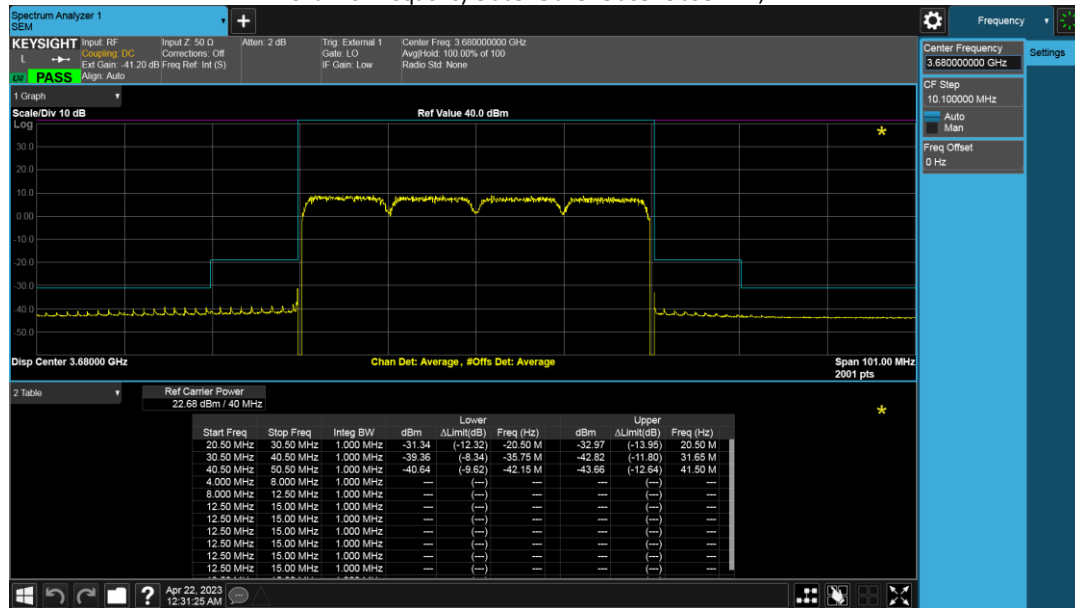
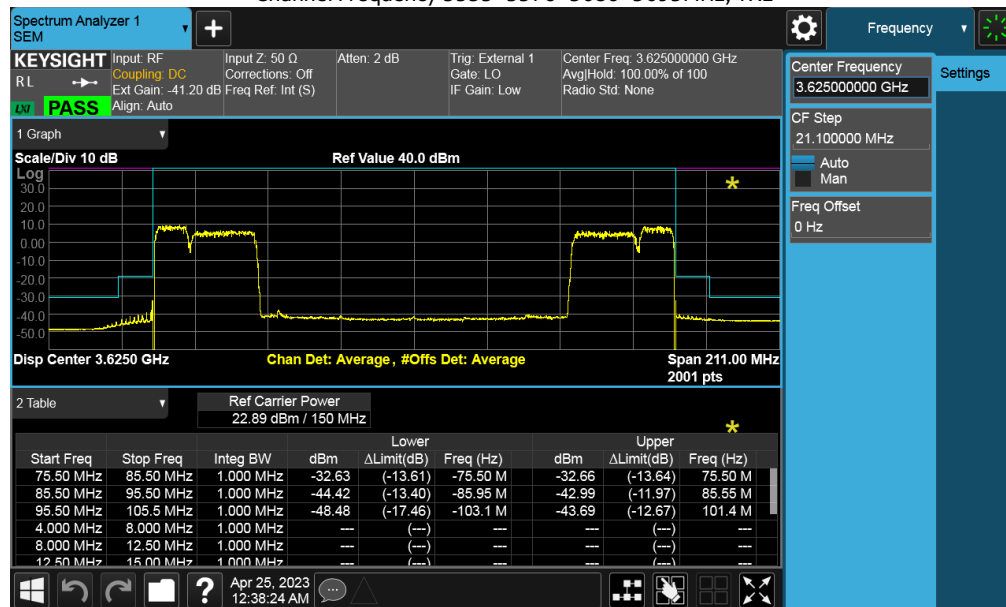
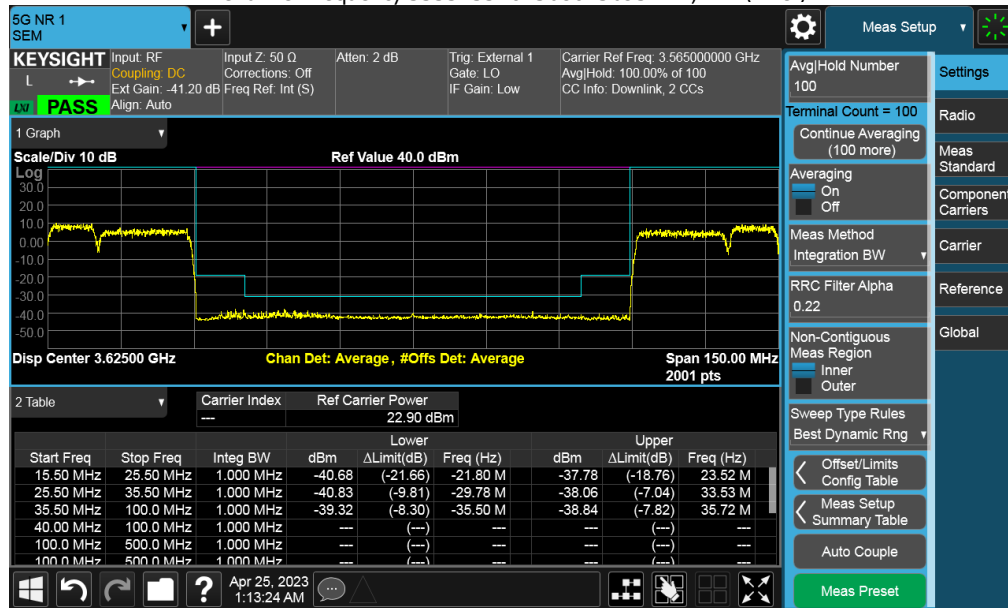


Test Model 3.1a, Modulation 256QAM, 10+10+10+10MBW
Channel Frequency 3665+3675+3685+3695MHz, TX2Test Model 3.1, Modulation 64QAM, 10+20+20+10MBW
Channel Frequency 3555+3570+3680+3695MHz, TX2

Test Model 3.1, Modulation 64QAM, 10+20+20+10MBW
Channel Frequency 3555+3570+3680+3695MHz, TX2 (inner)



5. FCC Section 2.1051 - Spurious Emissions at Transmit Antenna Port

This test measures the emissions of spurious signals which may come from harmonic, parasitic, intermodulation and frequency conversion products and are outside the necessary bandwidth but excludes Edge-of-Band emissions.

5.1 Section 2.1051 Spurious Emissions at Antenna Terminals

Spurious Emissions at the antenna terminals were investigated per 47CFR Section 2.1057(a)(1) over the frequency range of 10 MHz to 37 GHz which is beyond the 10th harmonic of the carrier frequency. A test coupler which incorporates a low intermod broadband RF attenuator was used to reduce the transceiver's amplitude to a level usable by the spectrum analyzer. The test configuration is shown in Figure 4.4.1 which documents the test set up used for the measurements. In this set up the complete RF test path was calibrated over the 10 MHz-37 GHz range.

The spurious measurements were made using an MXA Signal Analyzer. These measurements are performed in compliance with ANSI C63.26 and our ISO17025 process. The measurement meets the ANSI C63.26 requirements in paragraphs 5.2.4.4.1 and 5.7 which requires that the number of points in the sweep be $> 2 \times \text{Span/RBW}$. The MXA signal analyzer measurements examine the 10 MHz to 37 GHz range.

Measurements were performed for all of the test configurations in Table 5.1 and these matches the test configurations used for Occupied Bandwidth / Edge of Band Emissions, RF Power and modulation.

5.2 Required Limit

The required emission limitation specified in **47CFR 96.41 (e)** was applied to these tests. Based upon the criterion given in Section 96 of the Code and as developed in 4.3.3, the required emission limit for emissions outside a licensee's frequency block is:

47CFR 96.41 (e)(2) *Additional protection levels.* Notwithstanding paragraph (e)(1) of this section, the conducted power of any emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

In order to account for the spectral adding of identical signals from the primary and diversity ports, per KDB 662911 D01 Multiple Transmitter Output v01r01, the level needs be adjusted by $10\text{LOG}(n)$ where n =number of outputs.

The adjustment for $n=4$ is: $6.02 \text{ dB} = 10\text{LOG}(4)$

Therefore, the limit for emissions below 3540 MHz or above 3710 MHz frequency block when measured with a RBW of 1 MHz is:

$$-25 \text{ dBm} - 6.02 \text{ dB} = -31.02 \text{ dBm for 4x MIMO}$$

Therefore, the limit for emissions below 3530 MHz or above 3720 MHz frequency block when measured with a RBW of 1 MHz is:

$$-40 \text{ dBm} - 6.02 \text{ dB} = -46.02 \text{ dBm for 4x MIMO}$$

5.3 Spurious Emissions at Antenna Terminals Results

NOTE: Only plots with lowest margin in each frequency range are used in this report. The full suite of raw data resides at the MH, New Jersey location.

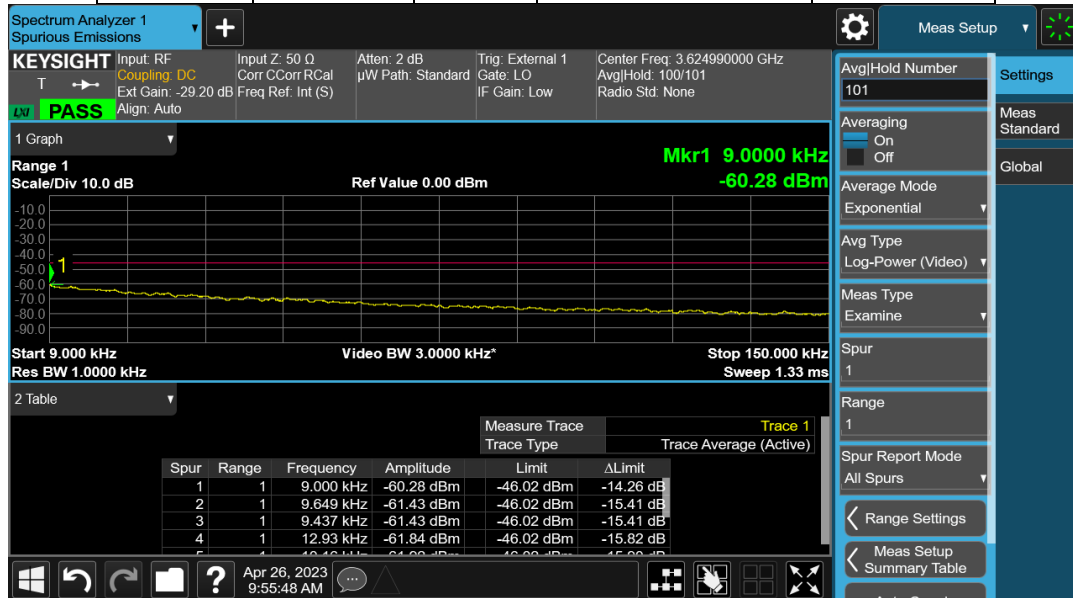
Tabular Data – Spurious Emissions at Antenna Terminals

Radio Technology	Test Model	Modulation	TX Port	Channel Frequency MHz	Signal BW MHz	Conducted Spurious Emissions Results Pass/ Fail
5G-NR	3.1	64QAM	4	3560	20	Pass
5G-NR	3.2	QPSK/16QAM	2	3560	20	Pass
5G-NR	3.1a	256QAM	2	3625	20	Pass
5G-NR	3.1a	256QAM	2	3600+3555+3669+3689	100+10+20+20	Pass
LTE	3.1	64QAM	2	3555+3565+3575+3585	10+10+10+10	Pass
LTE	3.1	64QAM		3555+3570+3580+3595	10+20+20+10	Pass

5.3.1 5G-NR Plots

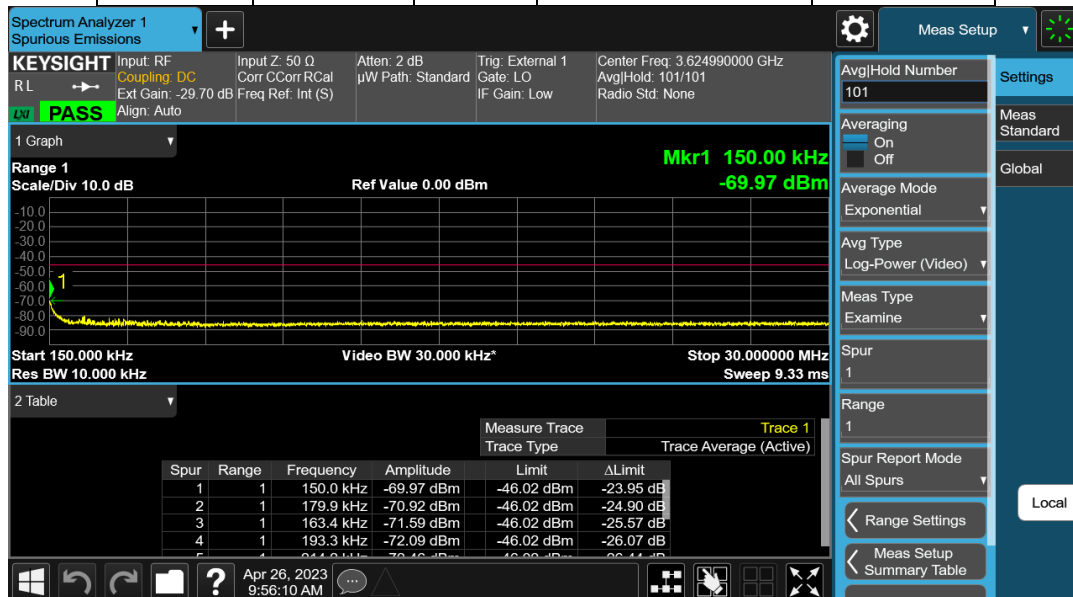
9KHz – 150kHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.2	QPSK/16QAM	2	3625	10

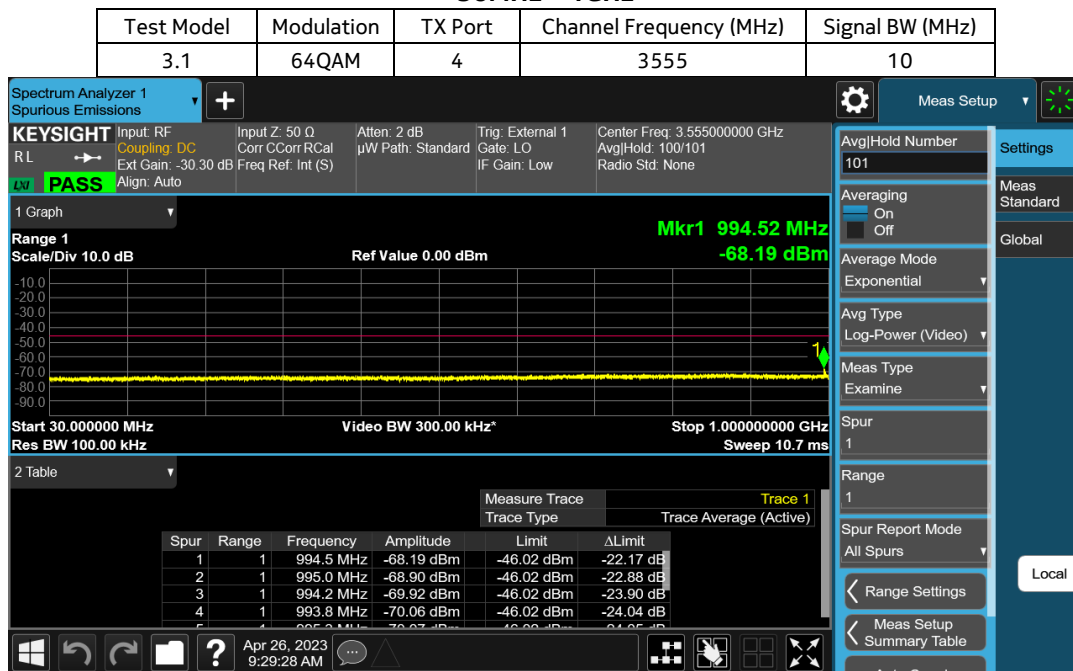


150kHz – 30MHz

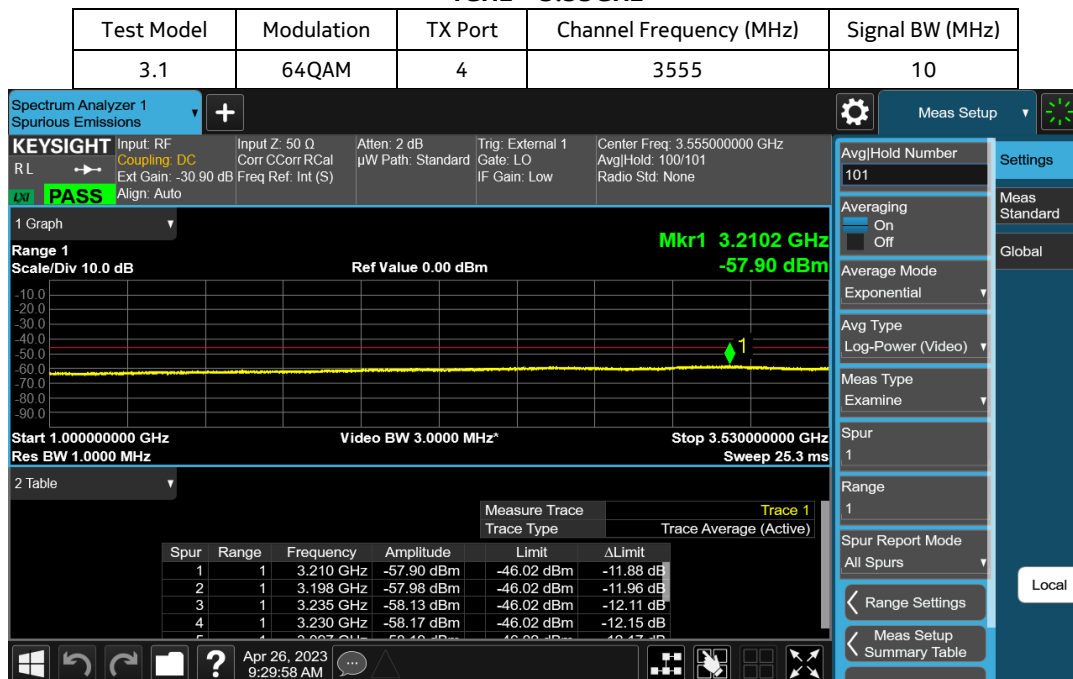
Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.2	QPSK/16QAM	2	3625	10



30MHz – 1GHz

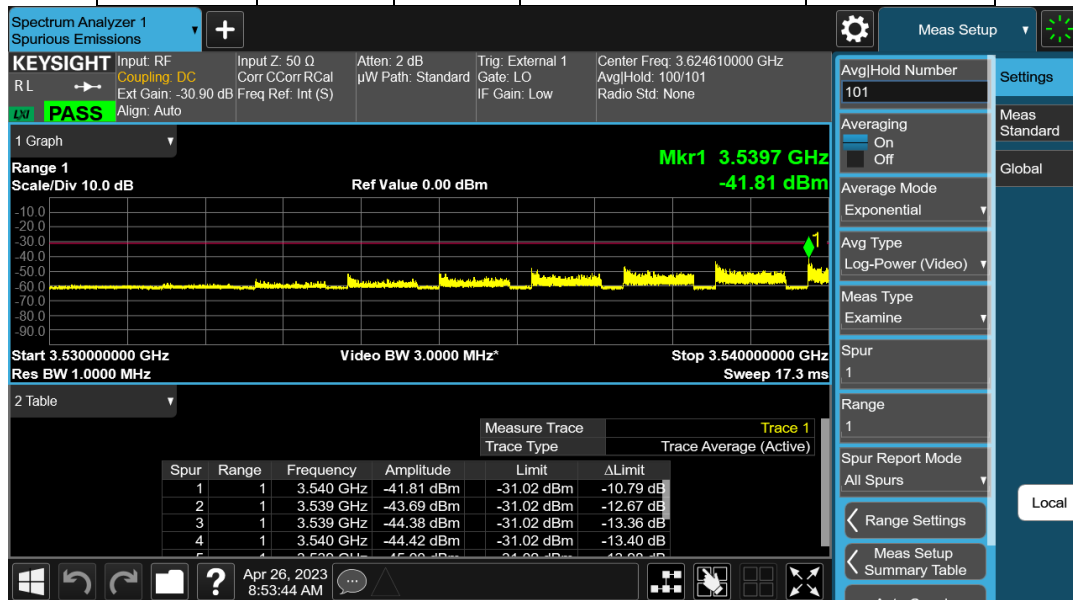


1GHz – 3.53GHz



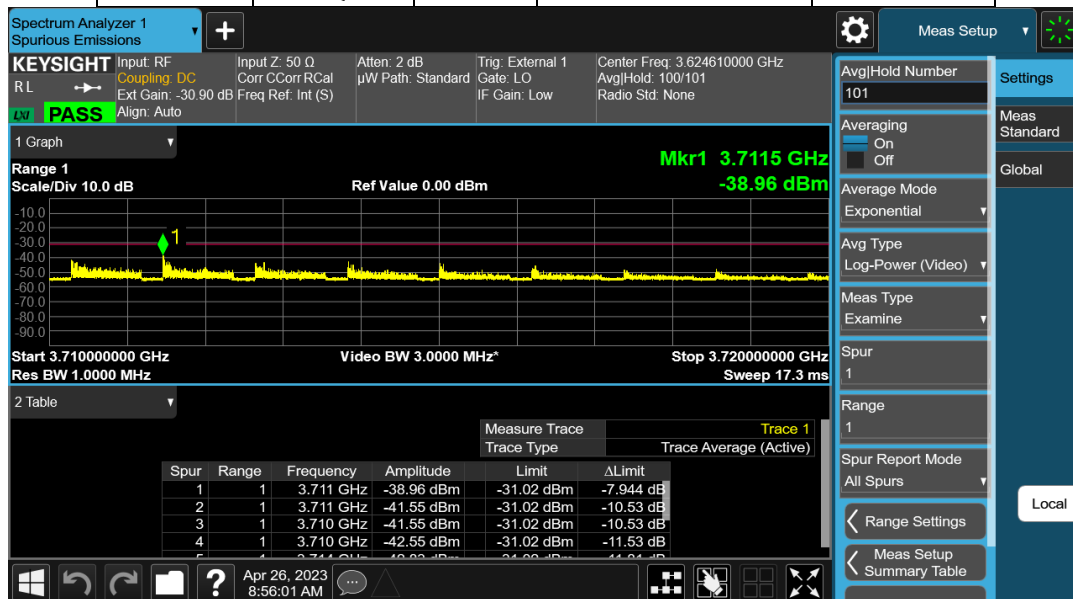
3.53GHz – 3.40GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1a	256QAM	2	3600+3555+3669+3689	100+10+20+20



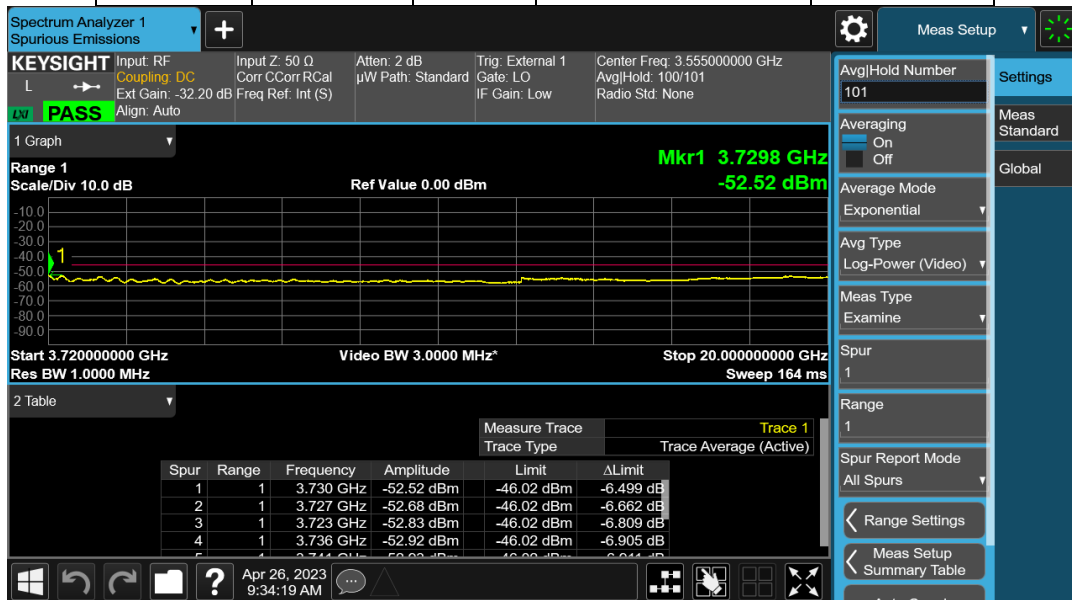
3.71GHz – 3.72GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1a	256QAM	2	3600+3555+3669+3689	100+10+20+20



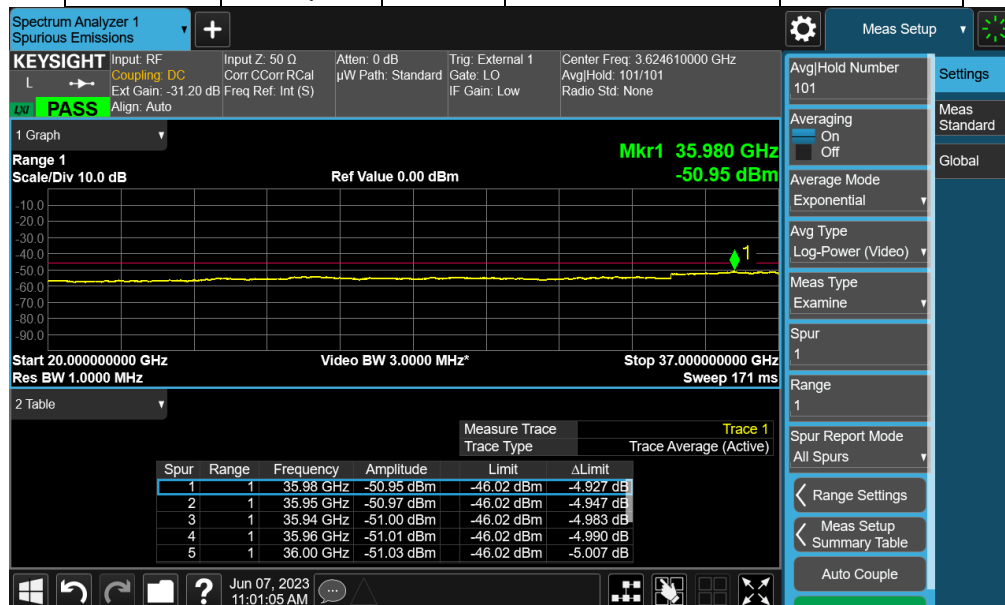
3.72GHz – 20GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM	4	3555	10



20GHz – 37GHz

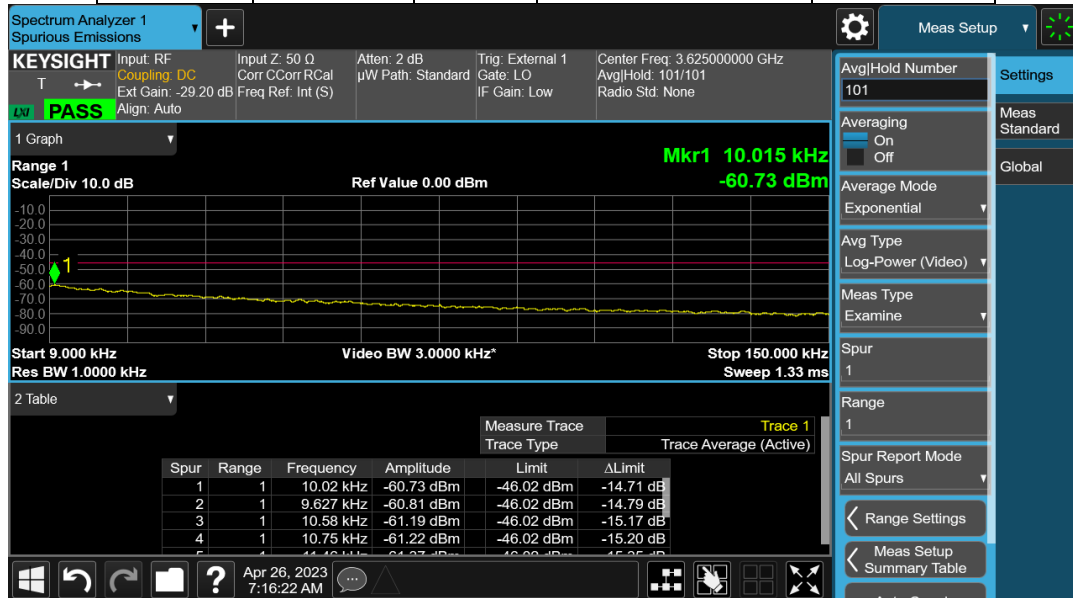
Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1a	256QAM	2	3600+3555+3669+3689	100+10+20+20



5.3.2 LTE Plots

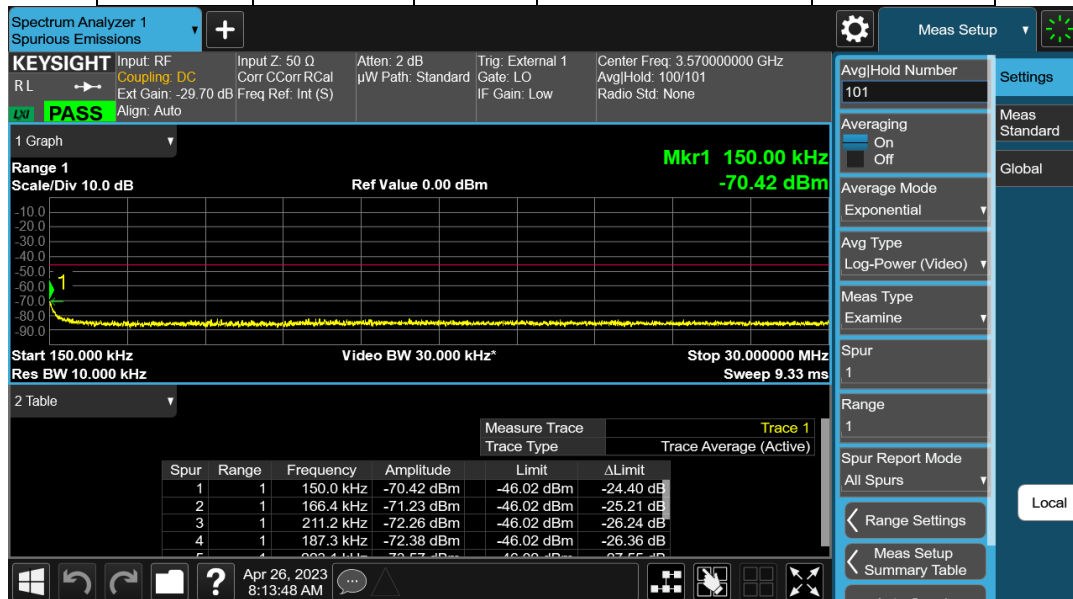
9KHz – 150kHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM		3555+3570+3580+3595	10+20+20+10



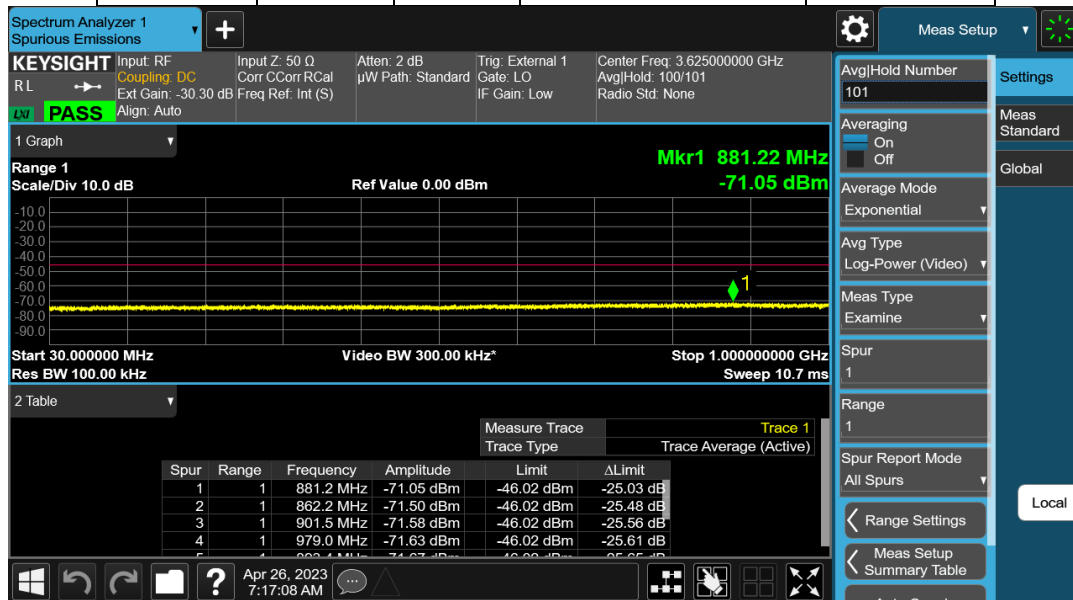
150kHz – 30MHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM	2	3555+3565+3575+3585	10+10+10+10



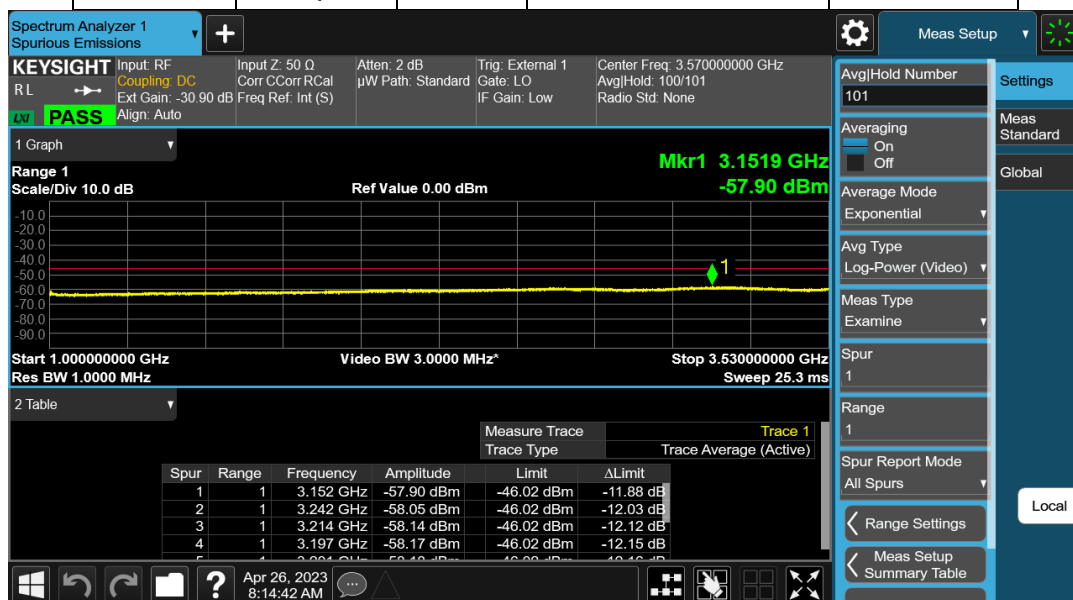
30MHz – 1GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM		3555+3570+3580+3595	10+20+20+10



1GHz – 3.53GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM	2	3555+3565+3575+3585	10+10+10+10



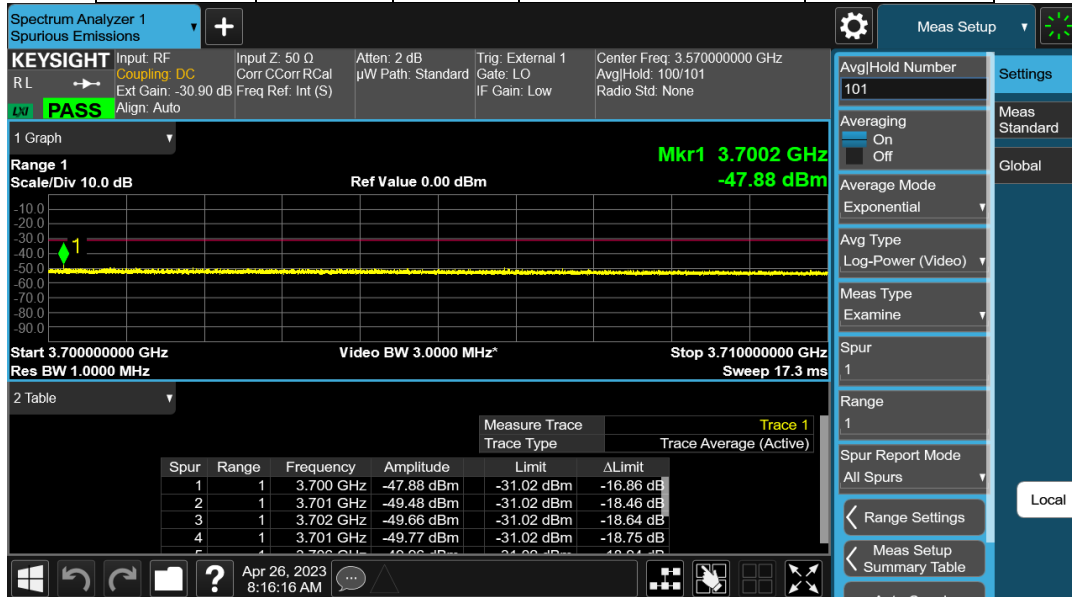
3.53GHz – 3.54GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM	2	3555+3565+3575+3585	10+10+10+10



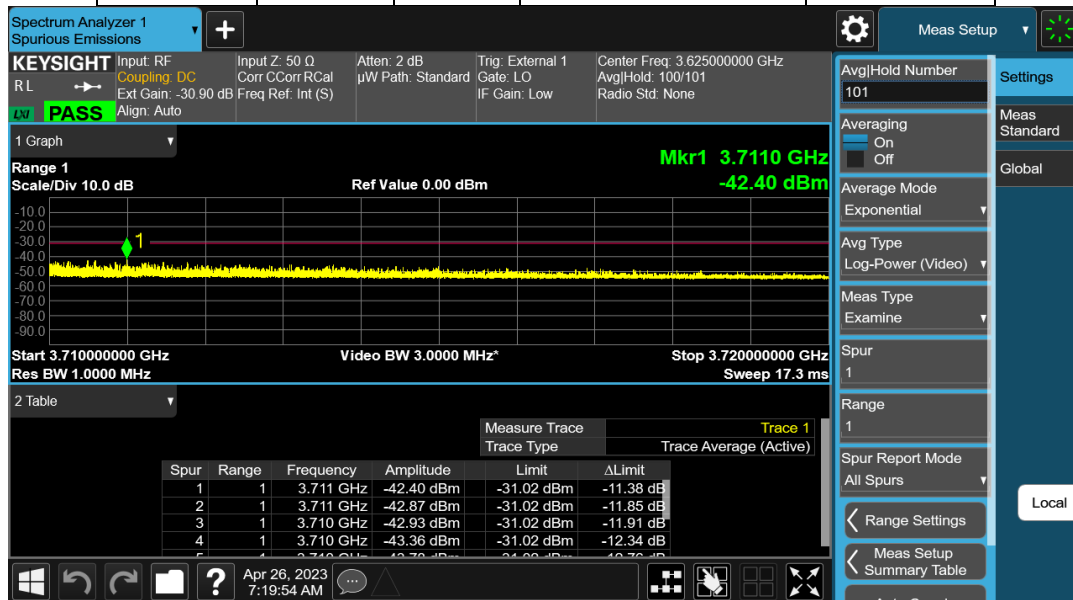
3.70GHz – 3.71GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM	2	3555+3565+3575+3585	10+10+10+10



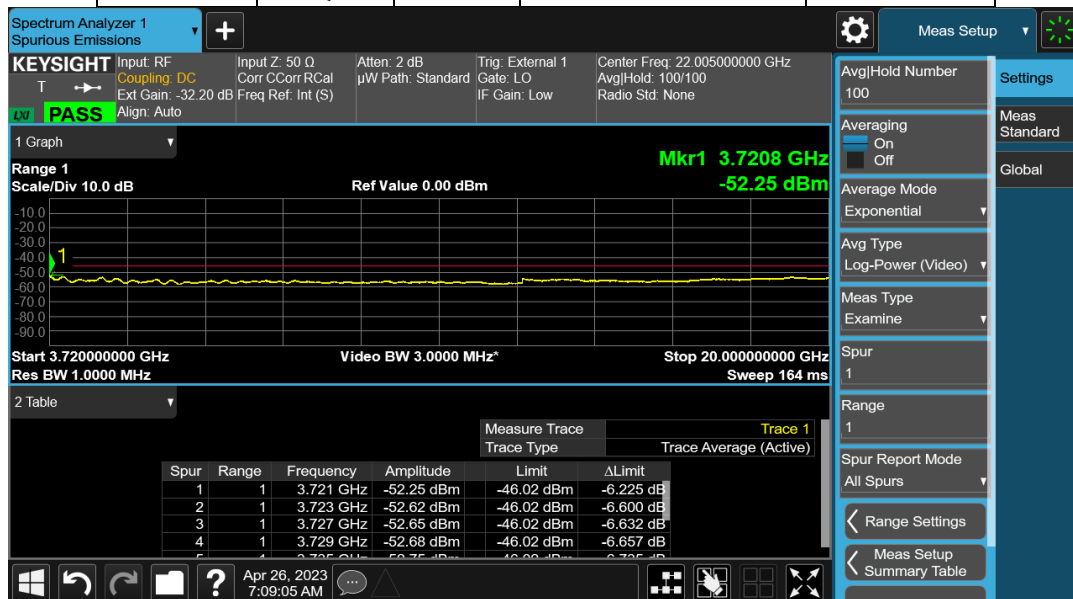
3.71GHz – 3.72GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM		3555+3570+3580+3595	10+20+20+10



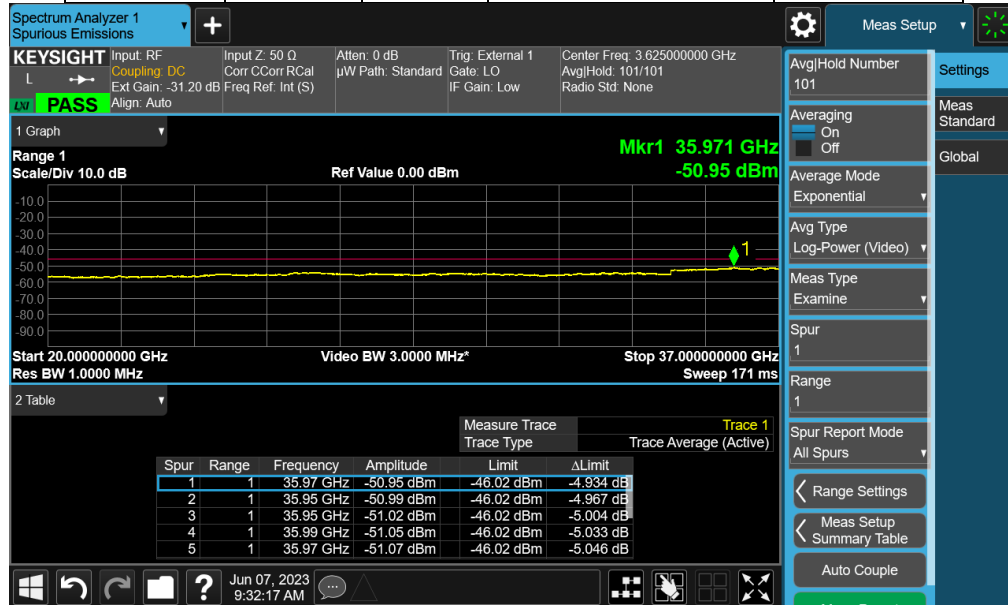
3.72GHz – 20GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM		3555+3570+3580+3595	10+20+20+10



20GHz – 37GHz

Test Model	Modulation	TX Port	Channel Frequency (MHz)	Signal BW (MHz)
3.1	64QAM		3555+3570+3580+3595	10+20+20+10



6. Section 2.1053 - Measurement Required: Field Strength of Spurious Radiation

The field strength measurements of radiated spurious emissions were made in a FCC registered 3-meter semi-anechoic chamber AR-5, (FCC Registration Number: 395774) NVLAP Lab Code: 100275-0 and IC (Filing Number: 6933F-5) which is maintained by Nokia Bell Labs in Murray Hill, New Jersey.

6.1 Spurious Radiation and Radiated Emissions Requirements.

This product meets Parts 2,15 and 96 requirements. FCC Part 15 Class B require emissions to be below 54.5 dBuV/m at 3m.

47CFR 96.41 (e)(1) (i) and KDB 940660 D01 Section 3.2 (b)(6) specified that the limits for the emissions outside the fundamental are as follows.

- within 0 MHz to 10 MHz above and below the assigned channel ≤ -13 dBm/MHz,
- greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz,
- any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz.

Title 47CFR section 2.1053 contains the requirements for the levels of spurious radiation as a function of the EIRP of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an isotropic radiator excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 27-7, 6th edition, IT&T Corp.

$$E = [(30 \cdot \text{EIRP})^{1/2}] / R$$

Where: E = Field Intensity in Volts/ meter
P = Emission Power in Watts

R = Distance in meters = 3 m

Hence,

$$E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20 \log d \text{ (m)} + 104.77.$$

For EIRP = -13dBm/MHz, E = 82.2 dB μ V/m,

For EIRP = -25dBm/MHz, E = 70.2 dB μ V/m,

For EIRP = -40dBm/MHz, E = 55.2 dB μ V/m.

The field strength of radiated spurious emissions measured was determined by

$$E \text{ (dB}\mu\text{V/m)} = V_{\text{meas}} \text{ (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dBi/m)}.$$

Field strength measurements of radiated spurious emissions were made in the 3m semi-anechoic chamber, AR-5 as detailed above. The recommendations of ANSI C63.4 and ANSI C63.26 were followed for EUT testing setup, cabling, and measurement approach and procedures. All the measurement equipment used, including antennas, was calibrated in accordance with ISO 9001 process. The EUT setup diagram is given in the Figure 4.5.

Below 18GHz, FCC Part 15 Class B limit 54.5 dBuV/m was used which is worse than FCC Part 96 limit. Above 18GHz, the limit 55.2 dBuV/m was used.

6.2 Field Strength of Spurious Radiation Results:

This product meets Part 96 Requirements. For the Title 47CFR section 96.41(e) and 2.1053 test, the field strength of any spurious radiation, measured at 3m, is required to be less than 55.2dB μ V/meter. Emissions equal to or less than 35.2 dB μ V/meter are not reportable and may be verified using field strength measurements with broadband antennas.

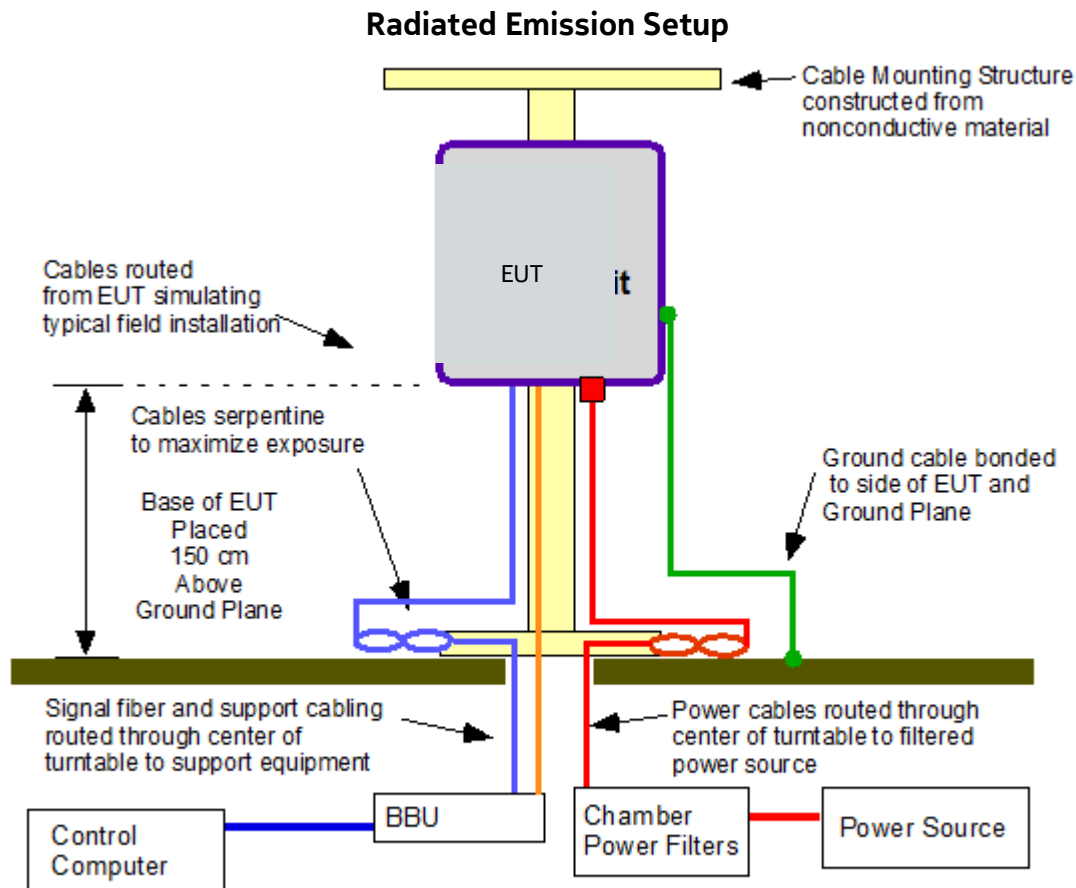
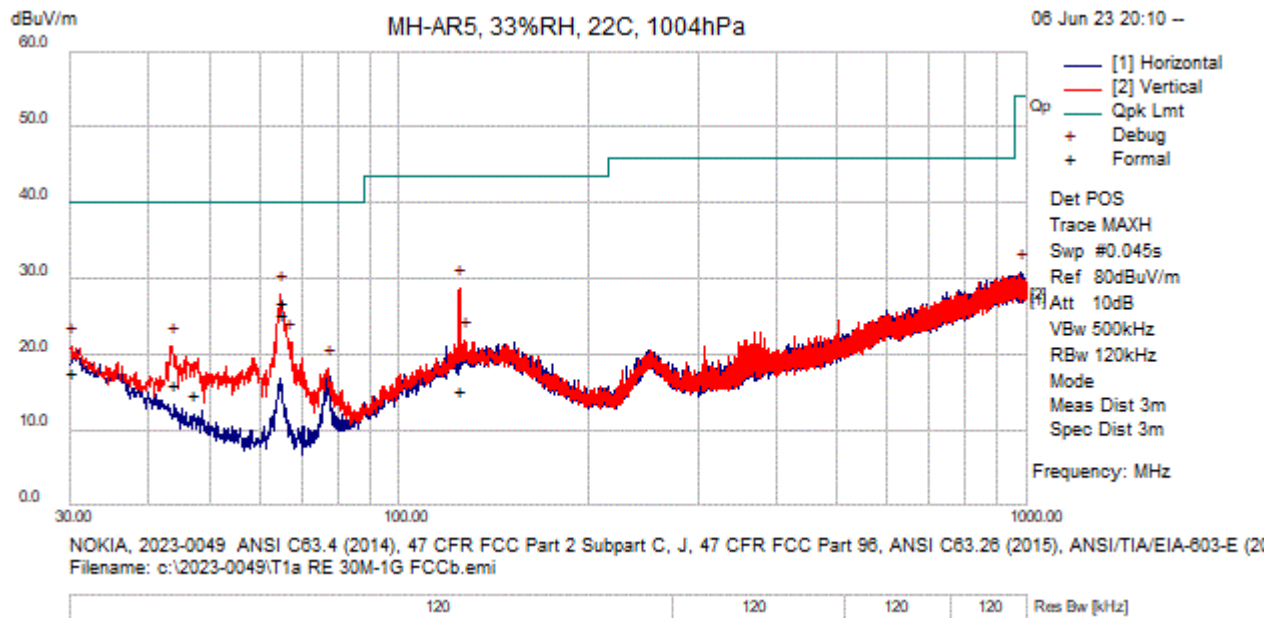


Figure 4.5

6.3 Transmitter Measurements of Radiated Spurious Emissions Plots

Radiated Emissions 30MHz – 1GHz



Test Information

Results Title	Radiated E 3m 30MHz-1GHz
File Name	T1b RE 30M-1G FCCb.emi
Test Laboratory	MH-AR5, 33%RH, 22C, 1004hPa
Test Engineer	BB/MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	NOKIA
EUT Details	2023-0049 ANSI C63.4 (2014), 47 CFR FCC Part 2 Subpart C, J, 47 CFR FCC Part 96, ANSI C63.26 (2015), ANSI/TIA/EIA-603-E (2016), KDB 971168 (April 9, 2018) – Licensed Transmitters AWPQY AWPQZ 3 & 4 carrier FCC
Configuration	Radiated Emissions 30MHz-1GHz FCC B Antenna E601, Pre Amp E-1252, Instrument E954 ESU, Offset Bore @ 3 Meter distance
Date	2023-06-06 20:12:27

Formal Data

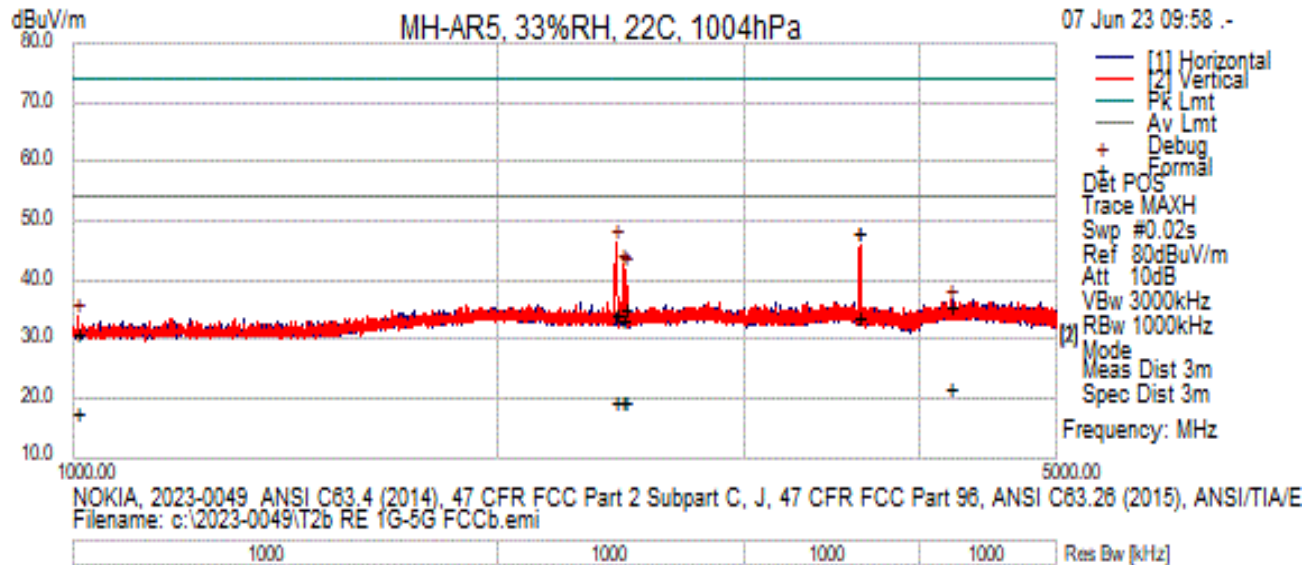
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
64.994	47.35	0.69	-21.21	26.84	QuasiMax	V	126	121	40.00	-13.16	Pass	
64.778	45.94	0.69	-21.19	25.44	QuasiMax	V	144	115	40.00	-14.56	Pass	
30.12125	25.93	0.50	-8.82	17.62	QuasiMax	V	100	116	40.00	-22.38	Pass	
43.609	31.26	0.57	-15.79	16.05	QuasiMax	V	130	205	40.00	-23.95	Pass	
47.085	31.50	0.59	-17.24	14.85	QuasiMax	V	104	168	40.00	-25.15	Pass	
125.324	23.90	0.97	-9.66	15.21	QuasiMax	V	231	308	43.50	-28.29	Pass	

Preview Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
64.920	48.44	0.69	-21.20	27.93	Debug	V	100	90	40.00	-12.07	Pass	
125.060	37.40	0.97	-9.67	28.70	Debug	V	200	225	43.50	-14.80	Pass	
66.98125	41.95	0.70	-21.04	21.60	Debug	V	100	135	40.00	-18.40	Pass	
30.12125	29.44	0.50	-8.82	21.13	Debug	V	200	270	40.00	-18.87	Pass	
43.580	36.25	0.57	-15.77	21.05	Debug	V	100	315	40.00	-18.95	Pass	
127.60625	30.54	0.98	-9.58	21.94	Debug	V	385	0	43.50	-21.56	Pass	
77.40875	36.64	0.76	-19.21	18.19	Debug	V	100	90	40.00	-21.81	Pass	
982.055	30.33	3.13	-2.54	30.92	Debug	H	100	135	54.00	-23.08	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

Radiated Emissions 1GHz – 5GHz



Test Information

Results Title	Radiated E 3m 1-5GHz
File Name	T2b RE 1G-5G FCCb.emi
Test Laboratory	MH-AR5, 33%RH, 22C, 1004hPa
Test Engineer	BB/MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	NOKIA
EUT Details	2023-0049 ANSI C63.4 (2014), 47 CFR FCC Part 2 Subpart C, J, 47 CFR FCC Part 96, ANSI C63.26 (2015), ANSI/TIA/EIA-603-E (2016), KDB 971168 (April 9, 2018) – Licensed TransmittersAWPQY AWPQZ 3 & 4 carrier FCC
Configuration	Radiated Emissions 1GHz -5GHz FCC B Antenna E057, Pre Amp E-1603, Instrument E954 ESU, Straight bore @ 3 Meter distance
Date	2023-06-07 10:22:19

Formal Data

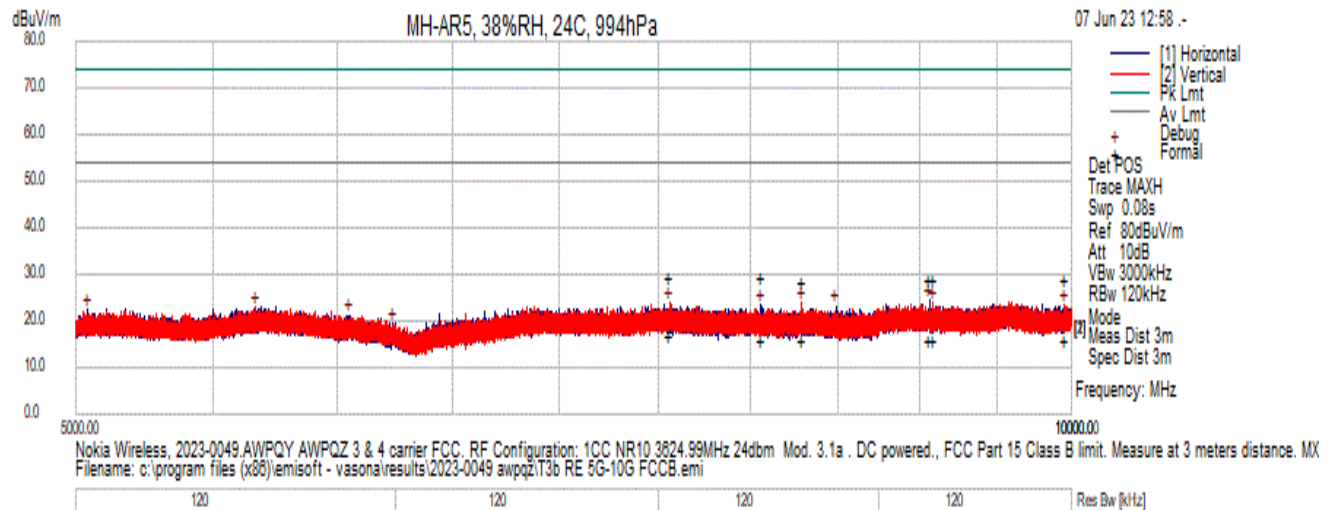
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
3623.000	46.63	1.28	-14.15	33.77	AvgMax	V	163	271	54.00	-20.23	Pass	
3623.000	60.88	1.28	-14.15	48.01	PeakMax	V	163	271	74.00	-25.99	Pass	
4199.314	34.17	0.86	-13.18	21.85	AvgMax	V	222	267	54.00	-32.15	Pass	
2462.500	33.85	2.02	-16.27	19.60	AvgMax	V	202	123	54.00	-34.40	Pass	
2434.290	33.73	2.05	-16.24	19.54	AvgMax	V	360	173	54.00	-34.46	Pass	
2471.481	33.72	2.01	-16.28	19.45	AvgMax	V	110	245	54.00	-34.55	Pass	
1009.884	34.47	3.48	-20.19	17.76	AvgMax	V	114	357	54.00	-36.24	Pass	
4199.314	47.81	0.86	-13.18	35.49	PeakMax	V	222	267	74.00	-38.51	Pass	
2471.481	49.65	2.01	-16.28	35.38	PeakMax	V	110	245	74.00	-38.62	Pass	
2434.290	48.42	2.05	-16.24	34.23	PeakMax	V	360	173	74.00	-39.77	Pass	
2462.500	47.72	2.02	-16.27	33.47	PeakMax	V	202	123	74.00	-40.53	Pass	
1009.884	47.55	3.48	-20.19	30.85	PeakMax	V	114	357	74.00	-43.15	Pass	

Preview Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
2434.000	60.70	2.05	-16.23	46.52	Debug	V	100	264	54.00	-7.48	Pass	
3623.000	58.79	1.28	-14.15	45.92	Debug	V	185	264	54.00	-8.08	Pass	
2462.500	56.70	2.02	-16.27	42.45	Debug	V	100	132	54.00	-11.55	Pass	
2471.500	56.18	2.01	-16.28	41.91	Debug	V	100	264	54.00	-12.09	Pass	
4199.000	48.82	0.86	-13.18	36.50	Debug	V	385	242	54.00	-17.50	Pass	
1010.007	50.51	3.48	-20.19	33.81	Debug	V	100	353	54.00	-20.19	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

Radiated Emissions 5GHz – 10GHz



Test Information

Results Title	Radiated E 3m 5-10GHz
File Name	T3b RE 5G-10G FCCB.emi
Test Laboratory	MH-AR5, 38%RH, 24C, 994hPa
Test Engineer	CP
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0049.AWPQY AWPQZ 3 & 4 carrier FCC. RF Configuration: 1CC NR10 3624.99MHz 24dbm Mod. 3.1a . DC powered.
Configuration	FCC Part 15 Class B limit. Measure at 3 meters distance. RE 5GHz-10GHz. MXE E1608 RBW 100kHz Previews / 1MHz Formals, VBW 3MHz, Ref Lvl 80dBuV, Int. att. 10dB, PA E1603, Horn E057.
Date	2023-06-07 12:58:56

Formal Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
7561.001	30.09	-6.59	-6.39	17.10	AvgMax	V	251	155	54.00	-36.90	Pass	
8056.334333	29.38	-6.96	-6.11	16.31	AvgMax	H	111	67	54.00	-37.69	Pass	
9083.126	28.07	-7.02	-4.85	16.20	AvgMax	V	154	183	54.00	-37.80	Pass	
9060.209333	27.95	-7.02	-4.87	16.06	AvgMax	H	185	357	54.00	-37.94	Pass	
9953.459333	27.32	-7.30	-3.96	16.05	AvgMax	V	247	230	54.00	-37.95	Pass	
8289.292667	29.12	-7.04	-6.08	16.01	AvgMax	V	118	161	54.00	-37.99	Pass	
7561.001	42.61	-6.59	-6.39	29.63	PeakMax	V	251	155	74.00	-44.37	Pass	
8056.334333	42.60	-6.96	-6.11	29.53	PeakMax	H	111	67	74.00	-44.47	Pass	
9953.459333	40.51	-7.30	-3.96	29.24	PeakMax	V	247	230	74.00	-44.76	Pass	
9060.209333	40.97	-7.02	-4.87	29.08	PeakMax	H	185	357	74.00	-44.92	Pass	
9083.126	40.75	-7.02	-4.85	28.89	PeakMax	V	154	183	74.00	-45.11	Pass	
8289.292667	41.78	-7.04	-6.08	28.67	PeakMax	V	118	161	74.00	-45.33	Pass	

Preview Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
9060.209333	36.51	-7.02	-4.87	24.62	Debug	H	100	242	54.00	-29.38	Pass	
7561.001	37.12	-6.59	-6.39	24.14	Debug	V	300	198	54.00	-29.86	Pass	
9083.126	35.98	-7.02	-4.85	24.12	Debug	V	200	0	54.00	-29.88	Pass	
8289.292667	36.96	-7.04	-6.08	23.84	Debug	V	200	198	54.00	-30.16	Pass	
9953.459333	34.97	-7.30	-3.96	23.70	Debug	V	100	132	54.00	-30.30	Pass	
8056.334333	36.62	-6.96	-6.11	23.55	Debug	H	100	286	54.00	-30.45	Pass	
8490.042667	36.45	-7.11	-6.04	23.30	Debug	H	300	286	54.00	-30.70	Pass	
5666.916667	38.42	-5.22	-10.26	22.93	Debug	V	100	264	54.00	-31.07	Pass	
5042.583333	39.31	-4.96	-11.72	22.62	Debug	H	300	286	54.00	-31.38	Pass	
6047.583333	36.06	-5.30	-9.50	21.26	Debug	H	100	154	54.00	-32.74	Pass	
6235.916667	34.30	-5.39	-9.34	19.56	Debug	H	200	308	54.00	-34.44	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

Results Title	Radiated E 3m 1-18GHz
File Name	T4b RE 10G-18G FCCB.emi
Test Laboratory	MH-AR5, 38%RH, 24C, 994hPa
Test Engineer	CP
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0049.AWPQY AWPQZ 3 & 4 carrier FCC. RF Configuration: 1CC NR10 3624.99MHz 24dbm Mod. 3.1a . DC powered.
Configuration	FCC Part 15 Class B limit. Measure at 3 meters distance. RE 10GHz-18GHz. MXE E1608 RBW 100kHz Previews / 1MHz Formals, VBW 3MHz, Ref Lvl 80dBuV, Int. att. 10dB, PA E1603, Horn E057.
Date	2023-06-07 14:08:35

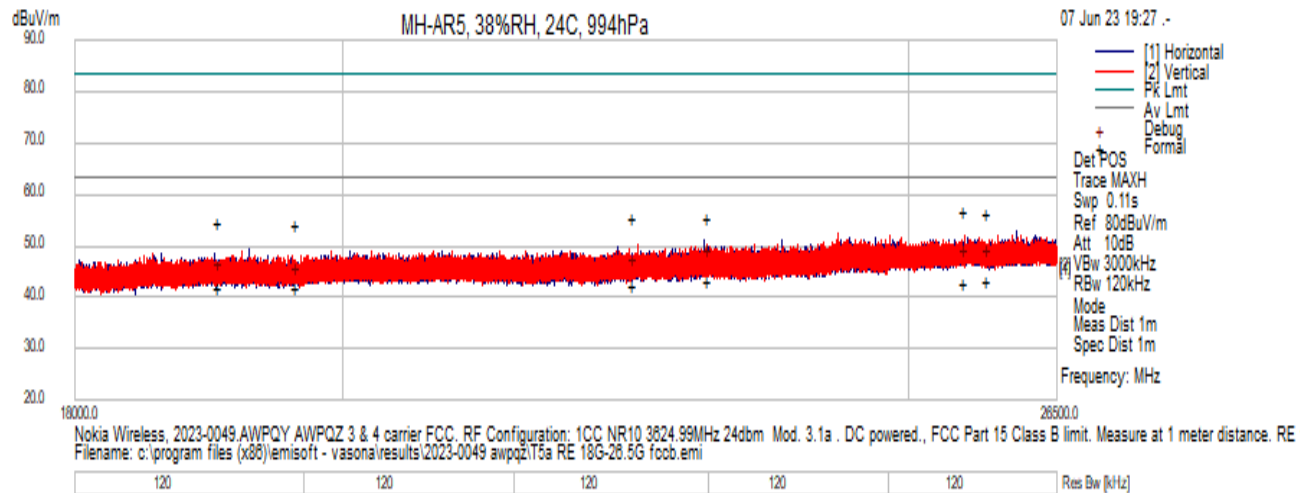
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
14107.933	26.11	-8.73	-0.64	16.74	AvgMax	V	168	231	54.00	-37.26	Pass	
14341.667	25.90	-8.77	-0.89	16.23	AvgMax	H	261	290	54.00	-37.77	Pass	
10873.800	26.68	-7.85	-2.89	15.94	AvgMax	V	199	193	54.00	-38.06	Pass	
13695.533	25.31	-8.59	-0.88	15.84	AvgMax	V	197	75	54.00	-38.16	Pass	
17639.600	24.12	-10.15	1.03	15.00	AvgMax	V	200	101	54.00	-39.00	Pass	
14555.000	24.62	-8.90	-1.34	14.38	AvgMax	H	111	20	54.00	-39.62	Pass	
14107.933	39.86	-8.73	-0.64	30.49	PeakMax	V	168	231	74.00	-43.51	Pass	
13695.533	39.62	-8.59	-0.88	30.15	PeakMax	V	197	75	74.00	-43.85	Pass	
17639.600	39.19	-10.15	1.03	30.07	PeakMax	V	200	101	74.00	-43.93	Pass	
14341.667	39.67	-8.77	-0.89	30.01	PeakMax	H	261	290	74.00	-43.99	Pass	
10873.800	40.23	-7.85	-2.89	29.49	PeakMax	V	199	193	74.00	-44.51	Pass	
14555.000	39.65	-8.90	-1.34	29.41	PeakMax	H	111	20	74.00	-44.59	Pass	

Preview Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
14107.933	35.57	-8.73	-0.64	26.20	Debug	V	200	286	54.00	-27.80	Pass	
13695.533	35.54	-8.59	-0.88	26.07	Debug	V	200	132	54.00	-27.93	Pass	
17639.600	34.41	-10.15	1.03	25.29	Debug	V	300	66	54.00	-28.71	Pass	
14555.000	35.51	-8.90	-1.34	25.27	Debug	H	100	22	54.00	-28.73	Pass	
14341.667	34.92	-8.77	-0.89	25.26	Debug	H	200	110	54.00	-28.74	Pass	
10873.800	35.37	-7.85	-2.89	24.63	Debug	V	200	44	54.00	-29.37	Pass	
13025.400	34.32	-8.70	-1.00	24.63	Debug	V	300	44	54.00	-29.37	Pass	
11558.733	34.82	-8.26	-2.30	24.26	Debug	H	300	154	54.00	-29.74	Pass	
14621.800	34.72	-8.96	-1.67	24.09	Debug	V	100	242	54.00	-29.91	Pass	
14865.067	35.75	-9.09	-2.86	23.80	Debug	H	300	132	54.00	-30.20	Pass	
14918.533	34.56	-9.10	-3.12	22.34	Debug	V	100	154	54.00	-31.66	Pass	
15335.267	35.88	-9.30	-4.30	22.29	Debug	V	100	154	54.00	-31.71	Pass	
15414.200	34.70	-9.34	-4.48	20.88	Debug	H	200	88	54.00	-33.12	Pass	
18000.000	31.90	-10.31	1.13	22.72	Debug	V	199	193	54.00	-31.28	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

Radiated Emissions 18GHz - 26.5GHz



Test Information

Results Title	Radiated E 1m 18-26.5GHz
File Name	T5a RE 18G-26.5G fccb.emi
Test Laboratory	MH-AR5, 38%RH, 24C, 994hPa
Test Engineer	BB/MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0049.AWPQY AWPQZ 3 & 4 carrier FCC. RF Configuration: 1CC NR10 3624.99MHz 24dbm Mod. 3.1a. DC powered.
Configuration	FCC Part 15 Class B limit. Measure at 1 meter distance. RE 18GHz-26.5GHz. MXE E1608 RBW 120kHz Previews / 1MHz Formals, VBW 3MHz, Ref Level 80dBuV, Int. att. 10dB, HPF E1211, antenna E1526, Preamp E1601, E1528+E1529 cable set
Date	2023-06-07 19:27:28

Formal Data

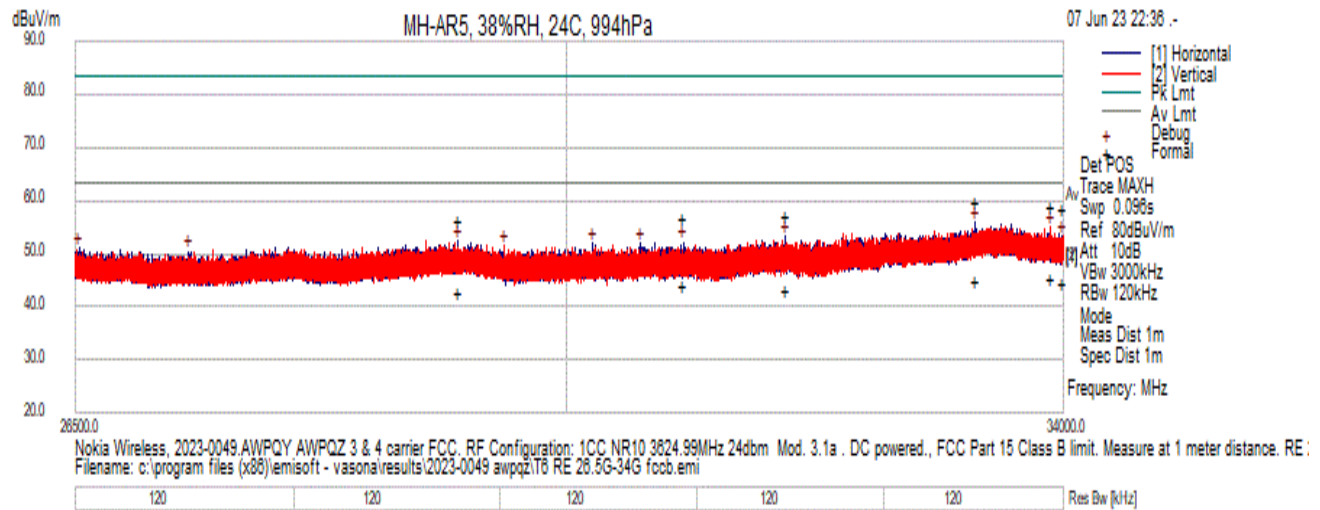
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
23091.245	32.47	12.71	-1.95	43.23	AvgMax	V	234	272	63.50	-20.27	Pass	
25792.161	31.50	13.39	-1.85	43.05	AvgMax	V	184	359	63.50	-20.45	Pass	
25558.793	31.20	13.33	-1.53	43.00	AvgMax	H	251	359	63.50	-20.50	Pass	
22422.362	32.97	12.46	-2.98	42.45	AvgMax	H	164	359	63.50	-21.05	Pass	
19632.813	36.28	11.68	-5.82	42.14	AvgMax	V	276	213	63.50	-21.36	Pass	
19049.369	36.10	11.48	-5.66	41.92	AvgMax	H	304	134	63.50	-21.58	Pass	
25558.793	44.79	13.33	-1.53	56.59	PeakMax	H	251	359	83.50	-26.91	Pass	
25792.161	44.99	13.39	-1.85	56.54	PeakMax	V	184	359	83.50	-26.96	Pass	
23091.245	44.93	12.71	-1.95	55.69	PeakMax	V	234	272	83.50	-27.81	Pass	
22422.362	45.79	12.46	-2.98	55.27	PeakMax	H	164	359	83.50	-28.23	Pass	
19049.369	48.64	11.48	-5.66	54.45	PeakMax	H	304	134	83.50	-29.05	Pass	
19632.813	48.49	11.68	-5.82	54.34	PeakMax	V	276	213	83.50	-29.16	Pass	

Preview Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
19049.369	38.56	11.48	-5.66	44.37	Debug	H	100	354	63.50	-19.13	Pass	
22422.362	35.65	12.46	-2.98	45.13	Debug	H	100	354	63.50	-18.37	Pass	
25558.793	35.37	13.33	-1.53	47.17	Debug	H	100	354	63.50	-16.33	Pass	
19632.813	37.73	11.68	-5.82	43.59	Debug	V	100	354	63.50	-19.91	Pass	
23091.245	36.27	12.71	-1.95	47.03	Debug	V	100	354	63.50	-16.47	Pass	
25792.161	35.64	13.39	-1.85	47.19	Debug	V	100	354	63.50	-16.31	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

Radiated Emissions 26.5GHz – 34GHz



Test Information

Results Title	Radiated E 1m 26.5-34GHz
File Name	T6 RE 26.5G-34G fccb.emi
Test Laboratory	MH-AR5, 38%RH, 24C, 994hPa
Test Engineer	BB/MJS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0049.AWPQY AWPQZ 3 & 4 carrier FCC. RF Configuration: 1CC NR10 3624.99MHz 24dbm Mod. 3.1a . DC powered.
Configuration	FCC Part 15 Class B limit. Measure at 1 meter distance. RE 26.5GHz-34GHz. MXE E1608 RBW 120kHz Previews / 1MHz Formals, VBW 3MHz, Ref Lvl 80dBuV, Int. att. 10dB, HPF E1211, antenna E1526, PreAmp E1601, E1528+E1529 cable set
Date	2023-06-08 07:08:35

Formal Data

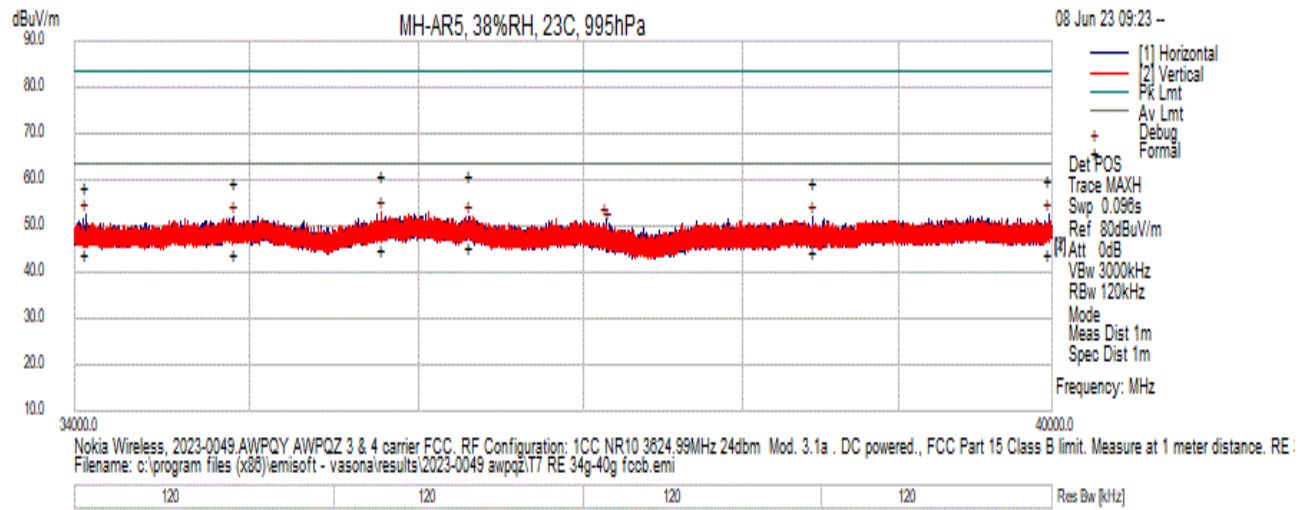
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
33898.300	29.70	14.92	0.69	45.31	AvgMax	V	252	58	63.50	-18.19	Pass	
33256.600	28.92	14.77	1.21	44.90	AvgMax	H	127	163	63.50	-18.60	Pass	
33999.050	29.07	14.93	0.40	44.40	AvgMax	V	163	1	63.50	-19.10	Pass	
30893.050	31.11	14.28	-1.38	44.01	AvgMax	H	304	319	63.50	-19.49	Pass	
31700.700	29.58	14.41	-0.52	43.46	AvgMax	H	182	175	63.50	-20.04	Pass	
29190.400	30.11	13.95	-1.17	42.89	AvgMax	H	220	112	63.50	-20.61	Pass	
33256.600	43.79	14.77	1.21	59.77	PeakMax	H	127	163	83.50	-23.73	Pass	
33898.300	43.51	14.92	0.69	59.12	PeakMax	V	252	58	83.50	-24.38	Pass	
33999.050	43.24	14.93	0.40	58.57	PeakMax	V	163	1	83.50	-24.93	Pass	
31700.700	43.37	14.41	-0.52	57.25	PeakMax	H	182	175	83.50	-26.25	Pass	
30893.050	43.69	14.28	-1.38	56.59	PeakMax	H	304	319	83.50	-26.91	Pass	
29190.400	43.43	13.95	-1.17	56.21	PeakMax	H	220	112	83.50	-27.29	Pass	

Preview Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
33256.600	39.77	14.77	1.21	55.74	Debug	H	200	0	63.50	-7.76	Pass	
33898.300	39.28	14.92	0.69	54.88	Debug	V	150	330	63.50	-8.62	Pass	
33999.050	37.98	14.93	0.40	53.31	Debug	V	300	308	63.50	-10.19	Pass	
31700.700	39.34	14.41	-0.52	53.22	Debug	H	250	220	63.50	-10.28	Pass	
29190.400	39.62	13.95	-1.17	52.39	Debug	H	150	176	63.50	-11.11	Pass	
30893.050	39.21	14.28	-1.38	52.11	Debug	H	100	352	63.50	-11.39	Pass	
30563.500	39.46	14.27	-1.64	52.09	Debug	H	300	330	63.50	-11.41	Pass	
30194.700	39.95	14.18	-2.08	52.06	Debug	H	150	66	63.50	-11.44	Pass	
29528.850	39.48	13.99	-1.98	51.49	Debug	V	250	198	63.50	-12.01	Pass	
26527.150	39.51	13.40	-1.90	51.00	Debug	H	150	352	63.50	-12.50	Pass	
27269.350	39.40	13.51	-2.54	50.36	Debug	H	300	88	63.50	-13.14	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

Radiated Emissions 34GHz – 40GHz



Test Information

Results Title	Radiated E 1m 34-40GHz
File Name	T7 RE 34g-40g fccb.emi
Test Laboratory	MH-AR5, 38%RH, 23C, 995hPa
Test Engineer	CP
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0049.AWPQY AWPQZ 3 & 4 carrier FCC. RF Configuration: 1CC NR10 3624.99MHz 24dbm Mod. 3.1a . DC powered.
Configuration	FCC Part 15 Class B limit. Measure at 1 meter distance. RE 34GHz-40GHz. MXE E1608 RBW 120kHz Previews / 1MHz Formals, VBW 3MHz, Ref Lvl 80dBuV, Int. att. 10dB, HPF E1211, antenna E1526, PreAmp E1601, E1528+E1529 cable set
Date	2023-06-08 09:25:40

Formal Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
36306.100	29.51	15.38	0.54	45.43	AvgMax	H	143	18	63.50	-18.07	Pass	
35779.250	28.69	15.18	1.09	44.95	AvgMax	V	145	336	63.50	-18.55	Pass	
38445.650	30.27	16.05	-1.75	44.57	AvgMax	H	156	101	63.50	-18.93	Pass	
34911.350	27.92	14.97	1.16	44.05	AvgMax	H	146	67	63.50	-19.45	Pass	
39983.200	27.32	16.34	0.34	44.00	AvgMax	H	116	250	63.50	-19.50	Pass	
34063.850	28.55	14.93	0.40	43.87	AvgMax	H	114	134	63.50	-19.63	Pass	
36306.100	45.31	15.38	0.54	61.24	PeakMax	H	143	18	83.50	-22.26	Pass	
35779.250	44.78	15.18	1.09	61.04	PeakMax	V	145	336	83.50	-22.46	Pass	
39983.200	43.38	16.34	0.34	60.05	PeakMax	H	116	250	83.50	-23.45	Pass	
38445.650	45.33	16.05	-1.75	59.63	PeakMax	H	156	101	83.50	-23.87	Pass	
34911.350	43.43	14.97	1.16	59.55	PeakMax	H	146	67	83.50	-23.95	Pass	
34063.850	43.42	14.93	0.40	58.74	PeakMax	H	114	134	83.50	-24.76	Pass	

Preview Data

Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
35779.250	36.92	15.18	1.09	53.18	Debug	V	175	198	63.50	-10.32	Pass	
34063.850	37.28	14.93	0.40	52.60	Debug	H	100	132	63.50	-10.90	Pass	
39983.200	35.77	16.34	0.34	52.45	Debug	H	200	308	63.50	-11.05	Pass	
38445.650	37.88	16.05	-1.75	52.18	Debug	H	175	231	63.50	-11.32	Pass	
36306.100	36.26	15.38	0.54	52.18	Debug	H	125	55	63.50	-11.32	Pass	
34911.350	35.79	14.97	1.16	51.92	Debug	H	200	352	63.50	-11.58	Pass	
37140.800	36.60	15.67	-0.66	51.61	Debug	H	175	154	63.50	-11.89	Pass	
37161.200	35.65	15.67	-0.73	50.60	Debug	H	175	66	63.50	-12.90	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

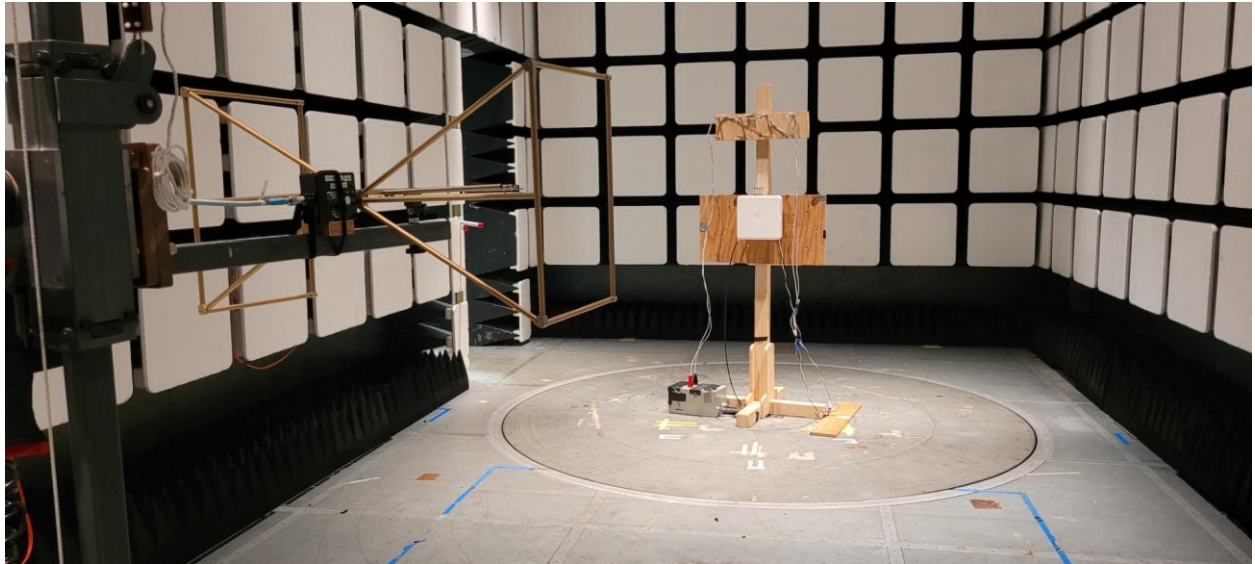
Photographs

Radio Test

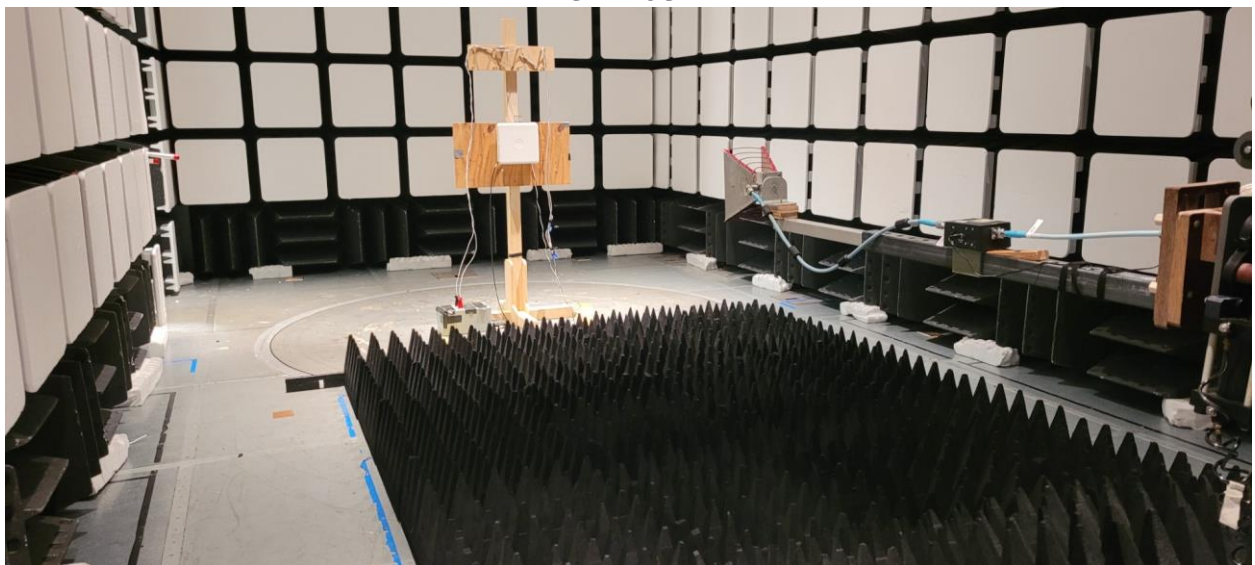


Radiated Emission Test

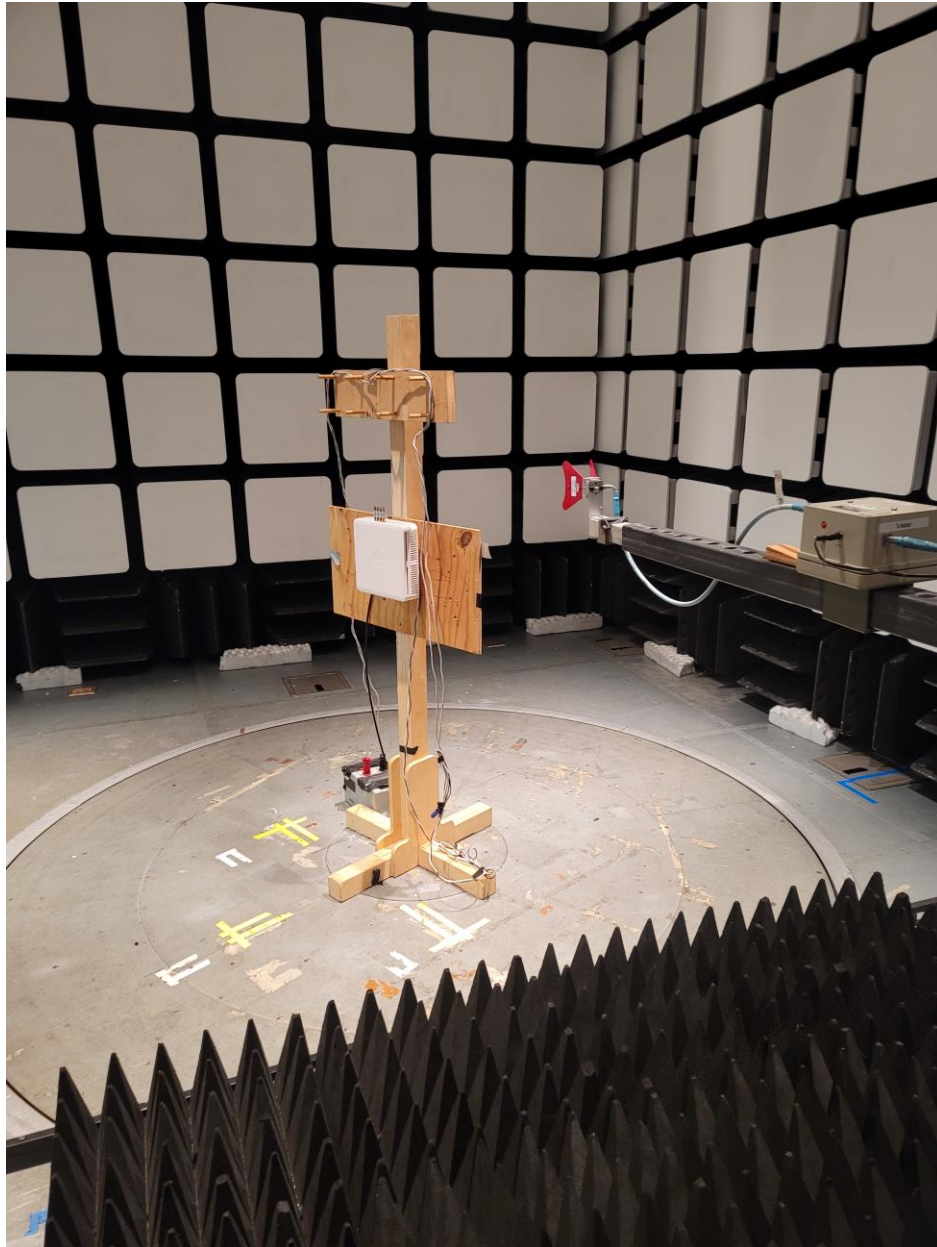
30MHz- 1GHz



1GHz-18GHz



18GHz – 40GHz



Test Equipment**Radio Test Equipment**

Asset ID	Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due
E896	Agilent Technologies	Network Analyzer	10 MHz - 40 GHz	N5230C	MY49000897	2023-02-08	2025-02-08
E1347	Fairview Microwave	Attenuator	10 dB, DC - 40 GHz, 20 watt	SA4023-10	N/A	CNR-V	CNR-V
E1367	Fairview Microwave	Attenuator	20 dB, DC - 40 GHz, 5 watt	SA4017-20	N/A	CNR-V	CNR-V
E1579	KeySight Technologies	MXA Signal Analyzer	10 Hz - 50 GHz	N9021B	MY60080199	2021-11-30	2023-11-30
E1212	RLC Electronics Inc	Filter, High Pass	10 - 30 GHz, 2W, 5dB	F-19414	1444002	CNR-V	CNR-V
E1587	Reactel, Inc.	Filter, High Pass	6 - 24 GHz	11HS-6G/24G-K11	20-02	CNR-V	CNR-V
E1154	Weinschel	Attenuator	30dB 25W 0.05GHz-26GHz	74-30-12	1065	CNR-V	CNR-V
	Micro Coax Utiflex	RF Cable	MFR-64639-228872-001	UF142A-000400-200-2G0	MFR-64639-228872-001	NA	NA
	Mini Circuit	Modular Test System		ZTM-53	91701250030	NA	NA
		CBRS Notch Filter	3550-3700MHz	ZTM-53	B6 163500004	NA	NA

CNR-V: Calibration Not Required, Must Be Verified

Test Dates: 4/17/2023 – 6/12/2023

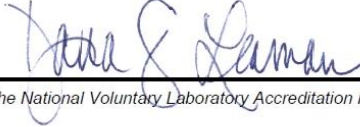
Radiated Emission Test Equipment

Asset ID	Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due
E601	A.H. Systems Inc.	Biological Antenna	25 - 2000 MHz	SAS-521-2	408	2022-06-16	2024-06-16
E1603	A.H. Systems Inc.	Pre-Amplifier	20 MHz - 18 GHz, 1 Watt Input limiter	PAM-0118P	621	2023-01-10	2025-01-10
E057	EMCO	Horn Antenna	Double Ridged Horn 1-18 GHz	3115	9006-3460	2022-01-05	2024-01-05
E1608	KeySight Technologies	EMI Receiver	MXE EMI Receiver, 3 Hz - 44 GHz	N9038B	MY61380146	2022-11-29	2024-11-29
E1211	RLC Electronics Inc	Filter, High Pass	10 - 30 GHz, 2W, 5dB	F-19414	1444003	CNR-V	CNR-V
E1480	Reactel, Inc.	Filter, High Pass	DC - 4.3 GHz	11HS-X4.3GS11	SN20-02	CNR-V	CNR-V
E954	Rohde & Schwarz	Test Receiver	EMI 20Hz - 40GHz -155 dBm +30 dBm	ESU40	100246	2022-12-08	2024-12-08
E1252	Sonoma Instrument Co.	Amplifier	Amplifier 9KHz-1GHz gain 32dB	310N	185704	2022-11-30	2024-11-30
E1601	A.H. Systems Inc.	Pre-Amplifier	18 - 42 GHz	PAM-1842	102	2022-12-12	2024-12-12
E1526	ETS Lindgren	Horn Antenna	Double Ridged Horn 10-40 GHz	3116C	0227821	2022-07-08	2024-07-08
E1529	Micro-Coax	Cable	1-40 GHz, 2.92 (m)+2.92 (m), 237 inch., armor, 90 degree bent	UFB142A-0-2370-2002G0	SFC235841	NA	NA
E1528	Micro-Coax	Cable	1-40 GHz, 2.92 (m)+2.92 (m), 36 inch., armor, 90 degree bent	UFB142A-Q-0360-2002GO	SFC235840	NA	NA
E1570	Weinschel	Attenuator	0-18 GHz, 6dB, 5W	WA2-6-0304	N/A	2021-12-01	2023-12-01

CNR-V: Calibration Not Required, Must Be Verified

Test Dates: 6/6/2023 – 6/13/2023

7. NVLAP Certificate of Accreditation

United States Department of Commerce National Institute of Standards and Technology NVLAP[®]  Certificate of Accreditation to ISO/IEC 17025:2017	
NVLAP LAB CODE: 100275-0	
Nokia, Global Product Compliance Lab Murray Hill, NJ	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i>	
2022-09-28 through 2023-09-30 <i>Effective Dates</i>	 For the National Voluntary Laboratory Accreditation Program