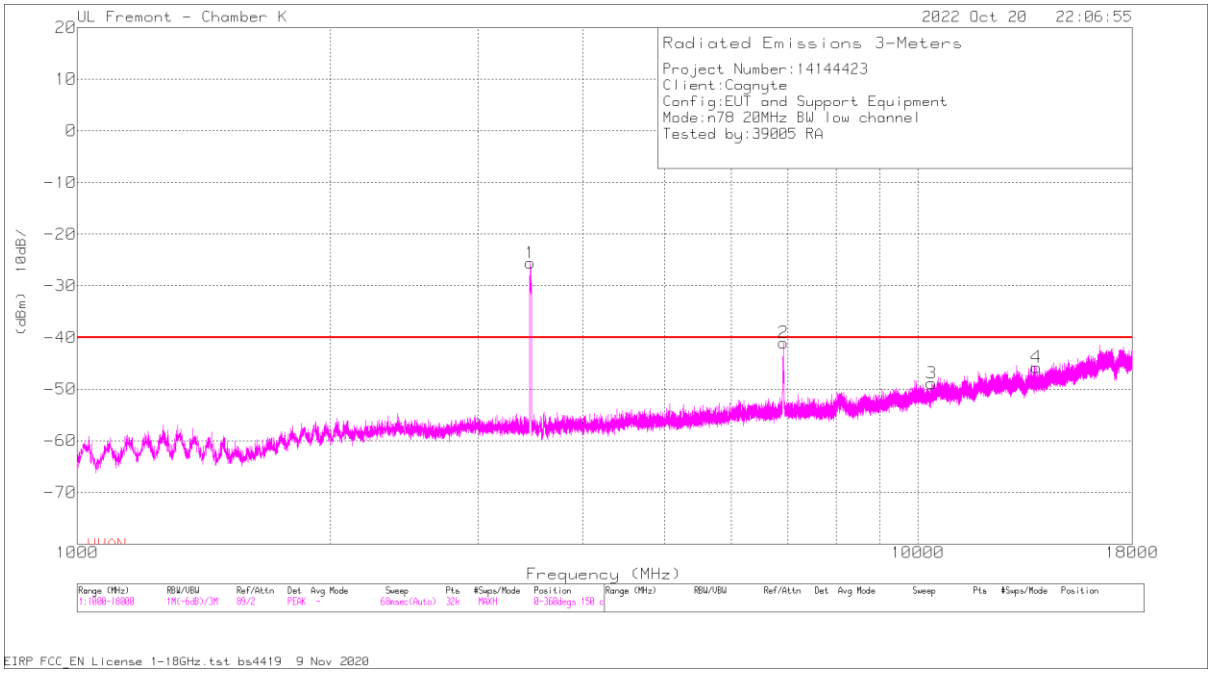
10.1.3. 5G NR n78 (FCC Part 27 3450-3550MHz)

LIMITS

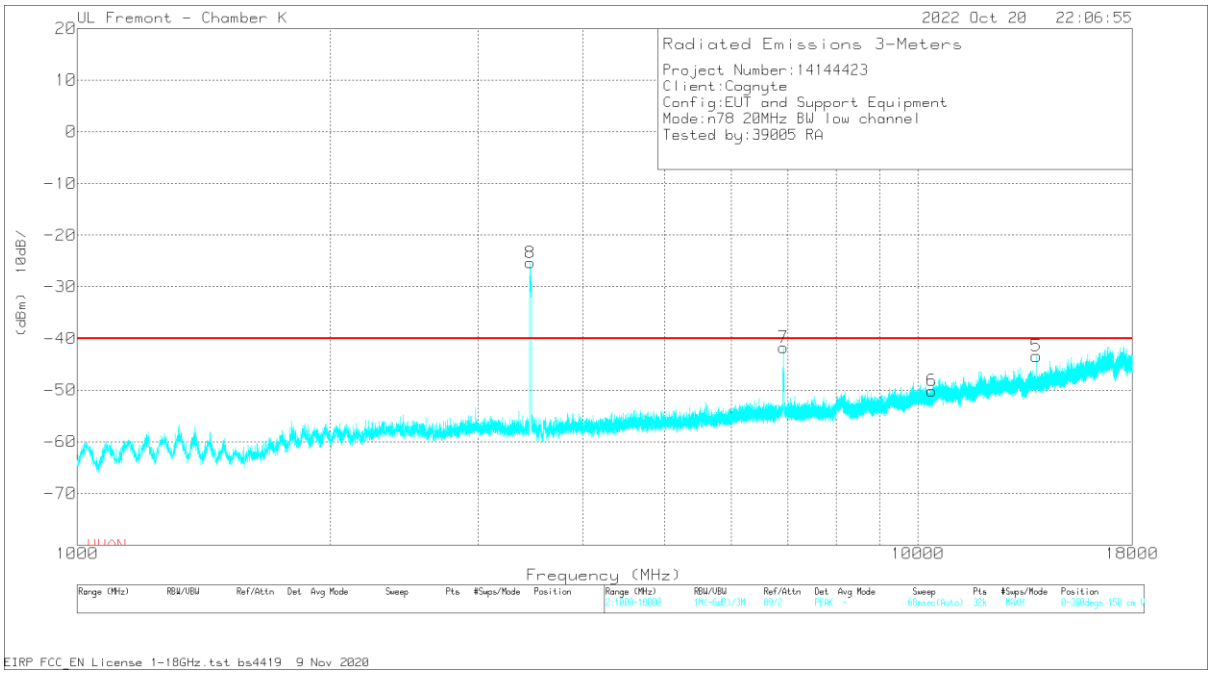
FCC: §27.53
Emission limits
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) The minimum permissible conducted power of emissions is -40dBm/MHz.

5G NR n78 QPSK (20.0MHZ BANDWIDTH)

LOW CHANNEL RESULTS



HORIZONTAL



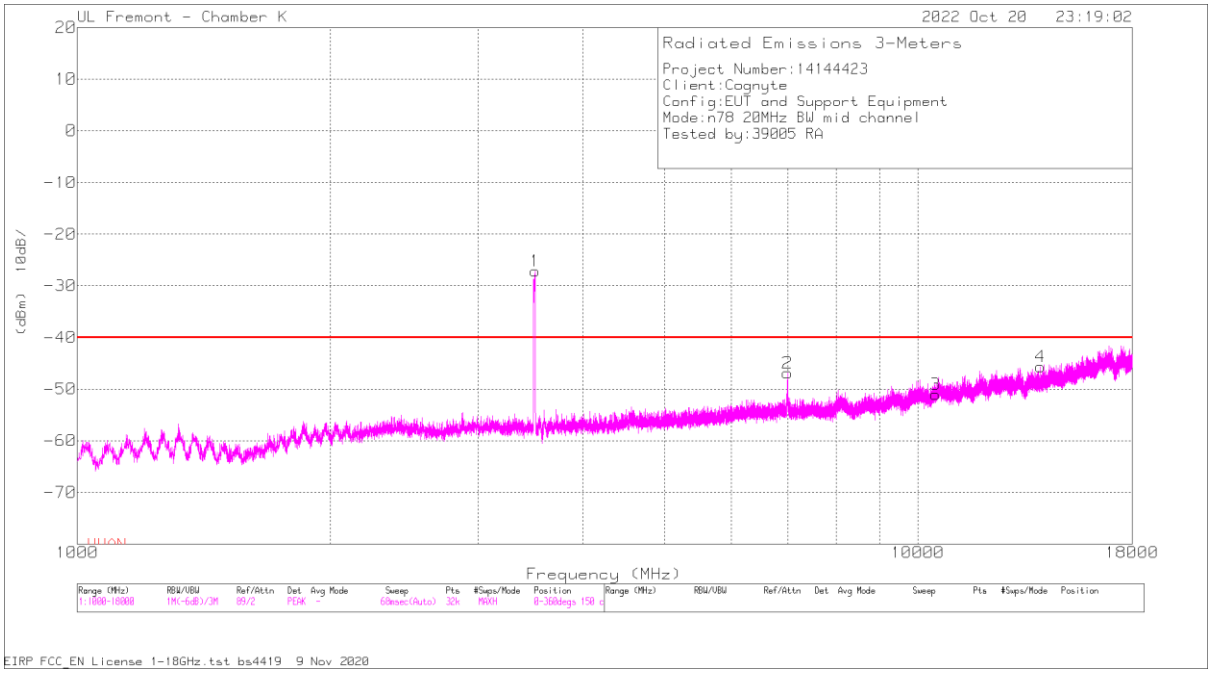
VERTICAL

Trace Markers

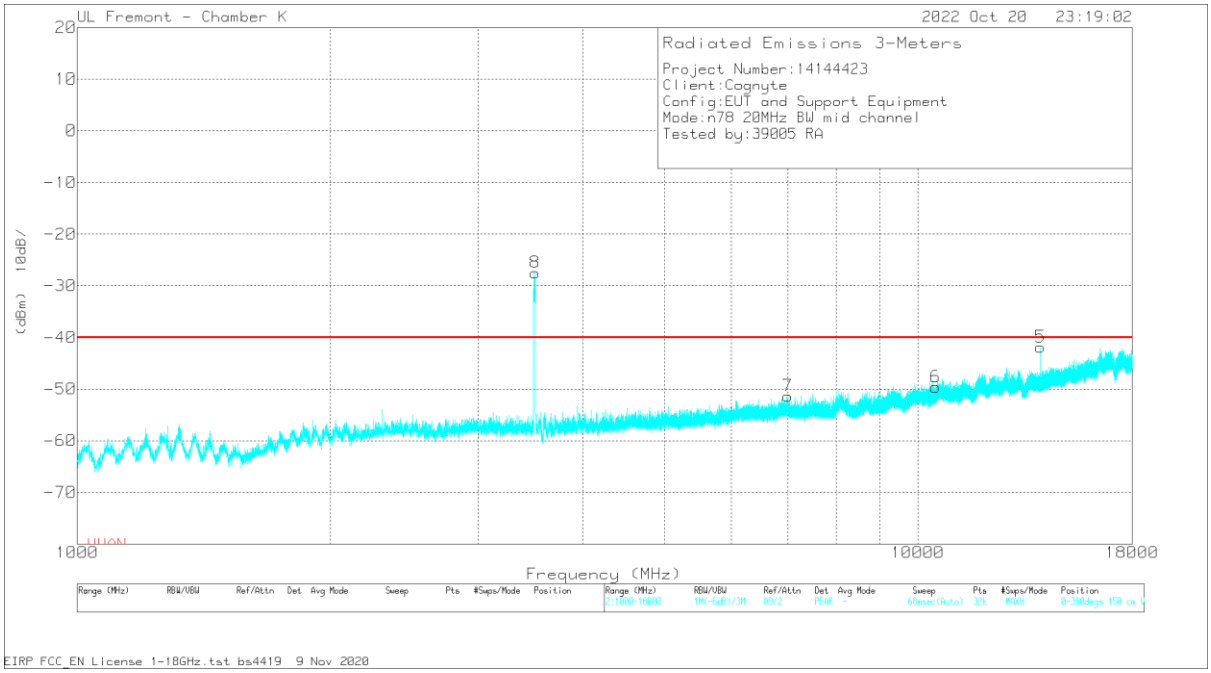
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3460.219	79.32	PK	32.9	-42.6	-95.2	-25.58	-	-	0-360	150	H
2	6919.288	56.77	PK	35.7	-38.3	-95.2	-41.03	-40	-1.03	235	170	H
	6919.016	47.99	RMS	35.7	-38.3	-95.2	-49.81	-40	-9.81	235	170	H
3	10387.007	46.83	PK	37.6	-37.2	-95.2	-47.97	-40	-7.97	235	150	H
	10387.564	35.55	RMS	37.6	-37.2	-95.2	-59.25	-40	-19.25	235	150	H
4	13843.096	47.04	PK	38.8	-35.4	-95.2	-44.76	-40	-4.76	235	150	H
	13843.033	35.95	RMS	38.8	-35.4	-95.2	-55.85	-40	-15.85	235	150	H
5	13843.07	46.46	PK	38.8	-35.4	-95.2	-45.34	-40	-5.34	235	150	V
	13843.365	35.43	RMS	38.8	-35.4	-95.2	-56.37	-40	-16.37	235	150	V
6	10387.203	47.99	PK	37.6	-37.2	-95.2	-46.81	-40	-6.81	235	150	V
	10389.127	35.72	RMS	37.6	-37.2	-95.2	-59.08	-40	-19.08	235	150	V
7	6926.817	56.05	PK	35.7	-38.3	-95.2	-41.75	-40	-1.75	250	338	V
	6926.889	46.15	RMS	35.7	-38.3	-95.2	-51.65	-40	-11.65	250	338	V
8	* 3457.563	79.57	PK	32.9	-42.6	-95.2	-25.33	-	-	0-360	150	V

* Fundamental Frequency
PK - Peak detector
RMS – RMS detector

MID CHANNEL RESULTS



HORIZONTAL



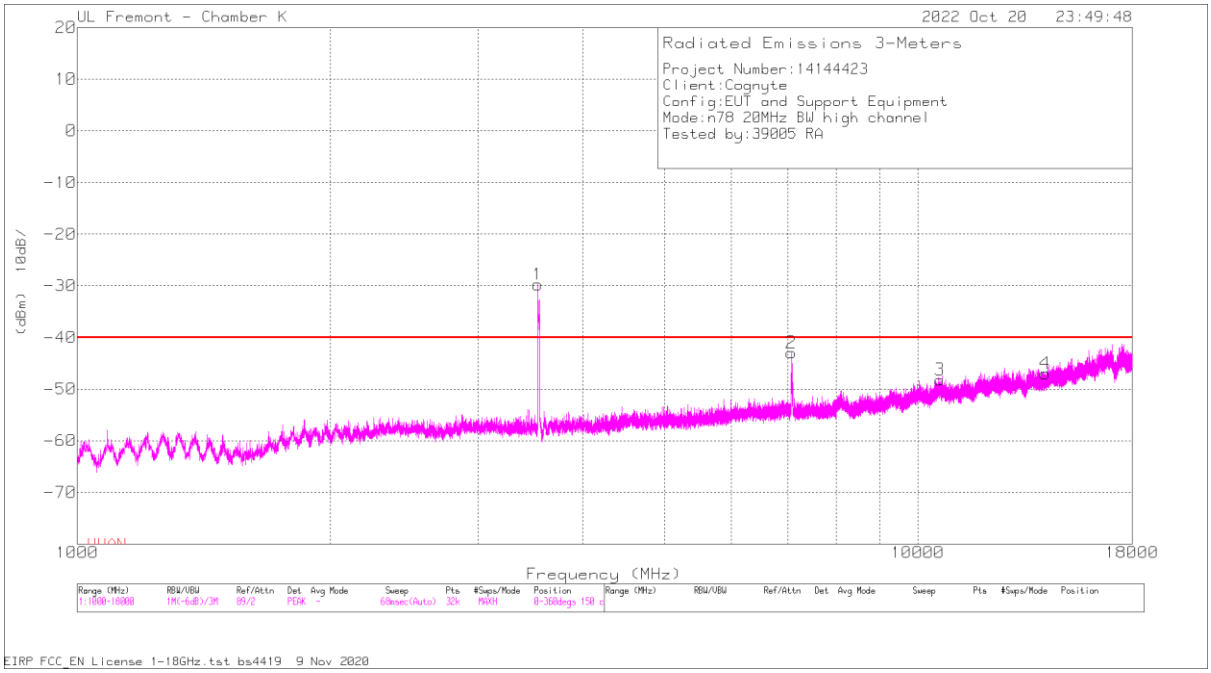
VERTICAL

Trace Markers

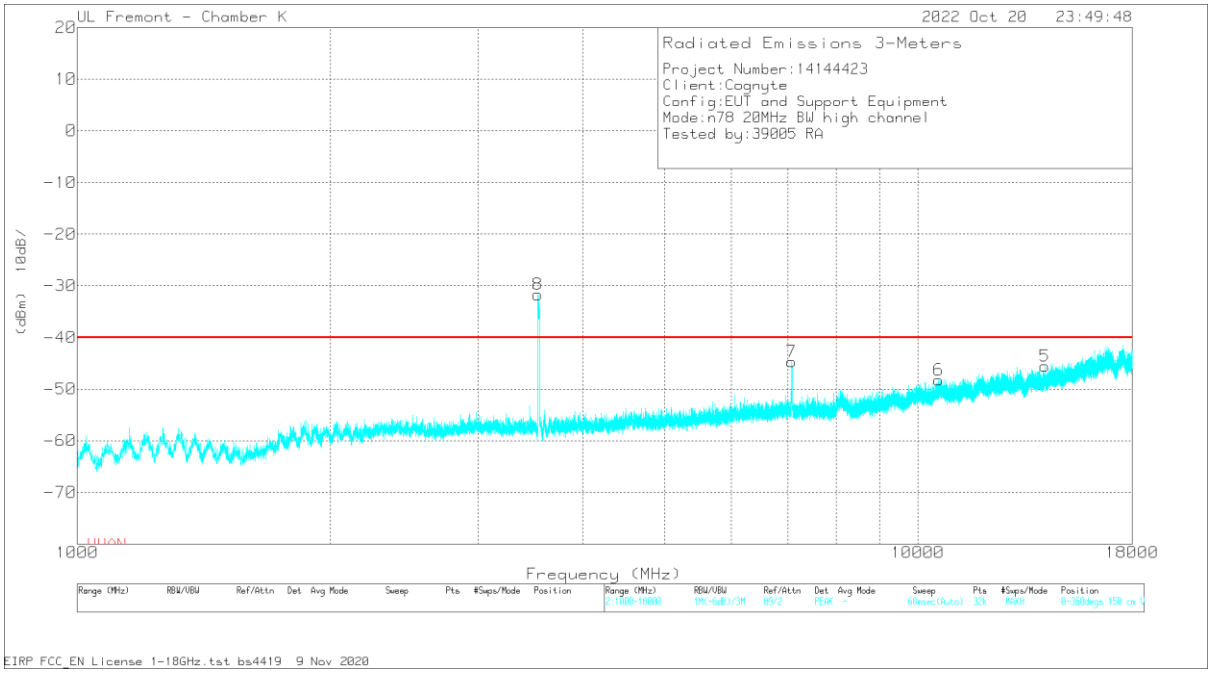
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3506.438	77.45	PK	33	-42.4	-95.2	-27.15	-	-	0-360	150	H
2	7000.009	54.62	PK	35.8	-38.6	-95.2	-43.38	-40	-3.38	189	171	H
	6998.726	42.83	RMS	35.8	-38.7	-95.2	-55.27	-40	-15.27	189	171	H
3	10496.551	47.44	PK	37.8	-37.2	-95.2	-47.16	-40	-7.16	189	150	H
	10496.914	36.05	RMS	37.8	-37.2	-95.2	-58.55	-40	-18.55	189	150	H
4	13998.317	46.99	PK	38.9	-35.5	-95.2	-44.81	-40	-4.81	189	150	H
	13998.601	35.94	RMS	38.9	-35.5	-95.2	-55.86	-40	-15.86	189	150	H
5	13998.637	49.94	PK	38.9	-35.5	-95.2	-41.86	-40	-1.86	224	193	V
	13998.677	46.06	RMS	38.9	-35.5	-95.2	-45.74	-40	-5.74	224	193	V
6	10502.096	47.95	PK	37.8	-37.2	-95.2	-46.65	-40	-6.65	224	150	V
	10504.682	36.19	RMS	37.8	-37.2	-95.2	-58.41	-40	-18.41	224	150	V
7	7007.07	47.68	PK	35.8	-38.7	-95.2	-50.42	-40	-10.42	360	150	V
	7002.354	36.12	RMS	35.8	-38.7	-95.2	-61.98	-40	-21.98	360	150	V
8	* 3504.844	77.34	PK	33	-42.6	-95.2	-27.46	-	-	0-360	150	V

* Fundamental Frequency
PK - Peak detector
RMS – RMS detector

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3530.875	74.95	PK	32.9	-42.4	-95.2	-29.75	-	-	0-360	150	H
2	7074.125	55.14	PK	35.9	-38.8	-95.2	-42.96	-40	-2.96	220	138	H
	7076.207	45.75	RMS	35.9	-38.8	-95.2	-52.35	-40	-12.35	220	138	H
3	10633.448	47.92	PK	37.9	-37.2	-95.2	-46.58	-40	-6.58	220	147	H
	10631.813	36.64	RMS	37.9	-37.1	-95.2	-57.76	-40	-17.76	220	147	H
4	14178.881	44.74	PK	39	-35.5	-95.2	-46.96	-40	-6.96	220	150	H
	14179.091	35.01	RMS	39	-35.5	-95.2	-56.69	-40	-16.69	220	150	H
5	14160.021	45.84	PK	39	-35.2	-95.2	-45.56	-40	-5.56	223	164	V
	14160.061	41.24	RMS	39	-35.2	-95.2	-50.16	-40	-10.16	223	164	V
6	10592.051	48.12	PK	37.9	-37.2	-95.2	-46.38	-40	-6.38	223	153	V
	10590.491	36.84	RMS	37.9	-37.2	-95.2	-57.66	-40	-17.66	223	153	V
7	7078.803	53.49	PK	35.9	-38.9	-95.2	-44.71	-40	-4.71	229	303	V
	7078.707	44.84	RMS	35.9	-38.8	-95.2	-53.26	-40	-13.26	229	303	V
8	* 3531.938	73.09	PK	32.9	-42.5	-95.2	-31.71	-	-	0-360	150	V

* Fundamental Frequency
PK - Peak detector
RMS – RMS detector

10.2. FIELD STRENGTH OF SPURIOUS RADIATION, BELOW 1GHz

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

All tests below 1GHz were done with a Resolution Bandwidth of 100kHz, and a Video Bandwidth of 300kHz.

RESULTS

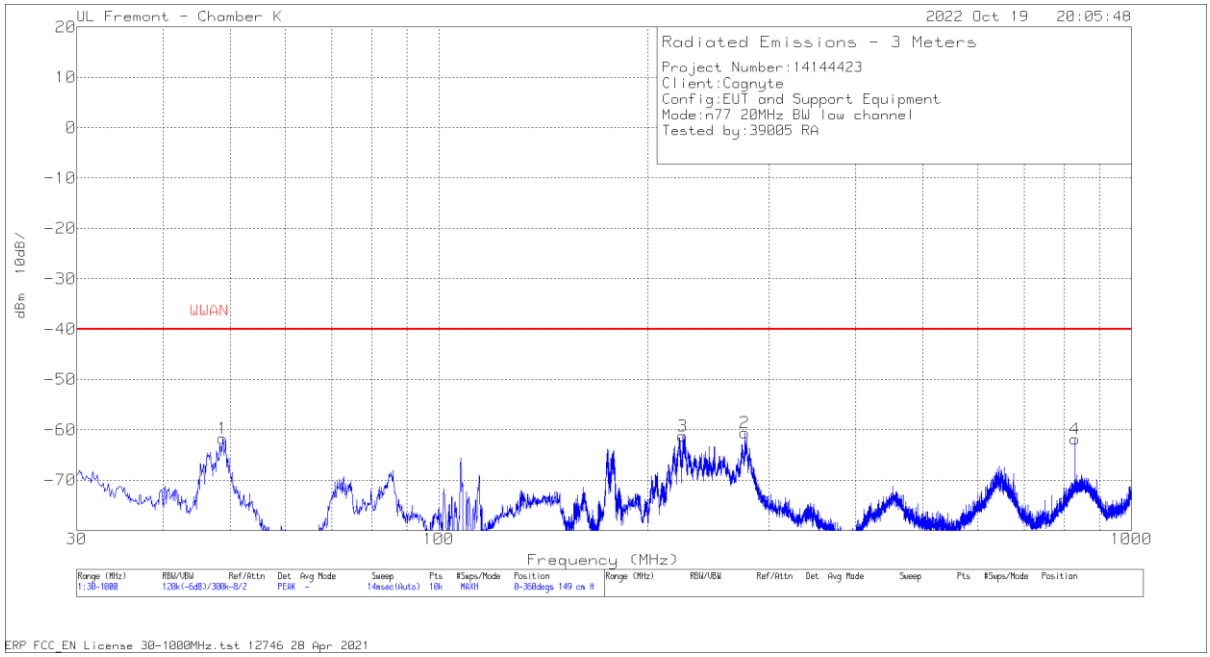
10.2.1. 5G NR n77 (FCC Part 27 3450-3550MHz)

LIMITS

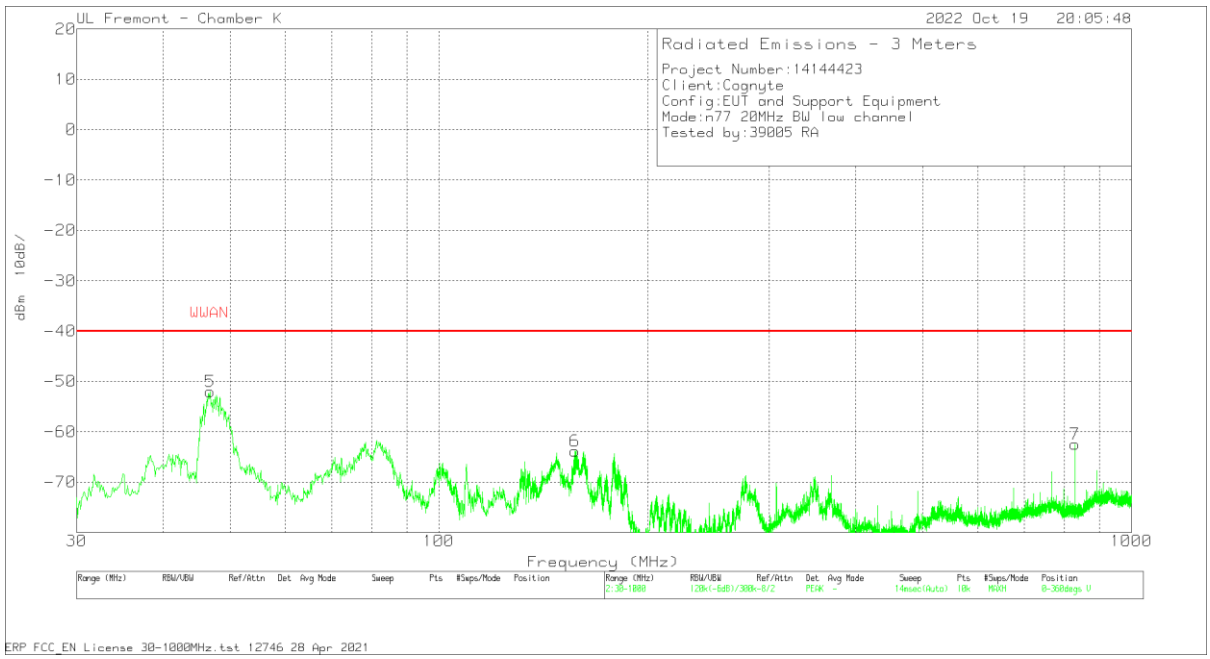
FCC: §27.53
Emission limits
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) The minimum permissible conducted power of emissions is -40dBm/MHz.

5G NR n77 QPSK (20.0MHZ BANDWIDTH)

LOW CHANNEL RESULTS



HORIZONTAL



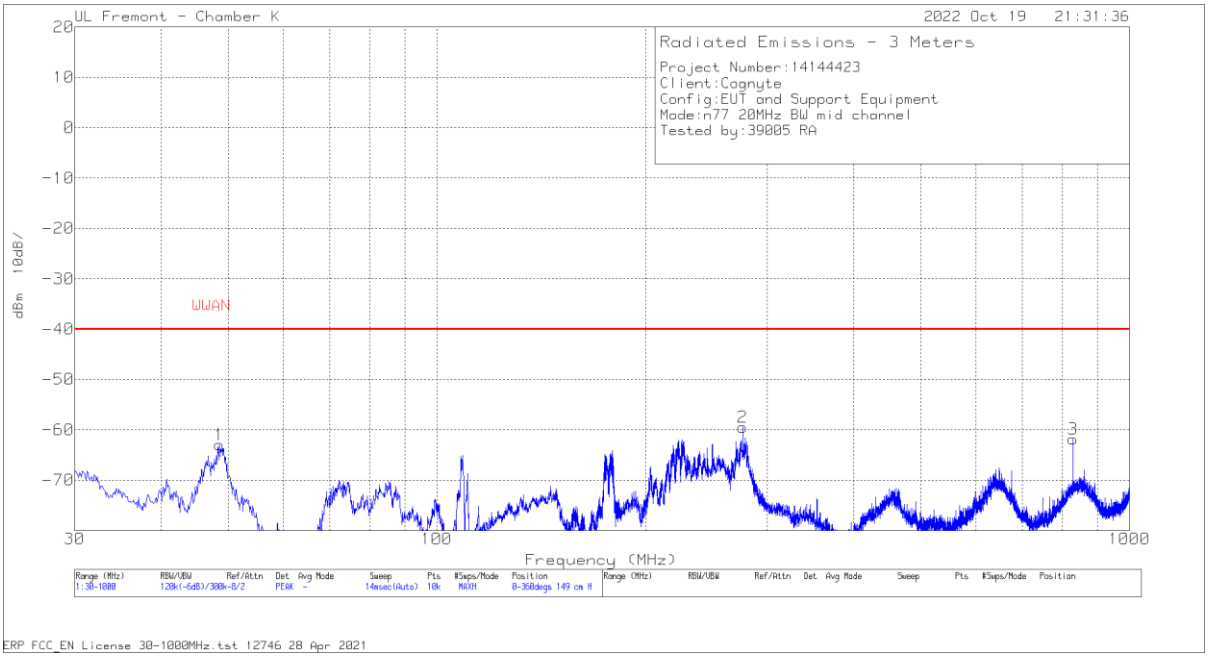
VERTICAL

Trace Markers

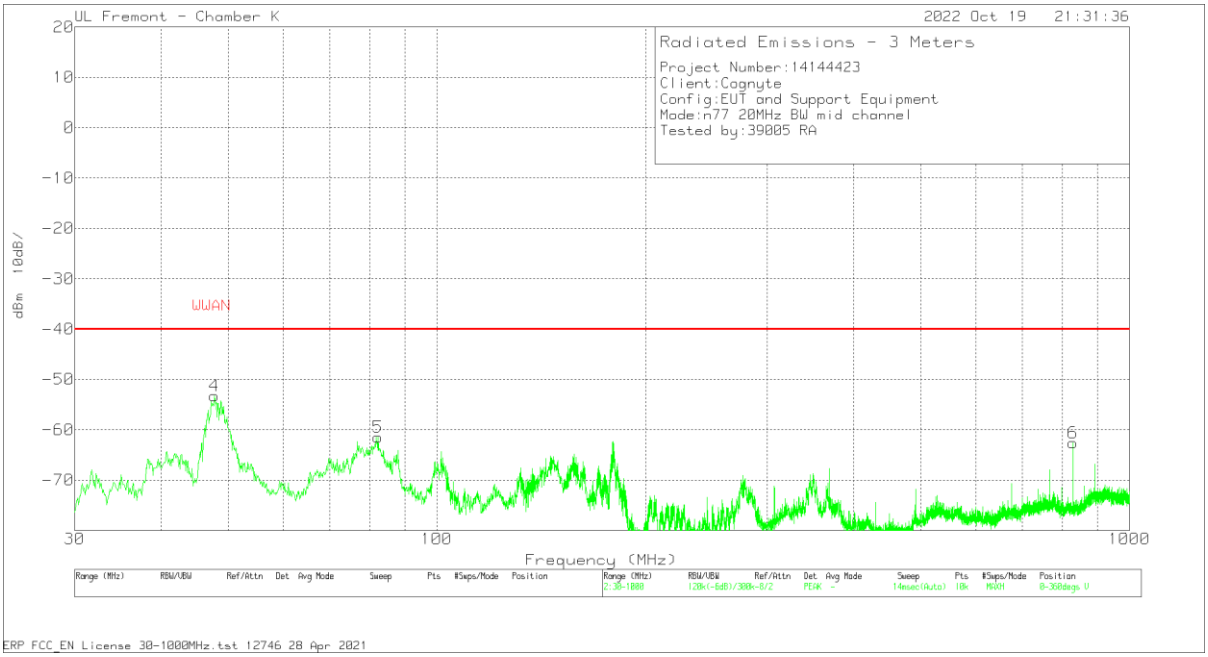
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	48.721	-58.47	Pk	15.1	-31.3	12.9	-61.77	-40	-21.77	0-360	149	H
2	* 276.477	-61.35	Pk	19.8	-29.8	10.8	-60.55	-40	-20.55	0-360	149	H
3	224.97	-59.84	Pk	17.5	-30.2	11.3	-61.24	-40	-21.24	0-360	149	H
4	829.474	-72.29	Pk	28.1	-27.8	10.1	-61.89	-40	-21.89	0-360	149	H
5	46.781	-43.94	Pk	16	-31.3	7.2	-52.04	-40	-12.04	0-360	149	V
6	157.07	-65	Pk	18.8	-30.5	12.9	-63.8	-40	-23.8	0-360	149	V
7	829.474	-68.78	Pk	28.1	-27.8	6	-62.48	-40	-22.48	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

MID CHANNEL RESULTS



HORIZONTAL



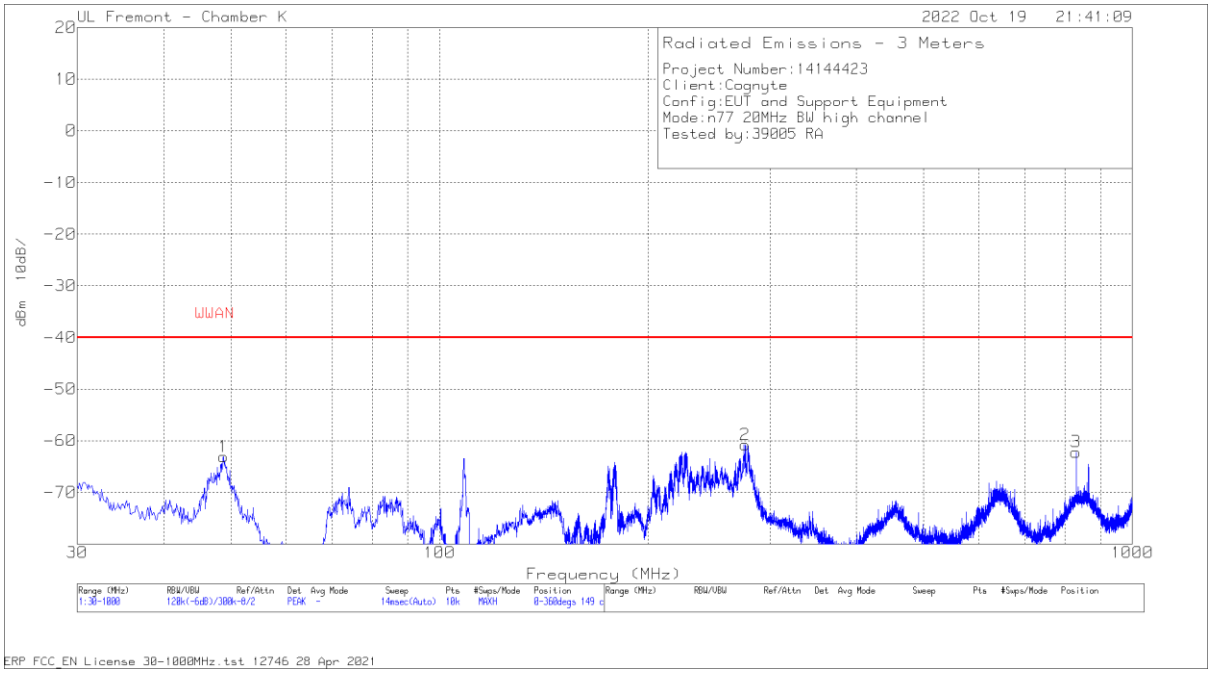
VERTICAL

Trace Markers

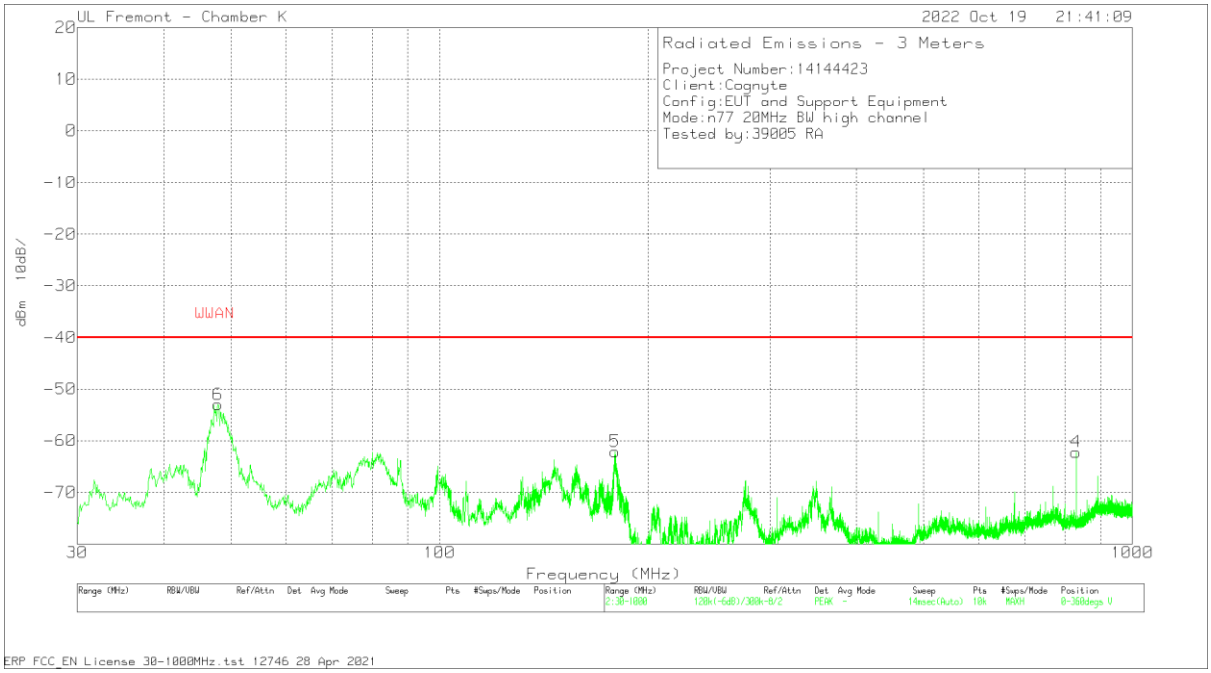
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	48.527	-59.72	Pk	15.1	-31.3	13	-62.92	-40	-22.92	0-360	149	H
2	* 276.477	-60.28	Pk	19.8	-29.8	10.8	-59.48	-40	-19.48	0-360	149	H
3	829.474	-72.28	Pk	28.1	-27.8	10.1	-61.88	-40	-21.88	0-360	149	H
4	47.751	-44.89	Pk	15.4	-31.3	7.6	-53.19	-40	-13.19	0-360	149	V
5	82.186	-56.27	Pk	13.8	-31	12	-61.47	-40	-21.47	0-360	149	V
6	829.474	-68.93	Pk	28.1	-27.8	6	-62.63	-40	-22.63	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	48.818	-59.79	Pk	15.1	-31.3	12.9	-63.09	-40	-23.09	0-360	149	H
2	* 276.38	-61.59	Pk	19.8	-29.8	10.8	-60.79	-40	-20.79	0-360	149	H
3	829.474	-72.57	Pk	28.1	-27.8	10.1	-62.17	-40	-22.17	0-360	149	H
4	829.474	-68.48	Pk	28.1	-27.8	6	-62.18	-40	-22.18	0-360	149	V
5	179.186	-58.89	Pk	17.6	-30.3	9.5	-62.09	-40	-22.09	0-360	149	V
6	47.848	-44.78	Pk	15.4	-31.3	7.7	-52.98	-40	-12.98	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

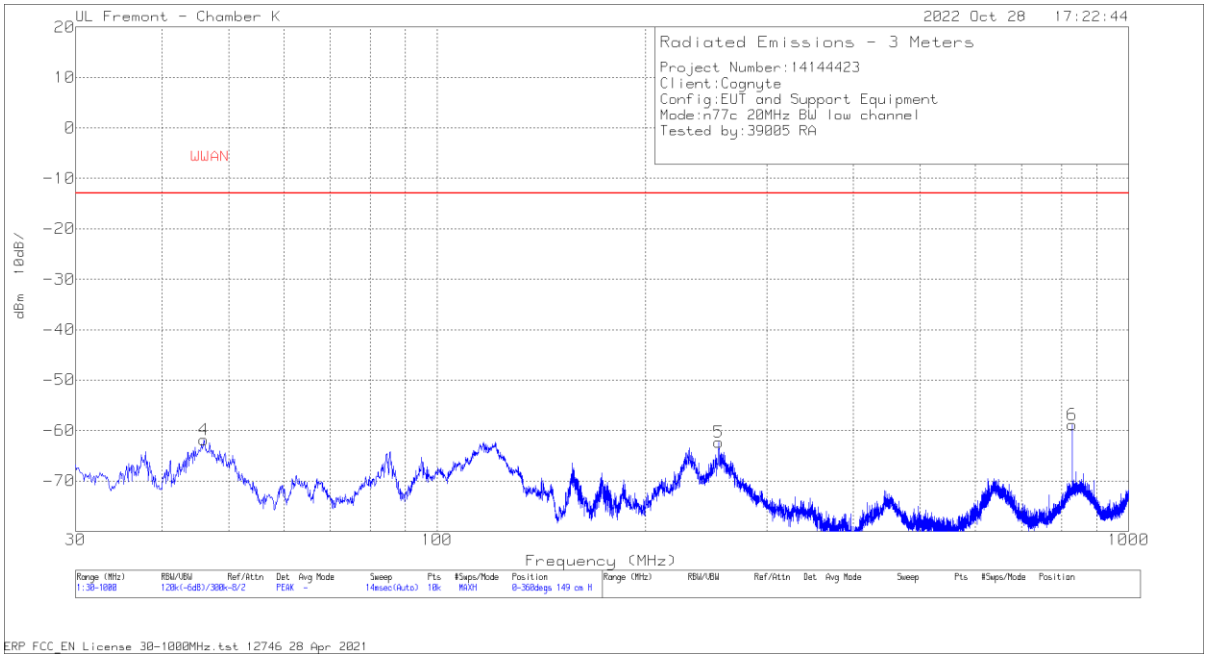
10.2.2. 5G NR n77 (FCC Part 27 3700-3980MHz)

LIMITS

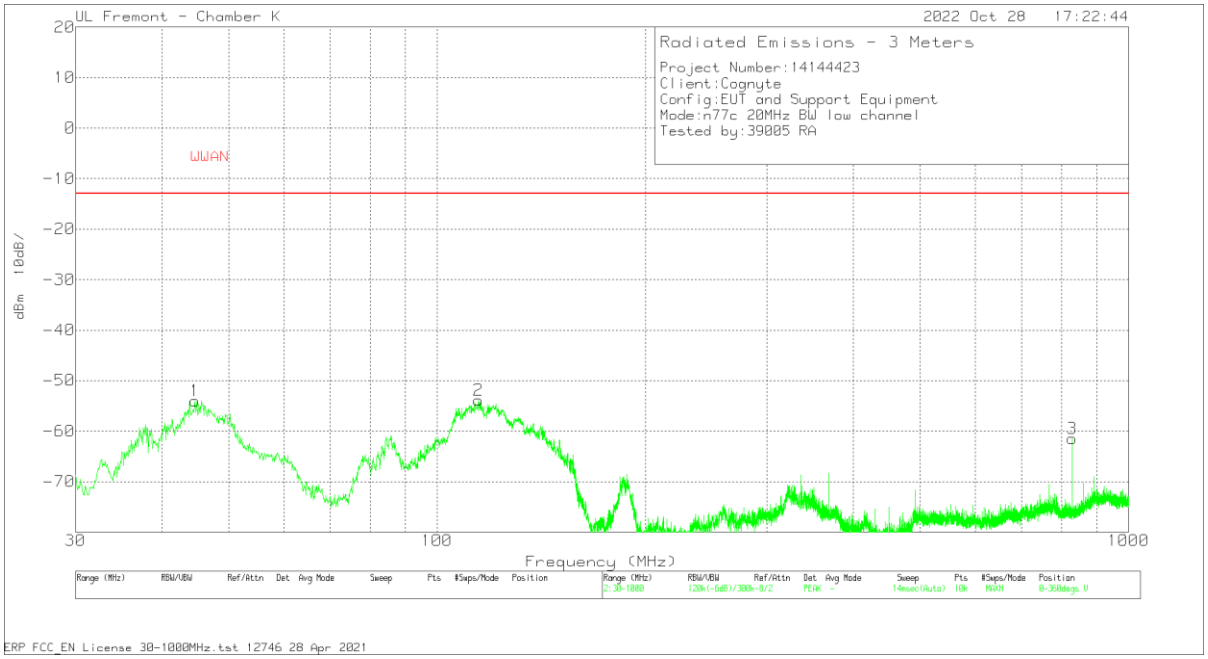
FCC: §27.53
Emission limits
(l) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:
(1) The minimum permissible conducted power of emissions is -13dBm/MHz.

5G NR n77 QPSK (20.0MHZ BANDWIDTH)

LOW CHANNEL RESULTS



HORIZONTAL



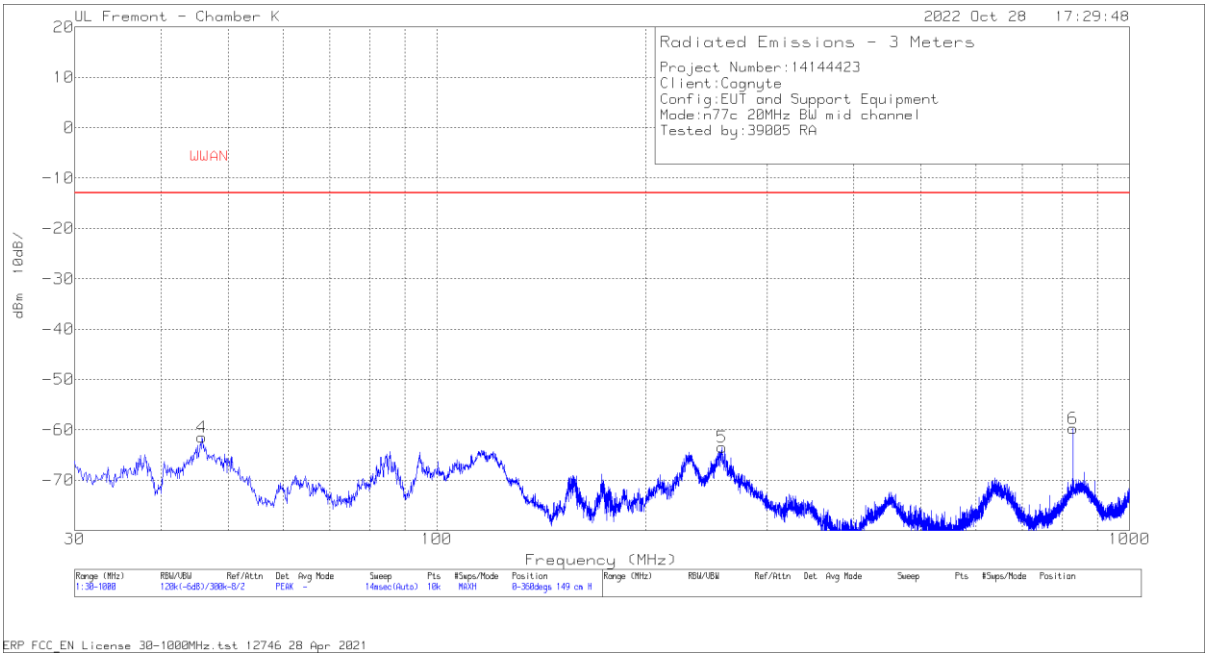
VERTICAL

Trace Markers

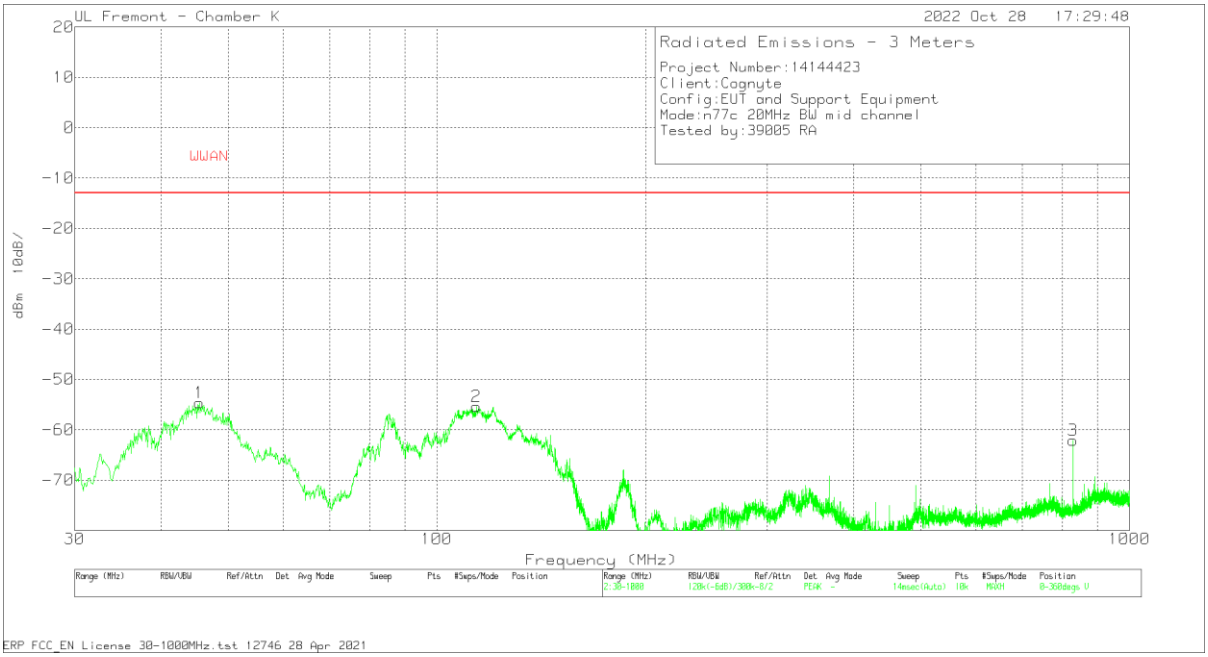
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	46.005	-59.72	Pk	16.3	-31.3	12.9	-61.82	-13	-48.82	0-360	149	H
5	* 255.428	-66.17	Pk	18.3	-29.9	15.4	-62.37	-13	-49.37	0-360	149	H
6	829.474	-69.29	Pk	28.1	-27.8	10.1	-58.89	-13	-45.89	0-360	149	H
1	44.647	-46.54	Pk	17.1	-31.4	6.8	-54.04	-13	-41.04	0-360	149	V
2	* 114.875	-55.12	Pk	19.6	-30.8	12.4	-53.92	-13	-40.92	0-360	149	V
3	829.474	-67.81	Pk	28.1	-27.8	6	-61.51	-13	-48.51	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

MID CHANNEL RESULTS



HORIZONTAL



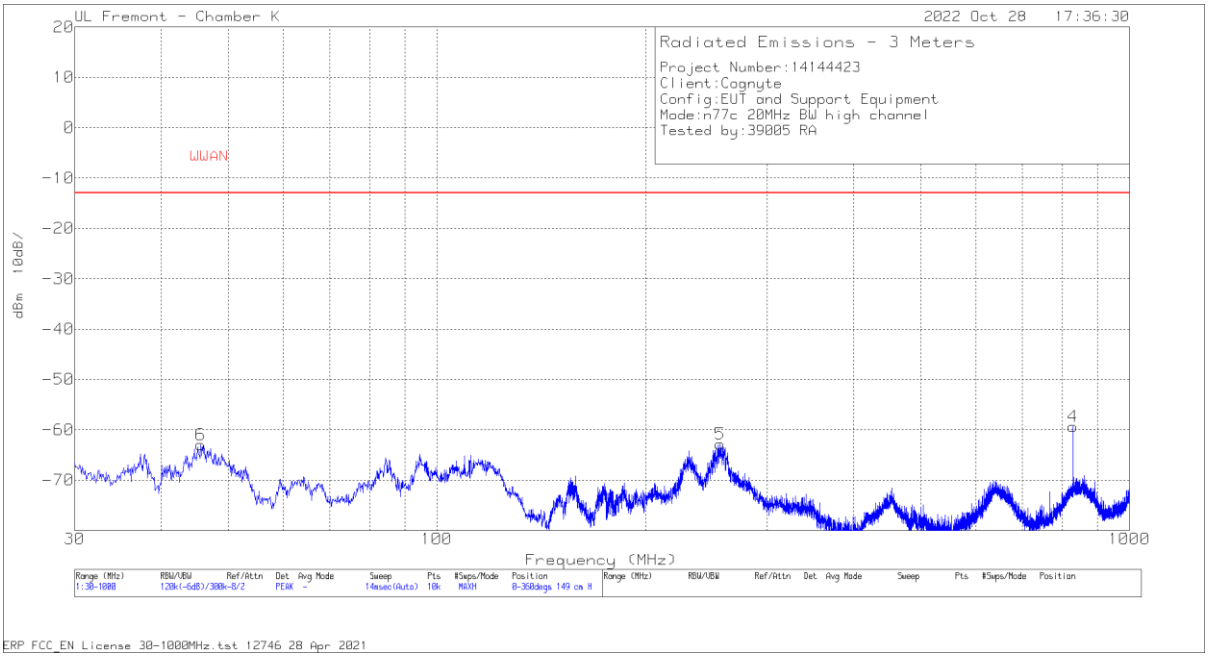
VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	45.811	-59.47	Pk	16.4	-31.3	12.9	-61.47	-13	-48.47	0-360	149	H
5	* 258.047	-67.41	Pk	18.5	-30	15.4	-63.51	-13	-50.51	0-360	149	H
6	829.474	-70.12	Pk	28.1	-27.8	10.1	-59.72	-13	-46.72	0-360	149	H
1	45.423	-46.6	Pk	16.7	-31.3	6.6	-54.6	-13	-41.6	0-360	149	V
2	* 114.099	-56.55	Pk	19.5	-30.7	12.4	-55.35	-13	-42.35	0-360	149	V
3	829.474	-68.35	Pk	28.1	-27.8	6	-62.05	-13	-49.05	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

HIGH CHANNEL RESULTS



HORIZONTAL

VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	829.474	-69.74	Pk	28.1	-27.8	10.1	-59.34	-13	-46.34	0-360	149	H
5	* 256.592	-66.87	Pk	18.4	-29.9	15.5	-62.87	-13	-49.87	0-360	149	H
6	45.617	-61	Pk	16.5	-31.3	12.9	-62.9	-13	-49.9	0-360	149	H
1	45.908	-46.18	Pk	16.4	-31.3	6.6	-54.48	-13	-41.48	0-360	149	V
2	85.29	-50.23	Pk	13.7	-31	11.6	-55.93	-13	-42.93	0-360	149	V
3	829.474	-67.99	Pk	28.1	-27.8	6	-61.69	-13	-48.69	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

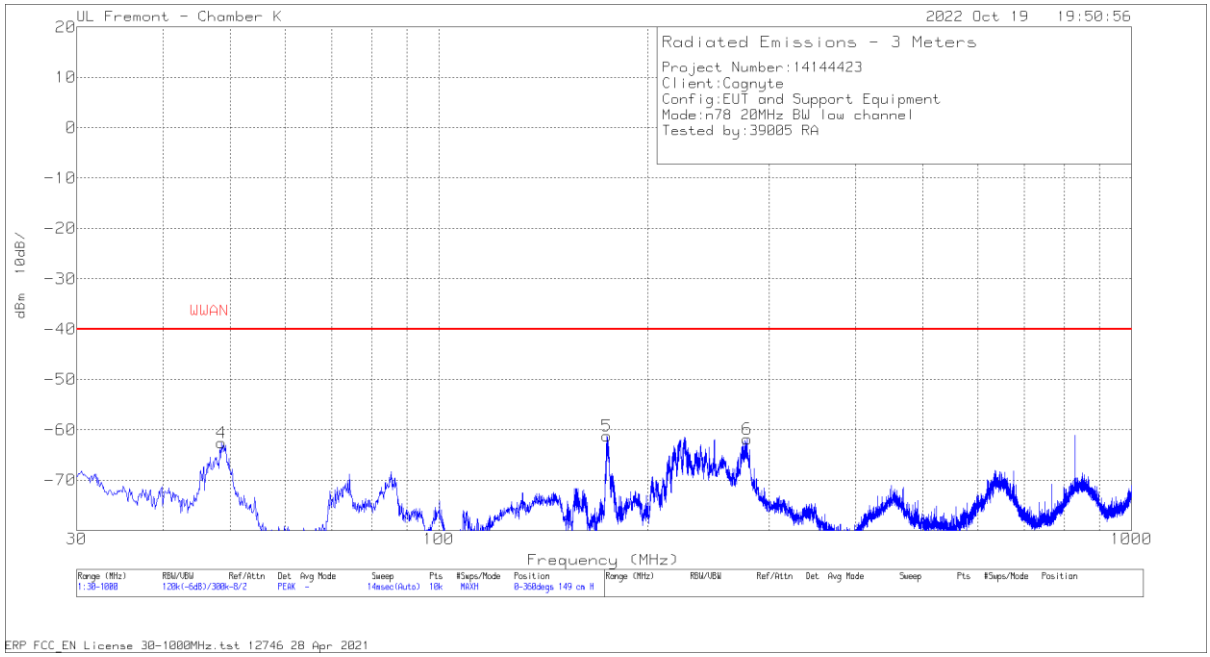
10.2.3. 5G NR n78 (FCC Part 27 3450-3550MHz)

LIMITS

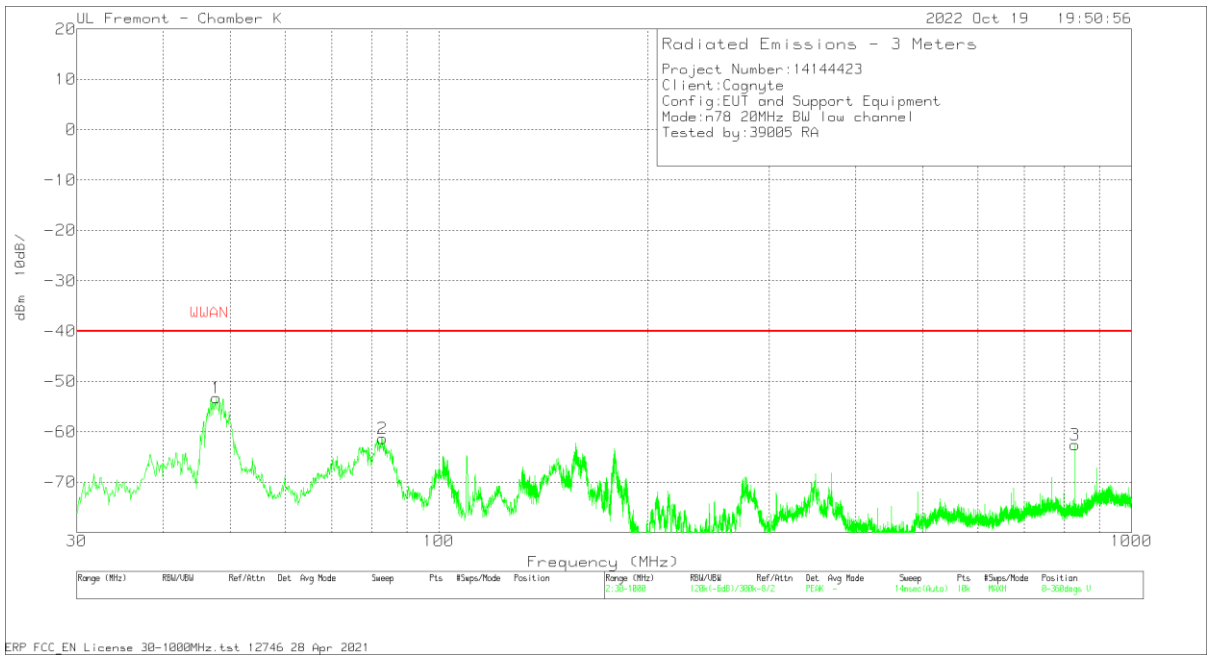
FCC: §27.53
Emission limits
(n) 3.45 GHz Service. The following emission limits apply to stations transmitting in the 3450-3550 MHz band:
(1) The minimum permissible conducted power of emissions is -40dBm/MHz.

5G NR n78 QPSK (20.0MHZ BANDWIDTH)

LOW CHANNEL RESULTS



HORIZONTAL



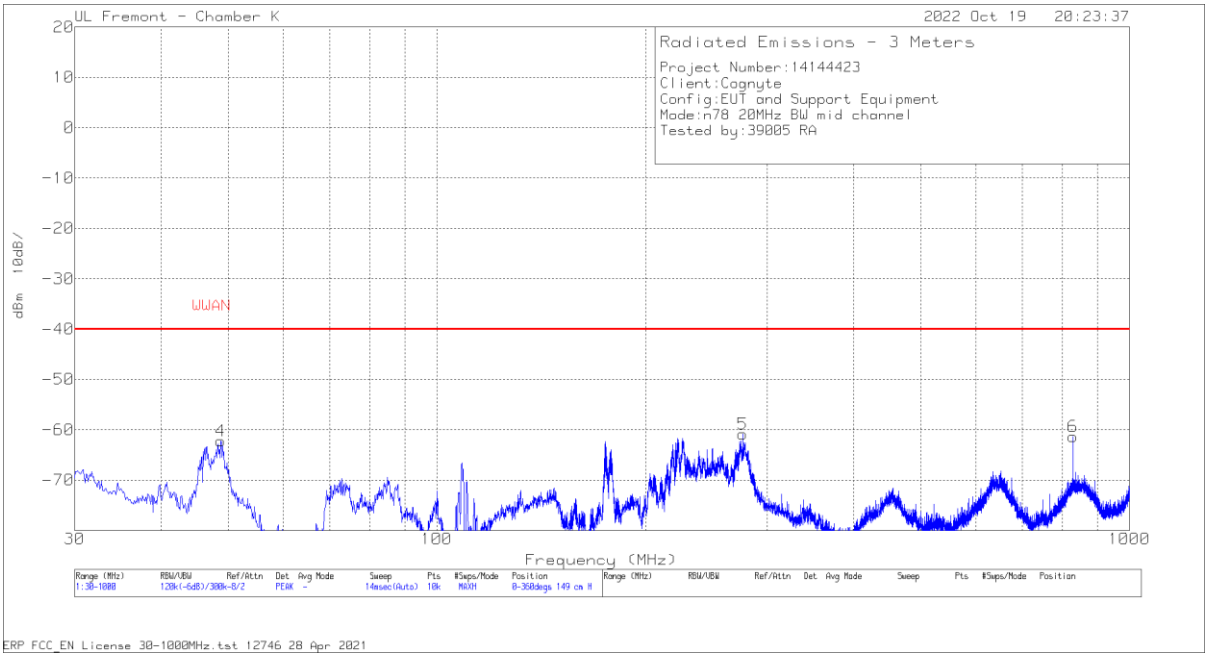
VERTICAL

Trace Markers

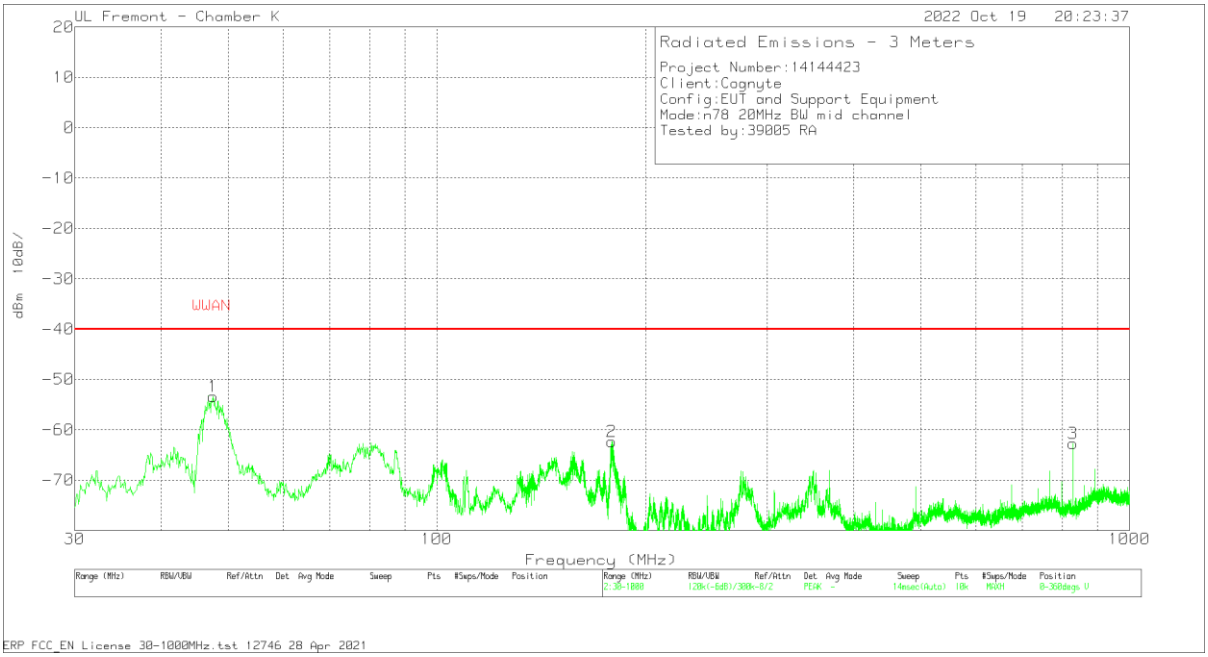
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	48.527	-59.44	Pk	15.1	-31.3	13	-62.64	-40	-22.64	0-360	149	H
5	174.918	-54.26	Pk	17.8	-30.4	5.7	-61.16	-40	-21.16	0-360	149	H
6	* 278.611	-62.1	Pk	19.8	-29.9	10.4	-61.8	-40	-21.8	0-360	149	H
1	47.751	-44.95	Pk	15.4	-31.3	7.6	-53.25	-40	-13.25	0-360	149	V
2	82.865	-56.2	Pk	13.8	-31	12.1	-61.3	-40	-21.3	0-360	149	V
3	829.474	-68.82	Pk	28.1	-27.8	6	-62.52	-40	-22.52	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

MID CHANNEL RESULTS



HORIZONTAL



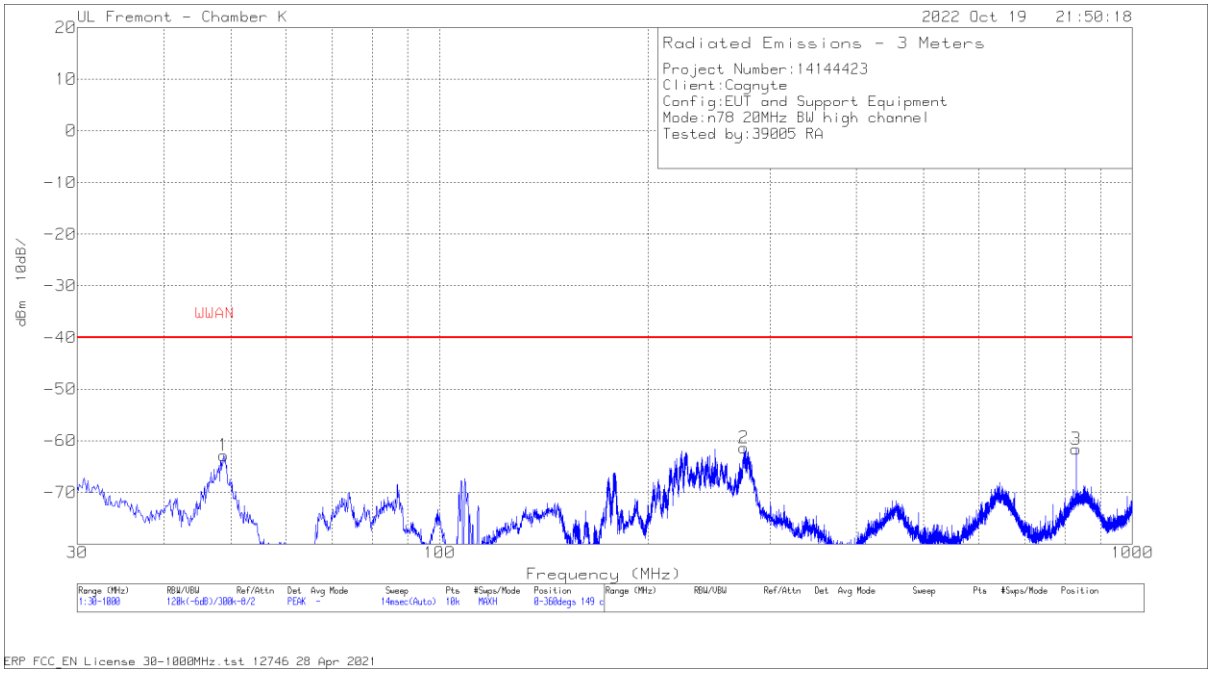
VERTICAL

Trace Markers

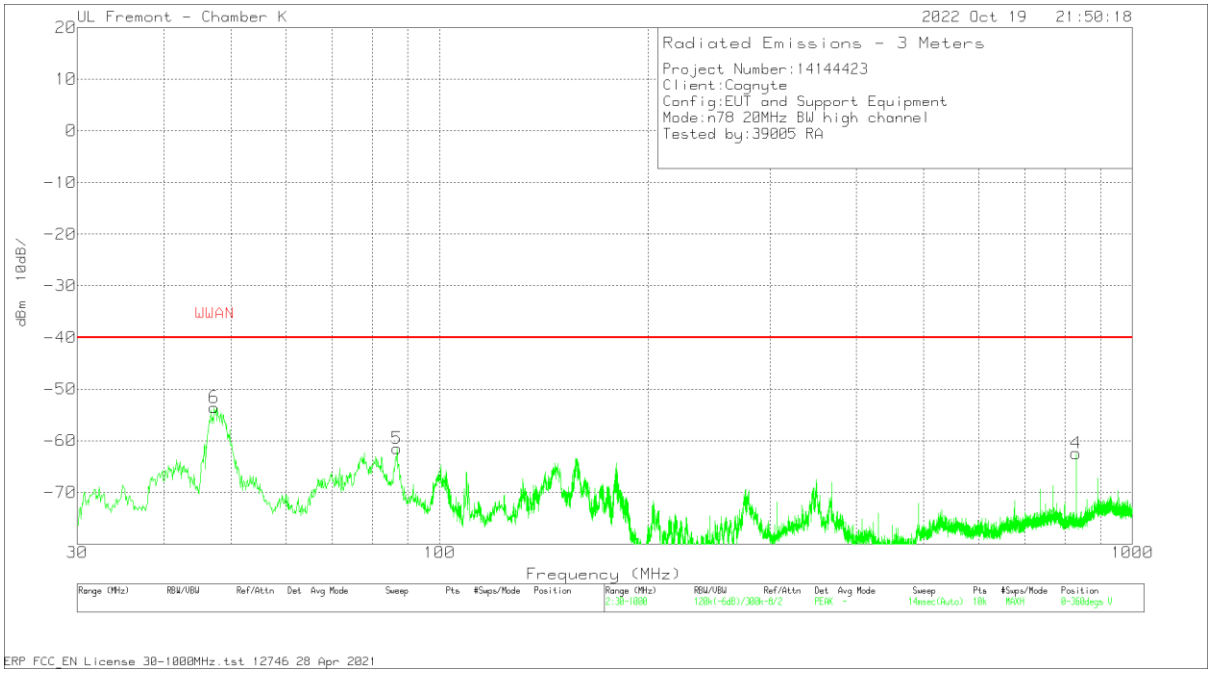
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	48.721	-58.93	Pk	15.1	-31.3	12.9	-62.23	-40	-22.23	0-360	149	H
5	* 276.477	-61.6	Pk	19.8	-29.8	10.8	-60.8	-40	-20.8	0-360	149	H
6	829.474	-71.78	Pk	28.1	-27.8	10.1	-61.38	-40	-21.38	0-360	149	H
1	47.557	-45.16	Pk	15.5	-31.3	7.6	-53.36	-40	-13.36	0-360	149	V
2	178.992	-59.11	Pk	17.6	-30.3	9.5	-62.31	-40	-22.31	0-360	149	V
3	829.474	-68.96	Pk	28.1	-27.8	6	-62.66	-40	-22.66	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	Hybrid Antenna ACF(dB)	Amp/Cbl (dB)	Sub Factor (dB)	Corrected Reading dBm	WWAN	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	48.818	-59.51	Pk	15.1	-31.3	12.9	-62.81	-40	-22.81	0-360	149	H
2	* 274.925	-62.24	Pk	19.8	-29.8	10.9	-61.34	-40	-21.34	0-360	149	H
3	829.474	-72.01	Pk	28.1	-27.8	10.1	-61.61	-40	-21.61	0-360	149	H
4	829.474	-68.71	Pk	28.1	-27.8	6	-62.41	-40	-22.41	0-360	149	V
5	86.842	-54.89	Pk	13.6	-31	10.8	-61.49	-40	-21.49	0-360	149	V
6	47.266	-45.38	Pk	15.7	-31.3	7.4	-53.58	-40	-13.58	0-360	149	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector