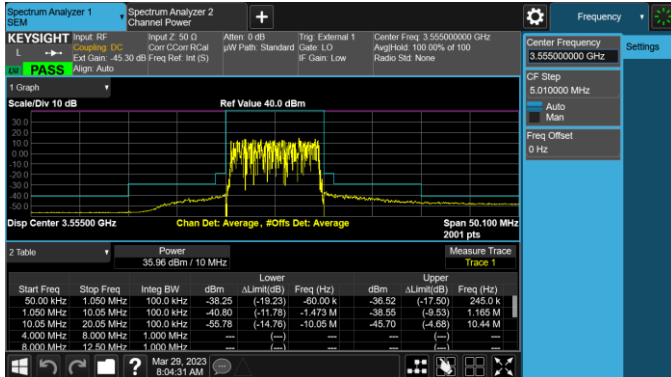


4.2.1 Edge of Band Emissions - Plots.

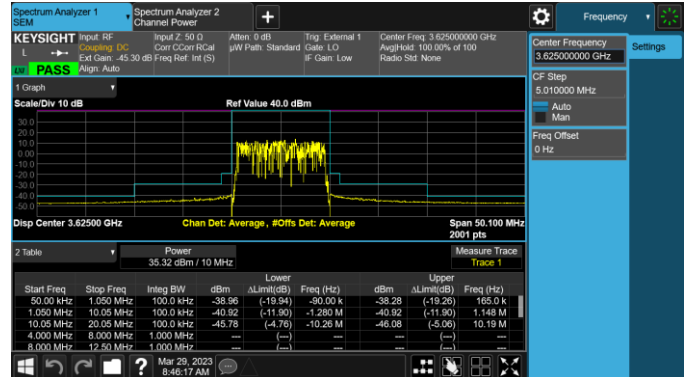
All of the measurements met the requirements of Part 96.41(e)(1) and KDB 940660 D01 Section 3.2 (b)(6) when measured per Part 2.1049.

4.2.1.1 LTE, 10MHz, 35.5dBm

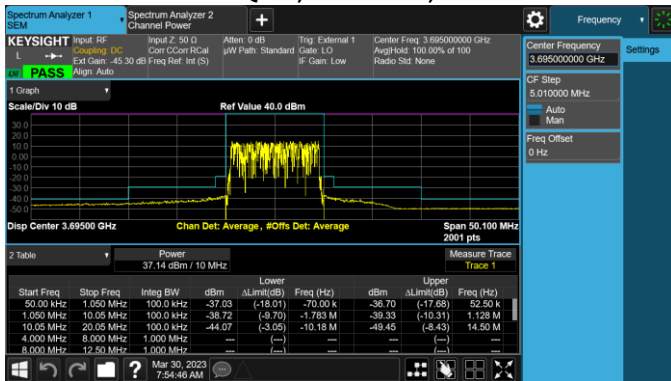
64QAM, 3555MHz, TX4



QPSK/16QAM, 3625MHz, TX2

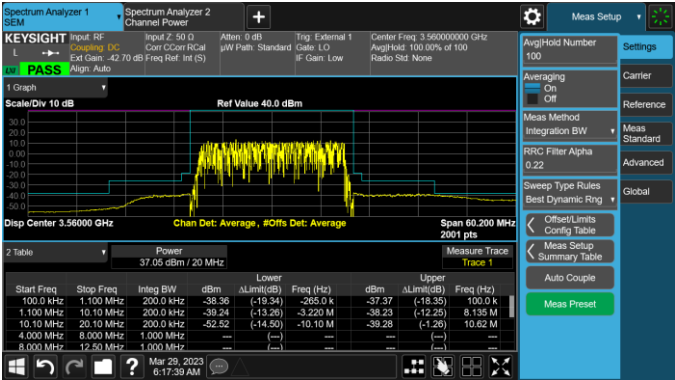


256QAM, 3695MHz, TX4

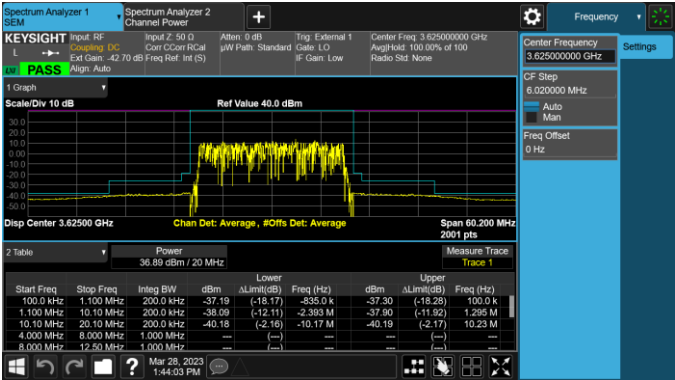


4.2.1.2 LTE, 20MHz, 37dBm

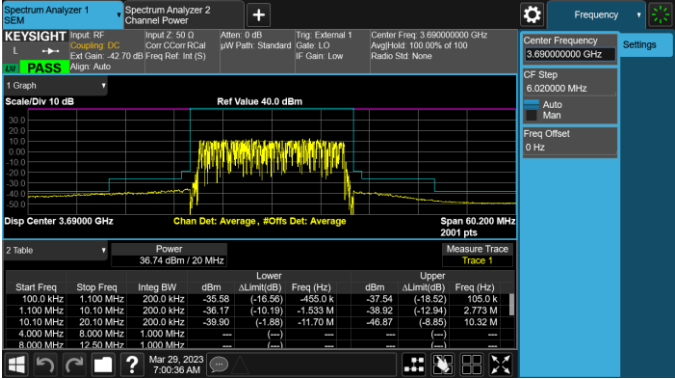
64QAM, 3560MHz, TX4



QPSK/16QAM, 3625MHz, TX2

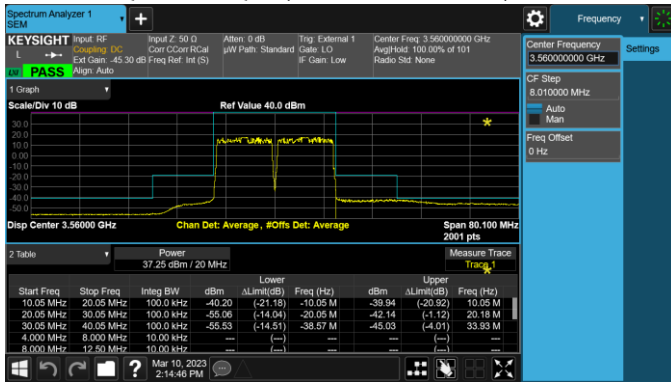


256QAM, 3690MHz, TX4

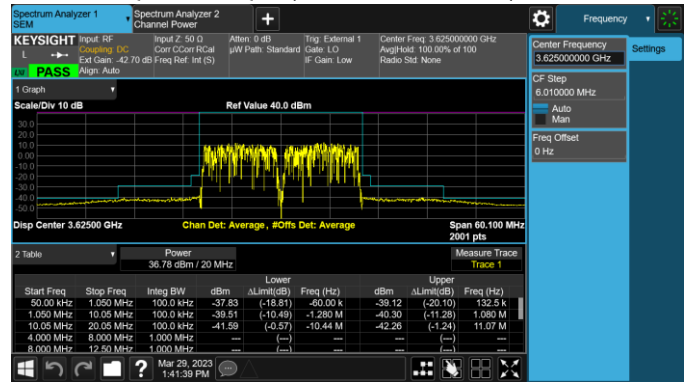


4.2.1.3 LTE, 10+10MHz, 37dBm

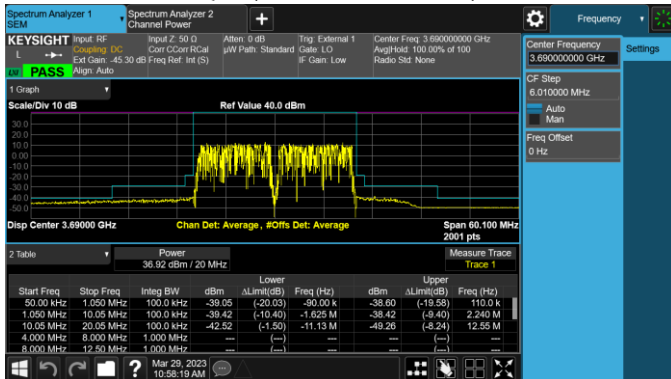
QPSK/16QAM, 3555+3565 MHz, TX4



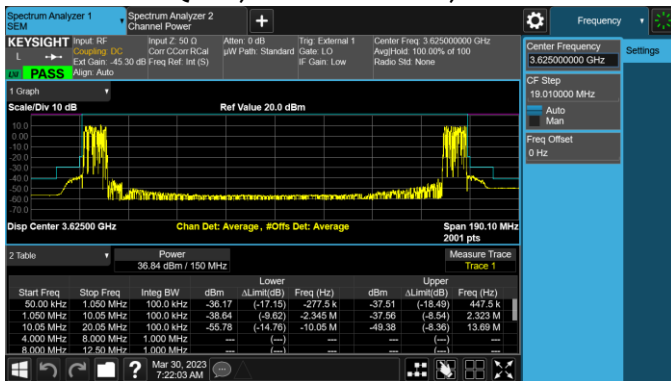
QPSK/16QAM, 3620+3630 MHz, TX2



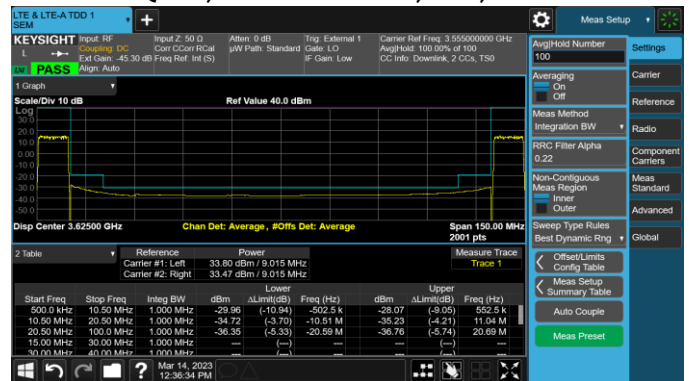
256QAM, 3685+3695 MHz, TX4



QPSK, 3555+3695MHz, TX4

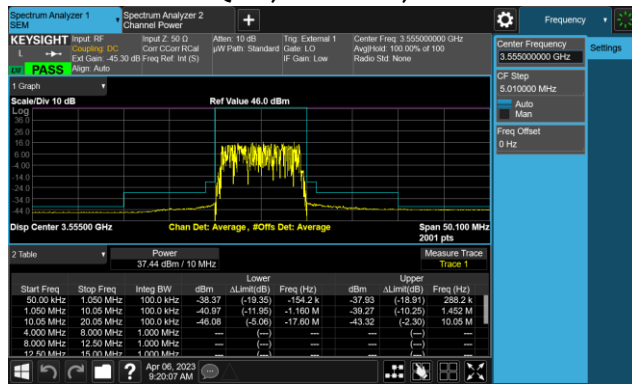


QPSK, 3555+3695MHz, TX4, Inner

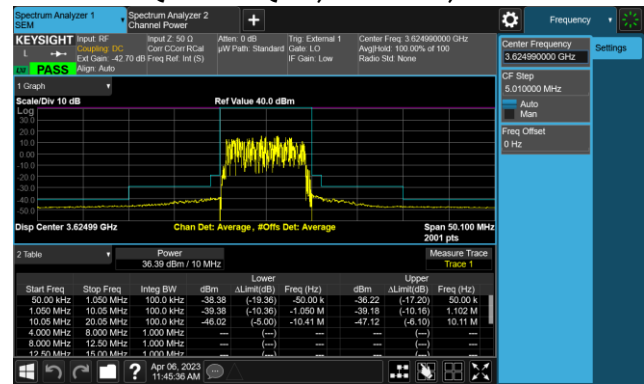


4.2.1.5 5G-NR, 10MHz, 35.5dBm

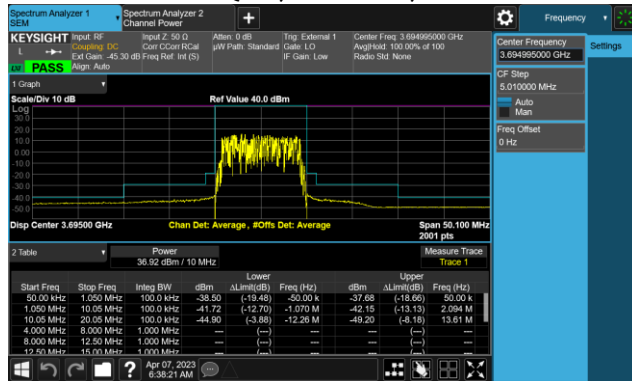
64QAM, 3555MHz, TX4



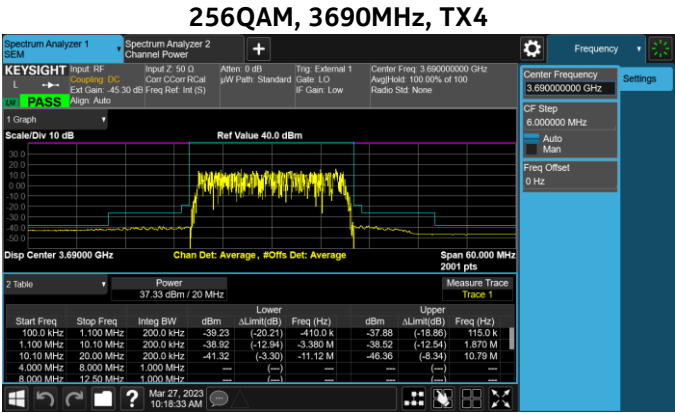
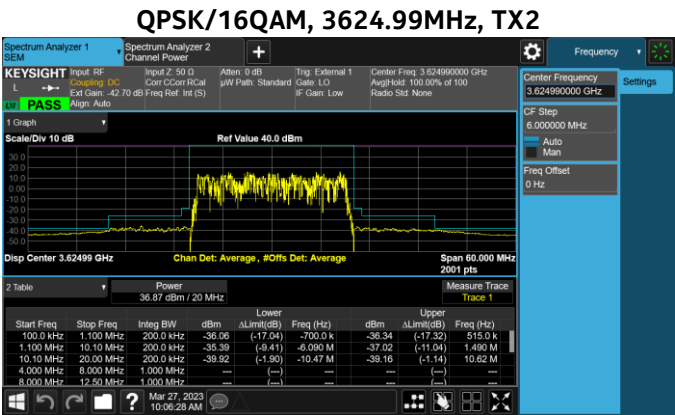
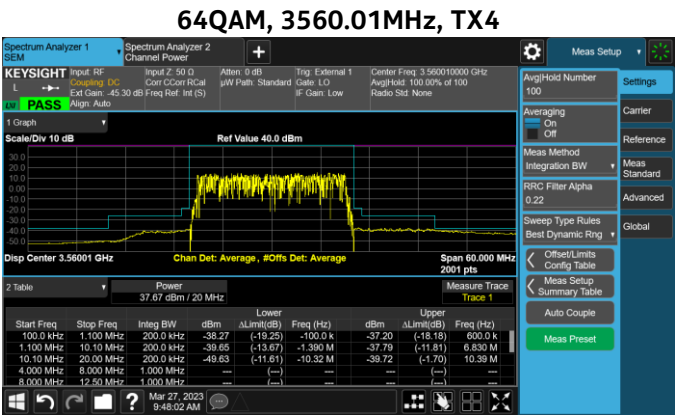
QPSK/16QAM, 3625MHz, TX2



256QAM, 3695MHz, TX4

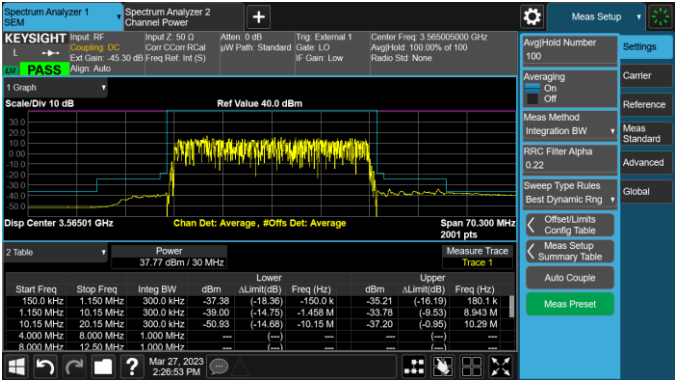


4.2.1.7 5G-NR, 20MHz, 37dBm

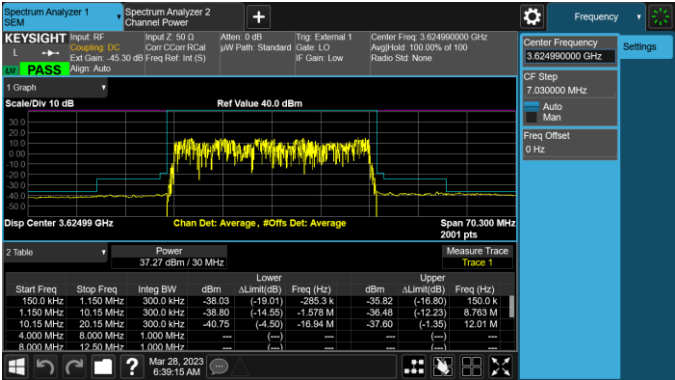


4.2.1.9 5G-NR, 30MHz, 37dBm

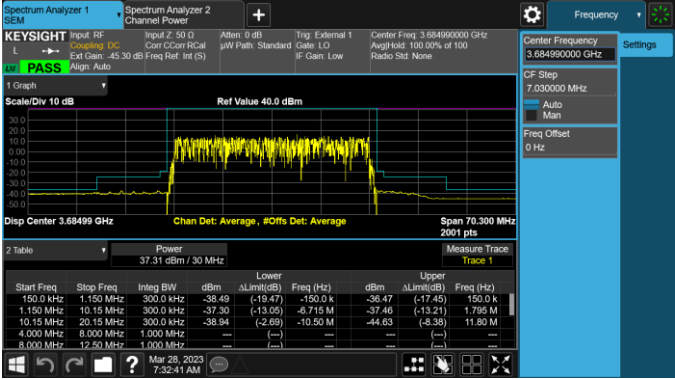
64QAM, 3565.005MHz, TX4



QPSK/16QAM, 3624.99MHz, TX4

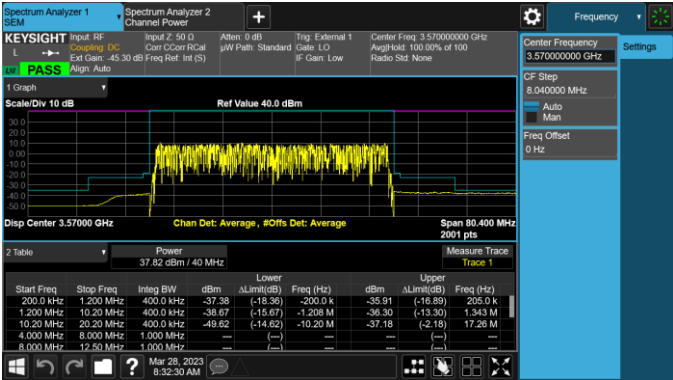


256QAM, 3684.99MHz, TX4

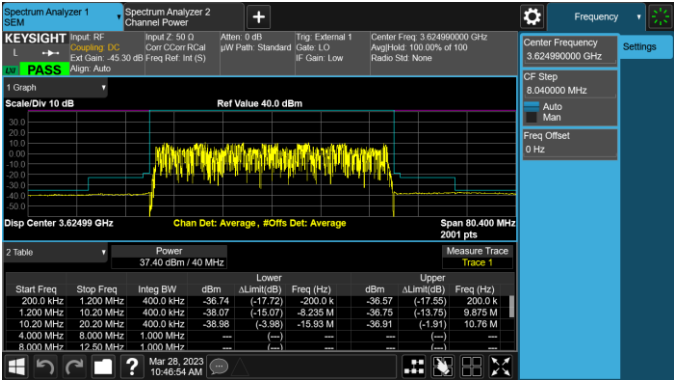


4.2.1.11 5G-NR, 40MHz, 37dBm

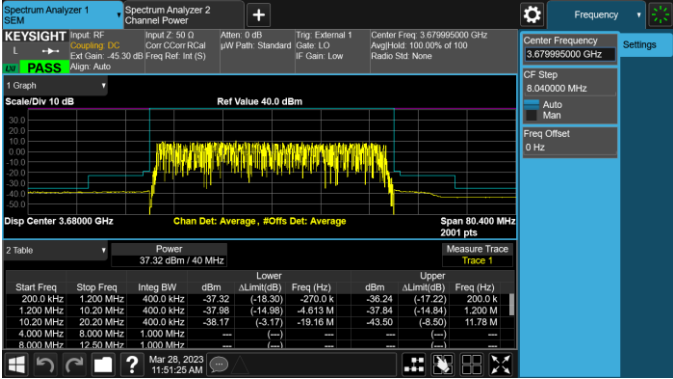
64QAM, 3570MHz, TX4



QPSK/16QAM, 3624.99MHz, TX4

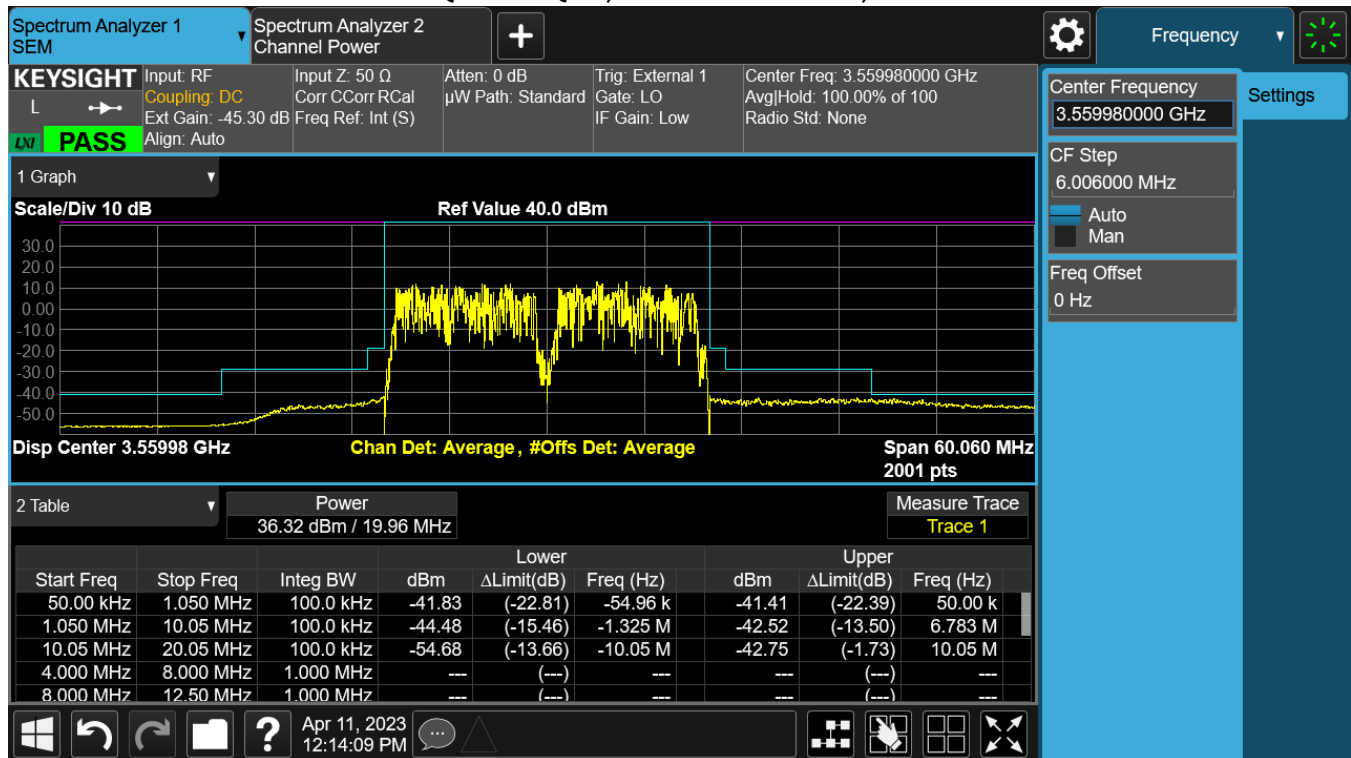


256QAM, 3679.995MHz, TX4

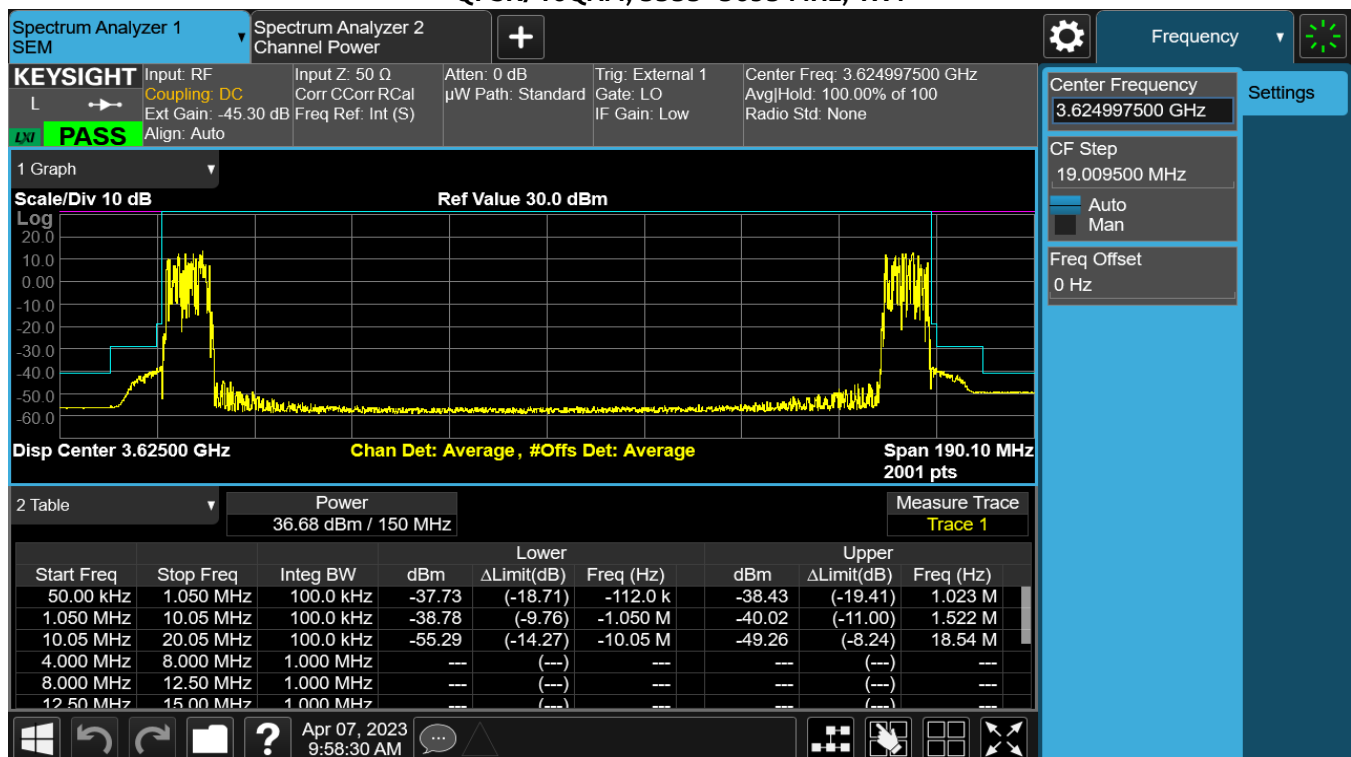


4.2.1.13 5G-NR, 10+10MHz, 37dBm

QPSK/16QAM, 3555+3564.96 MHz, TX4

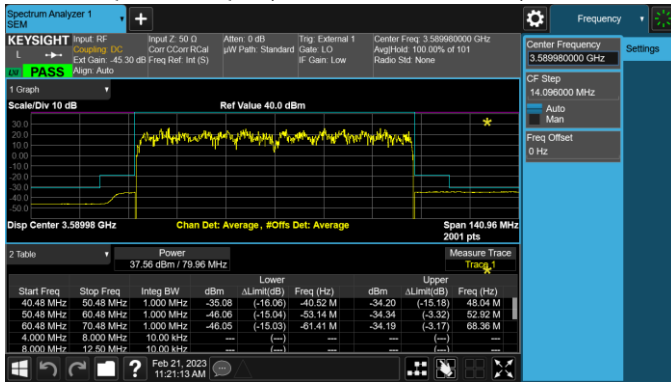


QPSK/16QAM, 3555+3695 MHz, TX4

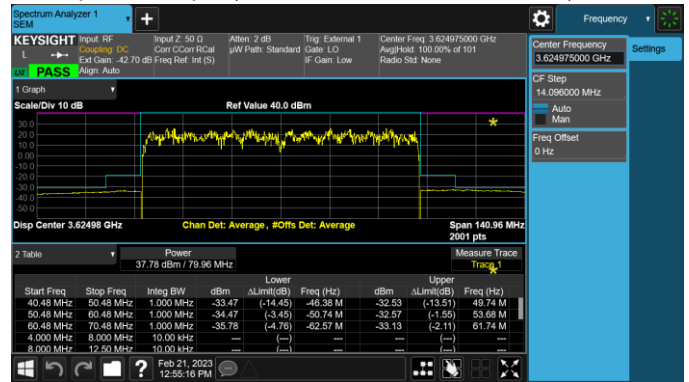


4.2.1.14 5G-NR, 40+40MHz, 37dBm

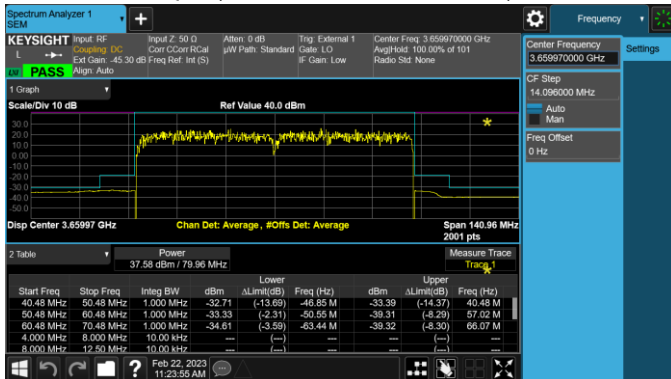
QPSK/16QAM, 3570+3609.96MHz, TX4



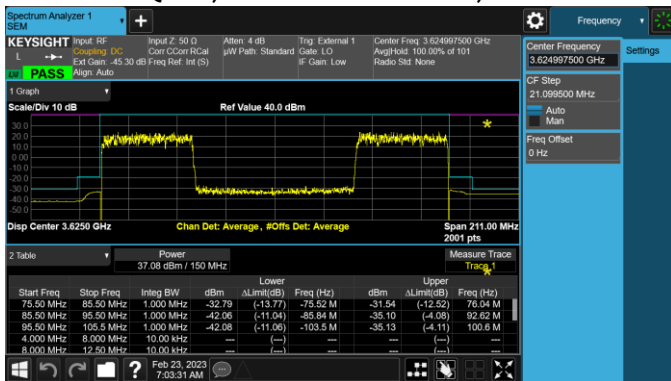
QPSK/16QAM, 3604.995 + 3644.955MHz, TX2



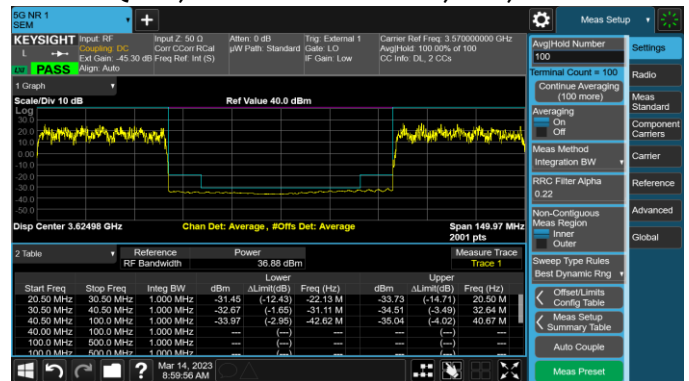
256QAM, 3639.99+3679.95MHz, TX4



QPSK, 3570+3679.995MHz, TX4



QPSK, 3570+3679.995MHz, TX4, 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 9 kHz to 37 GHz which is beyond the 10th harmonic of the carrier frequency. A test coupler and/or attenuator 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 spurious measurements were made using a PC based automated test system which controls either a MXA Signal Analyzer or a Rohde & Schwarz ESU-40 Test Receiver/ Spectrum 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 $> 2 \times \text{Span}/\text{RBW}$.

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, the required emission limit for emissions outside a licensee's frequency block is:

47CFR 96.41 (e)(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed $-40\text{dBm}/\text{MHz}$. 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 $n=4 \rightarrow 10\text{LOG}(4) = 6.02 \text{ dB}$

Therefore, the limit for emissions $>20 \text{ MHz}$ outside a licensee's frequency block when measured with a RBW of 1 MHz is:

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

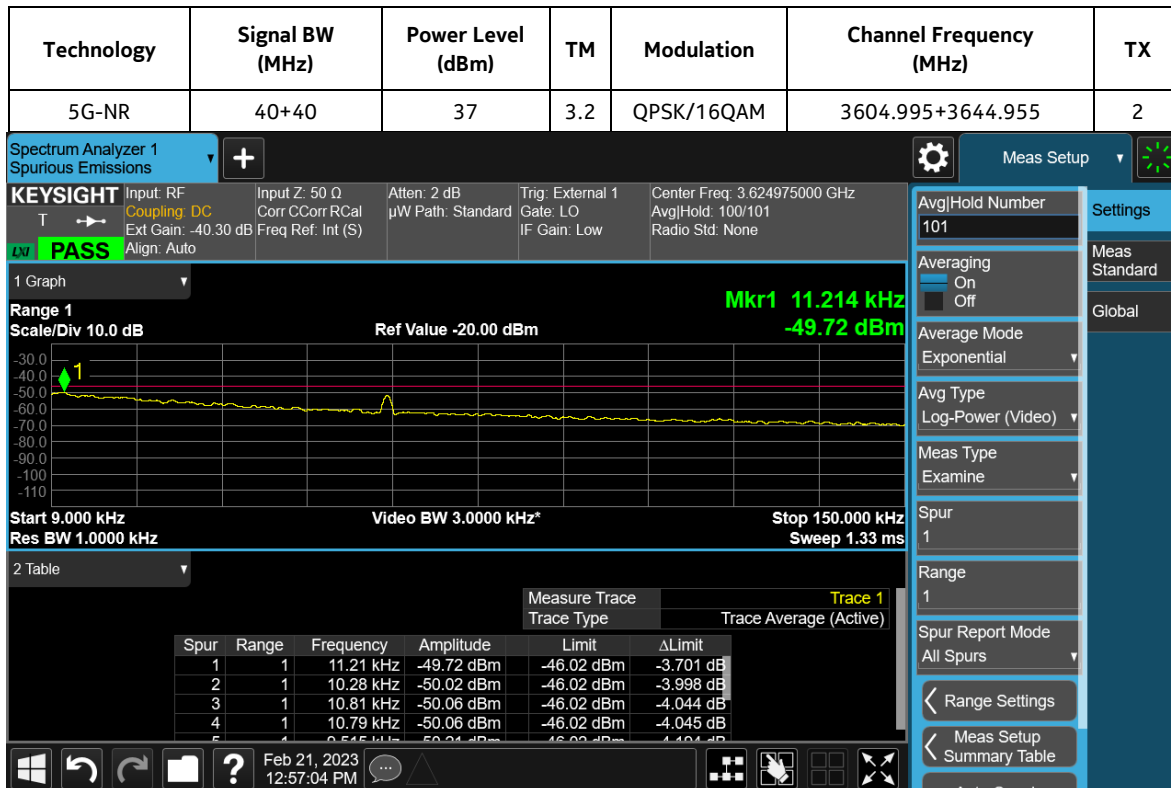
5.2 Spurious Emissions at Antenna Terminals Results

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.

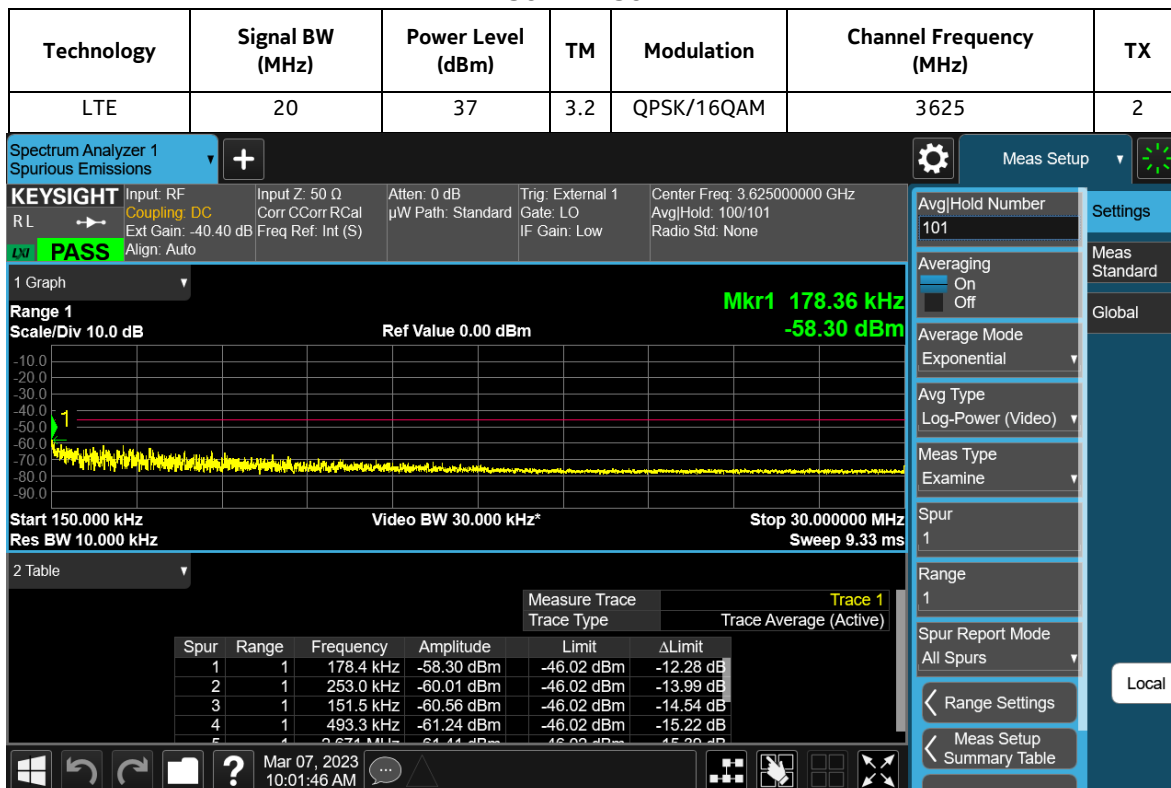
Tabular Data – Spurious Emissions at Antenna Terminals

Technology	Signal BW (MHz)	Power Level (dBm)	TM	Modulation	Channel Frequency (MHz)	TX	Conducted Spurious Emissions Results
5G-NR	10	35.5	3.1	64QAM	3555	4	Pass
5G-NR	10	35.5	3.2	QPSK/16QAM	3625	2	Pass
5G-NR	10	35.5	3.1a	256QAM	3695	4	Pass
5G-NR	20	37	3.1	64QAM	3560.01	4	Pass
5G-NR	20	37	3.2	QPSK/16QAM	3624.99	2	Pass
5G-NR	20	37	3.1a	256QAM	3690	4	Pass
5G-NR	30	37	3.1	64QAM	3565.005	4	Pass
5G-NR	30	37	3.2	QPSK/16QAM	3624.99	4	Pass
5G-NR	30	37	3.1a	256QAM	3684.99	4	Pass
5G-NR	40	37	3.1	64QAM	3570	4	Pass
5G-NR	40	37	3.2	QPSK/16QAM	3624.99	4	Pass
5G-NR	40	37	1.1	QPSK	3679.995	4	Pass
5G-NR	10+10	37	3.2	QPSK/16QAM	3555+3564.96	4	Pass
5G-NR	10+10	37	3.2	QPSK/16QAM	3555+3695	4	Pass
5G-NR	40+40	37	1.1	QPSK	3570+3679.995	4	Pass
5G-NR	40+40	37	3.2	QPSK/16QAM	3570+3609.96	4	Pass
5G-NR	40+40	37	3.2	QPSK/16QAM	3604.995+3644.955	2	Pass
5G-NR	40+40	37	3.1a	256QAM	3639.99+3679.95	4	Pass
LTE	10	35.5	3.1	64QAM	3555	4	Pass
LTE	10	35.5	3.2	QPSK/16QAM	3625	2	Pass
LTE	10	35.5	3.1a	256QAM	3695	4	Pass
LTE	20	37	3.1	64QAM	3560	4	Pass
LTE	20	37	3.2	QPSK/16QAM	3625	2	Pass
LTE	20	37	3.1a	256QAM	3690	4	Pass
LTE	10+10	37	3.2	QPSK/16QAM	3555+3565	4	Pass
LTE	10+10	37	3.2	QPSK/16QAM	3620+3630	2	Pass
LTE	10+10	37	3.1a	256QAM	3685+3695	4	Pass
LTE	10+10	37	1.1	QPSK	3555+3695	4	Pass

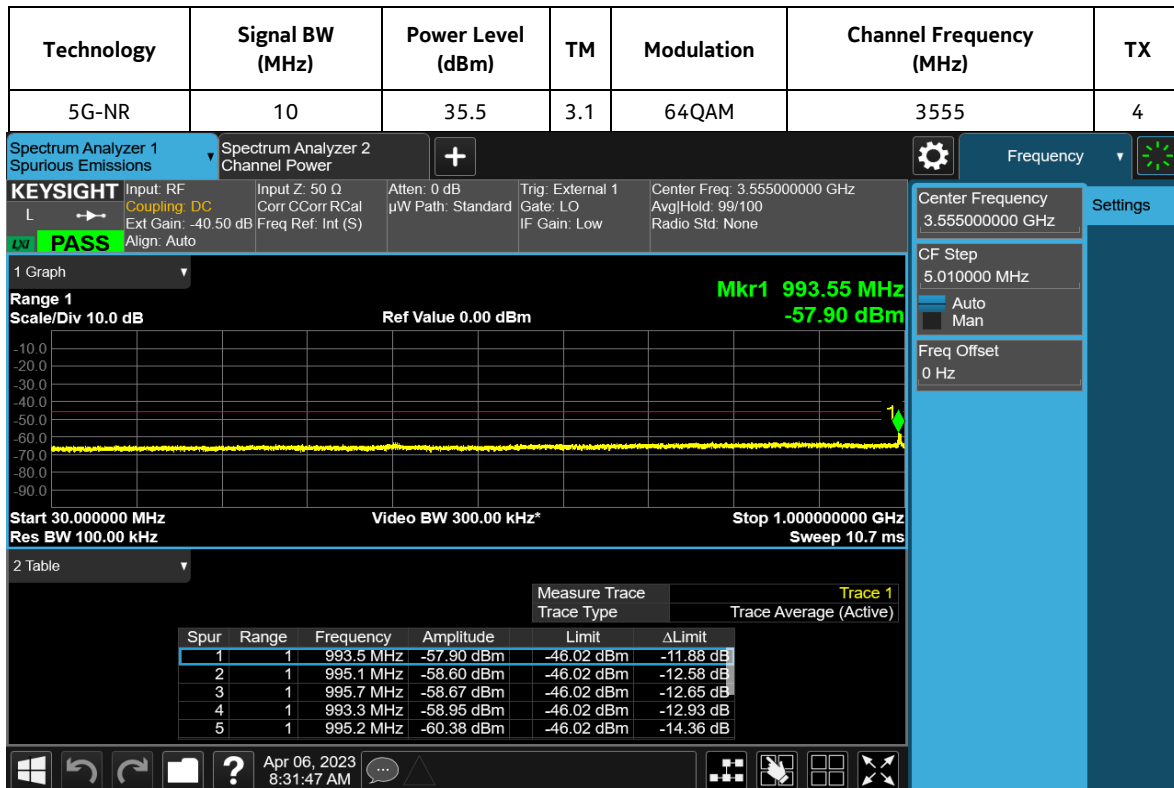
9KHz – 150kHz



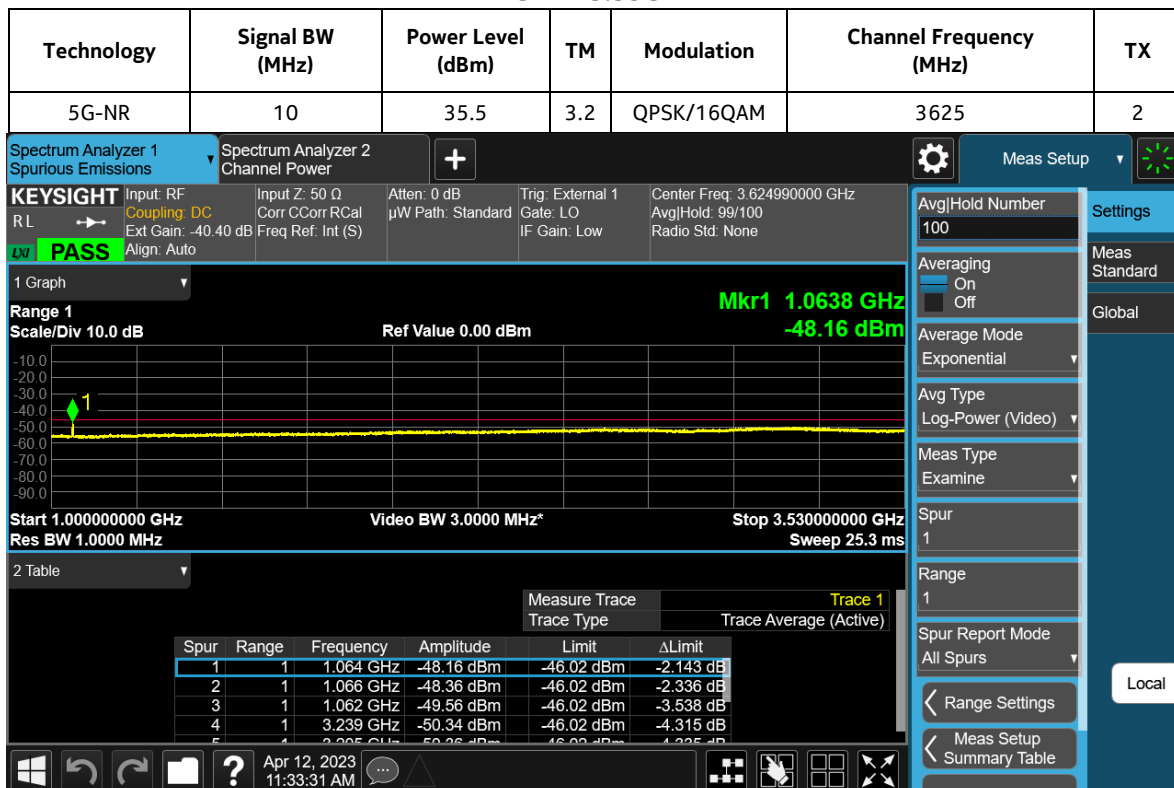
150kHz – 30MHz



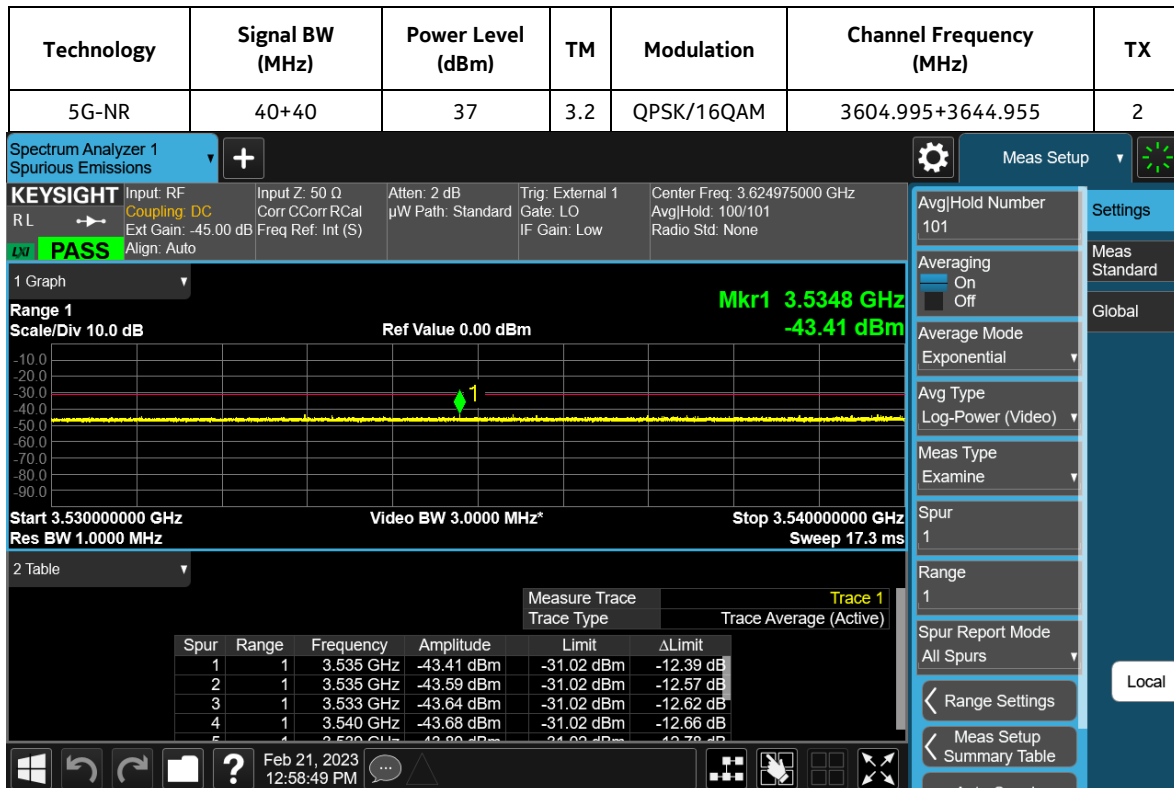
30MHz – 1GHz



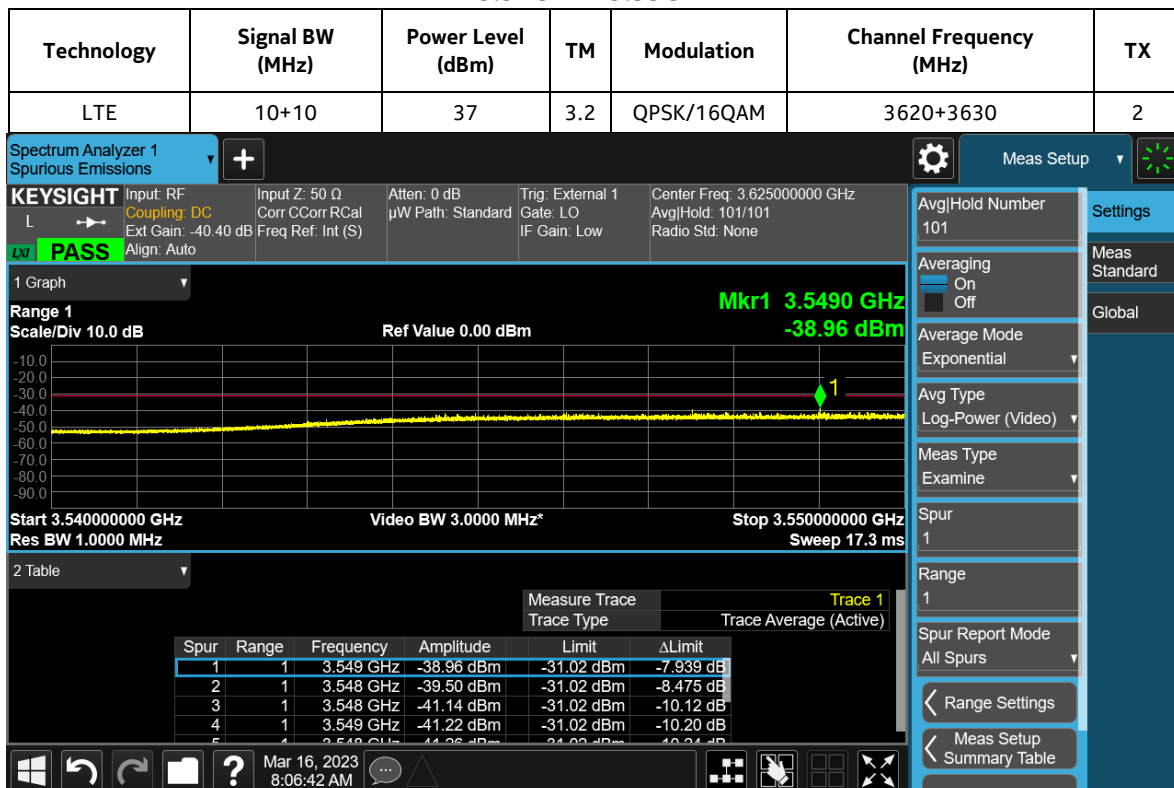
1GHz – 3.53GHz



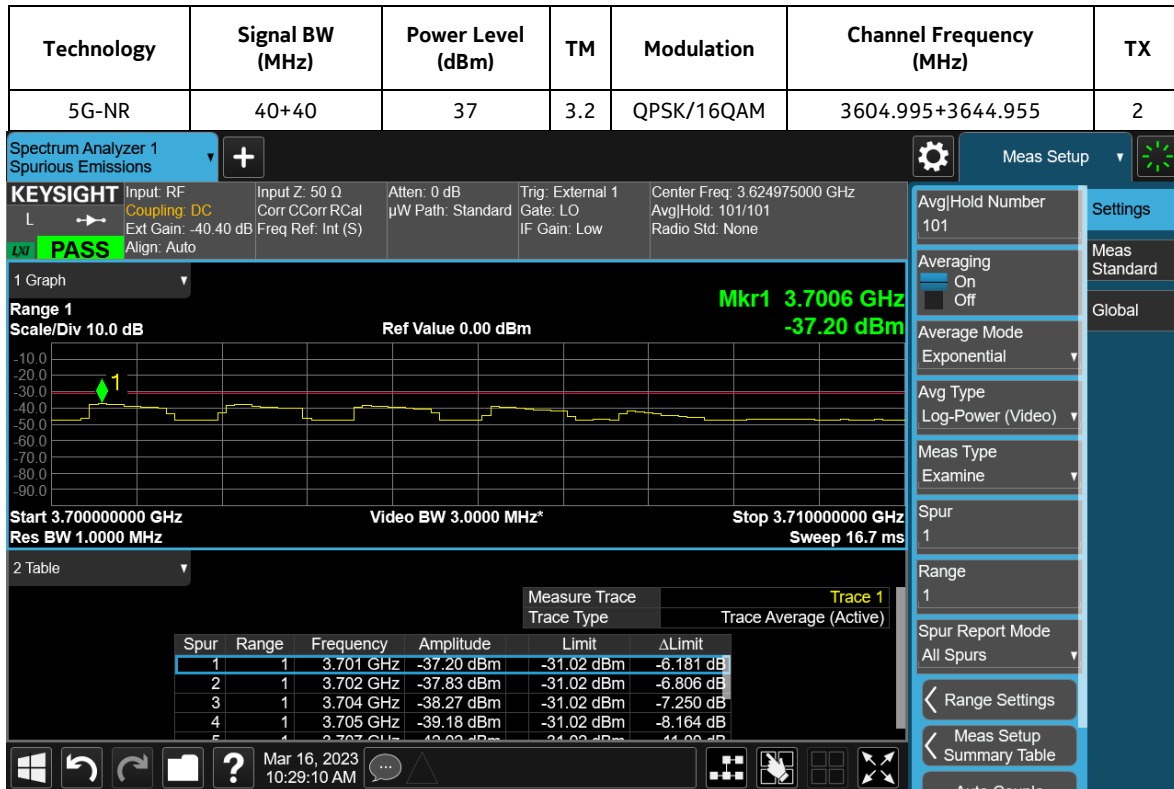
3.53GHz – 3.54GHz



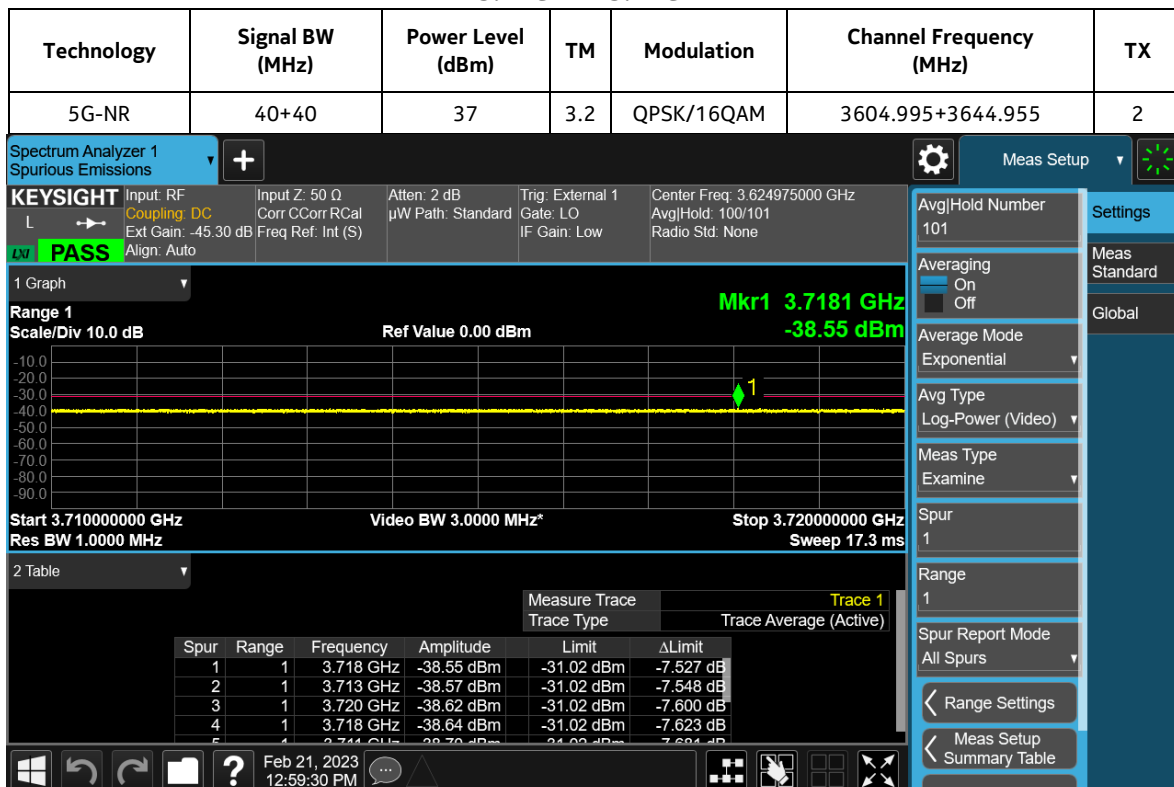
3.54GHz – 3.55GHz



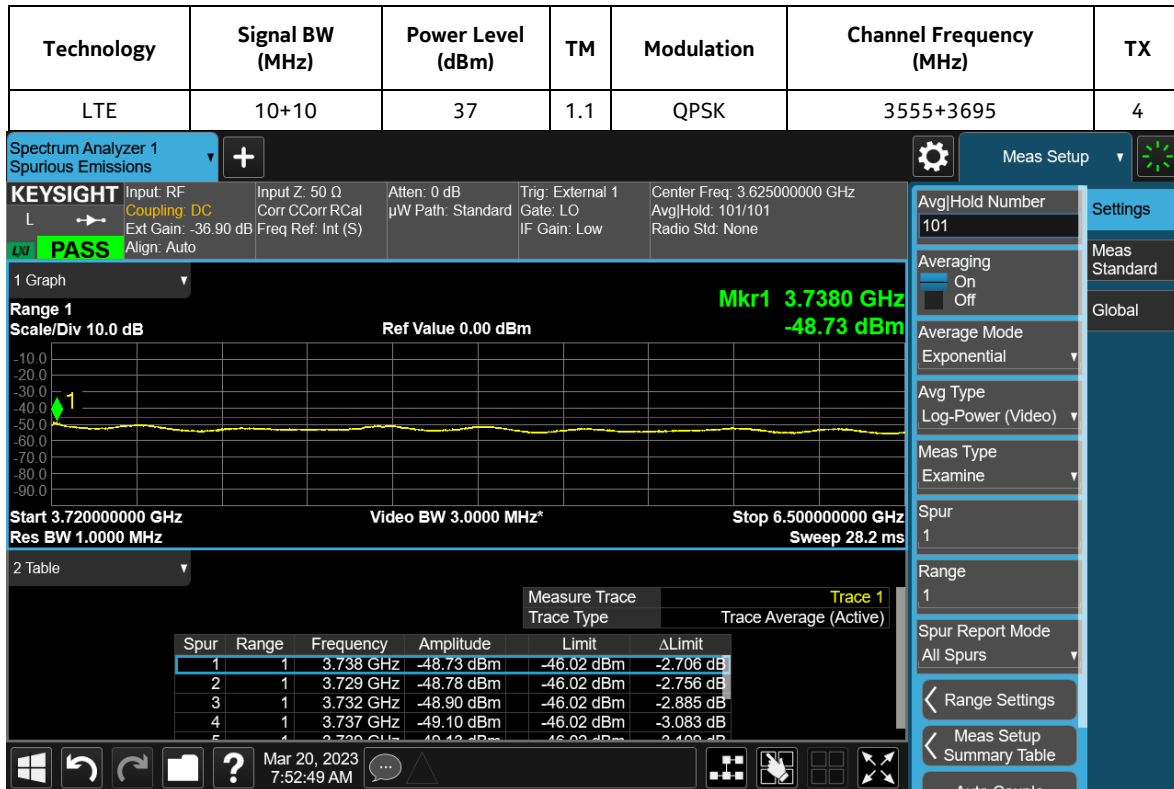
3.592-3.658G: 40+40 3570+3680 has a margin of -3.518dB
3.70GHz – 3.71GHz



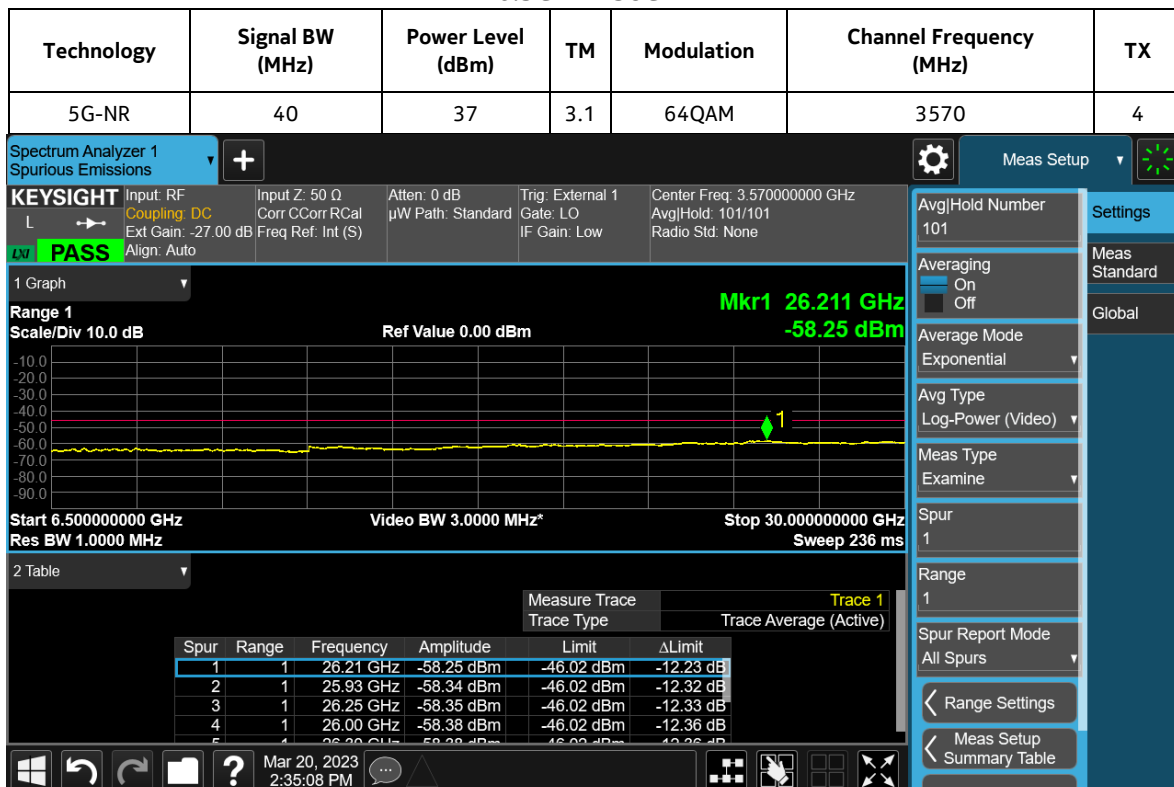
3.71GHz – 3.72GHz

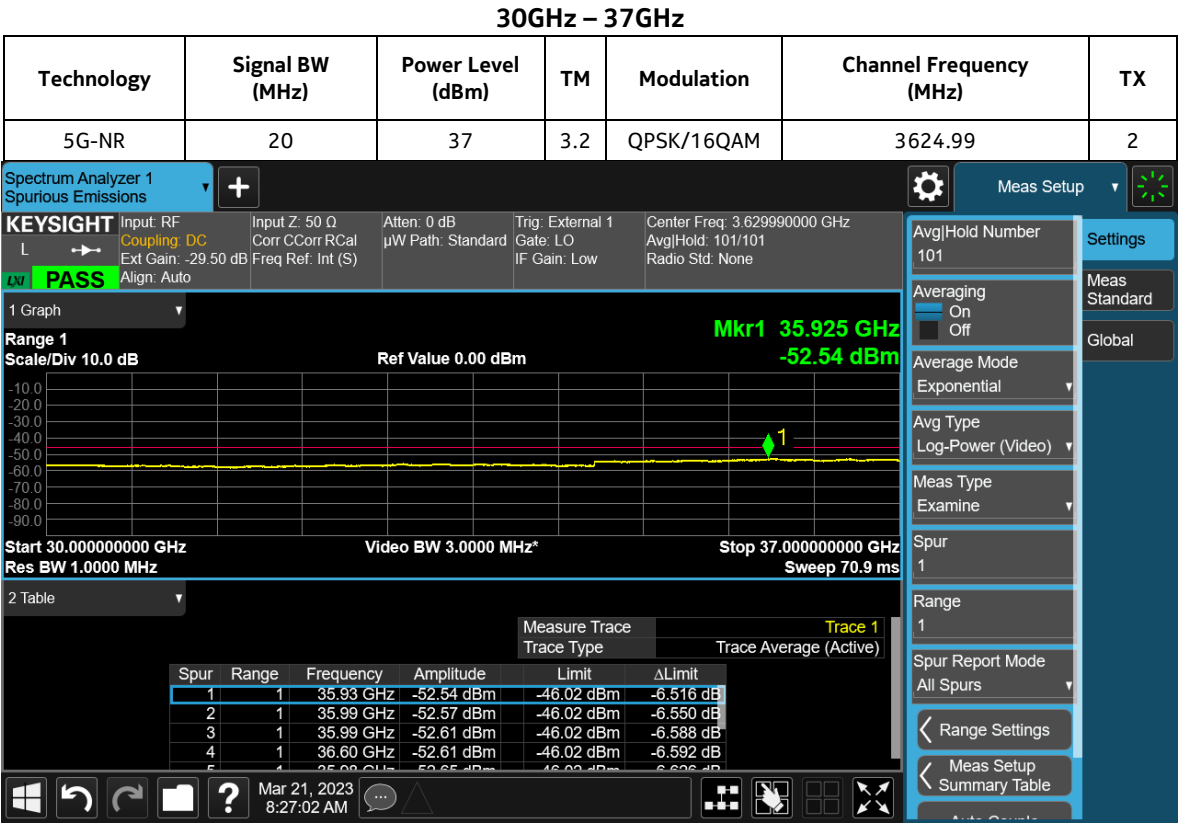


3.72GHz – 6.5GHz



6.5GHz – 30GHz





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-6, (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

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

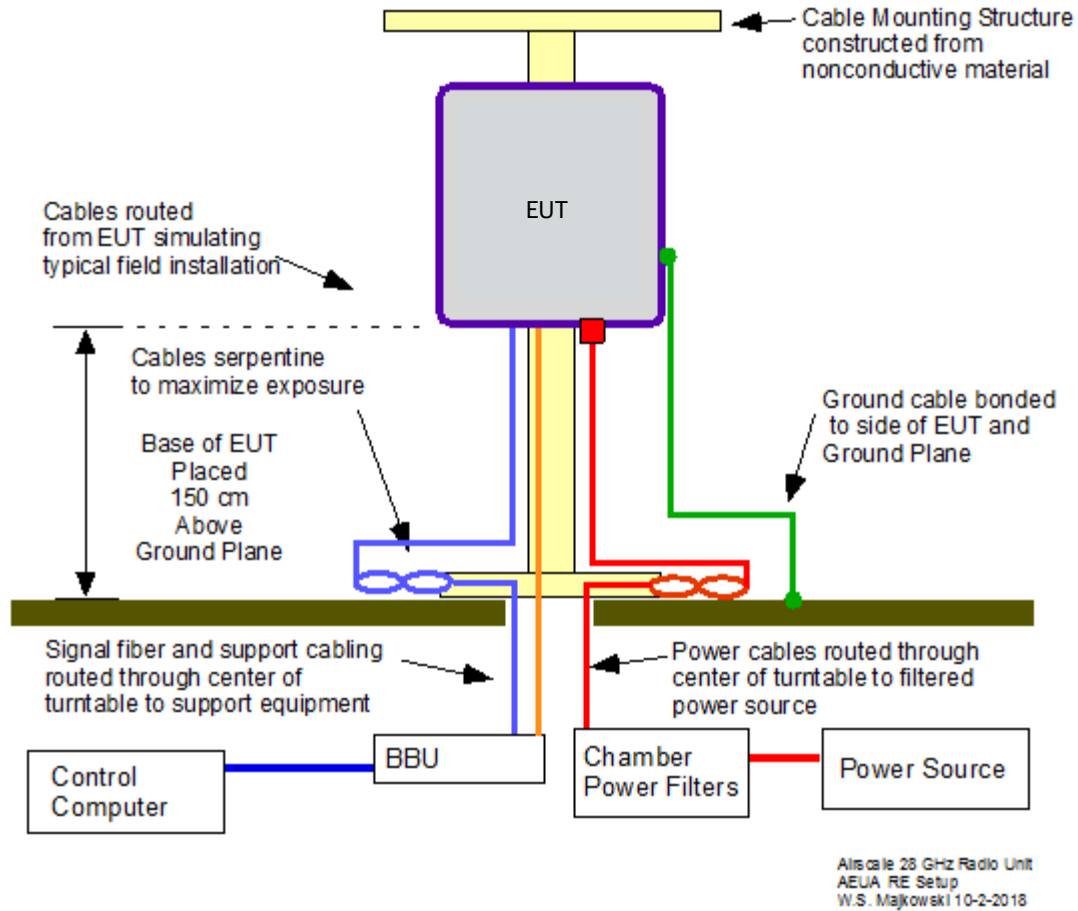
Field strength measurements of radiated spurious emissions were made in the 3m semi-anechoic chamber, AR-6 as detailed above. The recommendations of ANSI C63.4 and ANSI C63.26 were followed for EUT testing setup, cabling, and measurement approach and procedures. All the measurement equipment used, including 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 up to 54.5 dBuV/m AVE was used which is worse than FCC Part 96 limit. Above 18GHz, the limit 55.2 dBuV/m AVE was used.

6.2 Field Strength of Spurious Radiation Results:

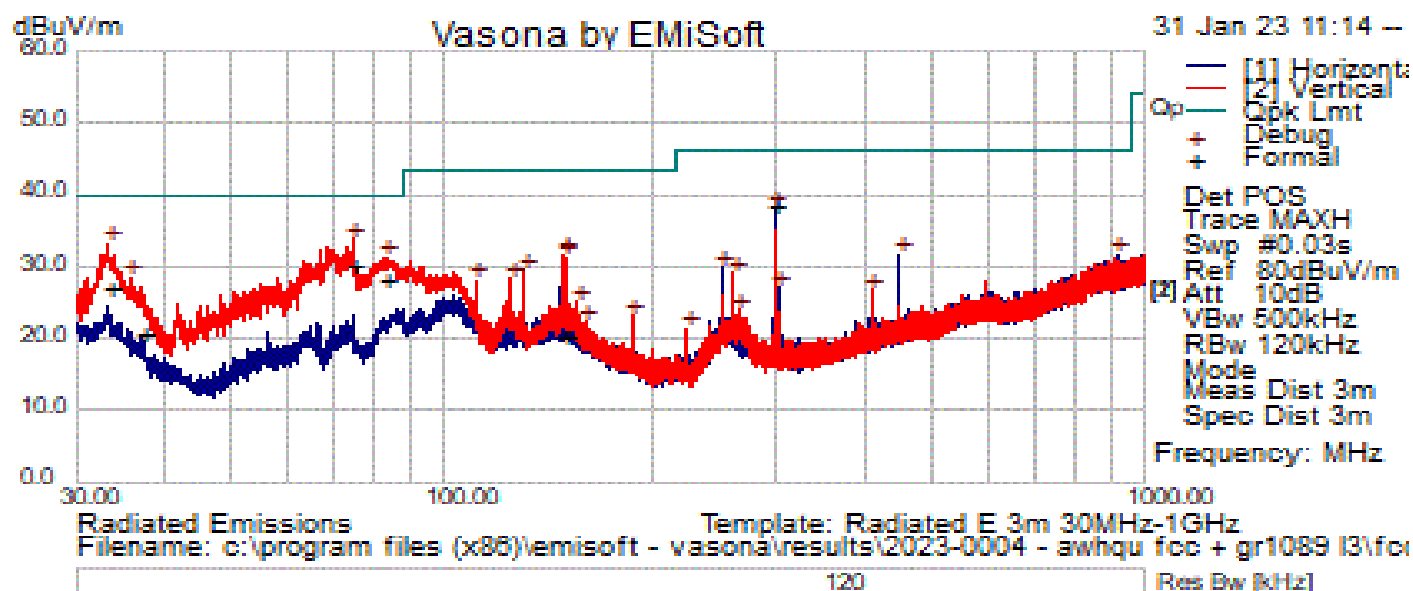
This product meets Part 96 Requirements. For the Title 47CFR section 96.41(e) and 2.1053 test, the field strength of any spurious radiation, measured at 3m, is required to be less than 55.2dB μ V/meter. Emissions equal to or less than 35.2 dB μ V/meter are not reportable and may be verified using field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

Radiated Emission Setup



6.3 Transmitter Measurements of Radiated Spurious Emissions Plots

RE 30MHz – 1GHz



Test Information

Results Title	Radiated E 3m 30MHz-1GHz
File Name	fcc 15 re 30mhz-1ghz.emi
Test Laboratory	MH-AR5, 25.8%RH, 23C, 1003hPa
Test Engineer	CP/HS
Test Software	Vasona by EMIsoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0004_AWHQU FCC + GR1089 L3. Product arranged in a single carrier configuration (1CC NR20). Carrier 1 set at 3624.99 MHz; Modulation = TM3.1a, TX Power = 37 dBm per port. -48 V DC.
Configuration	FCC 15 Class B, RE 30MHz-1GHz at 3 meter. ESW E1511, RBW: 100KHz, VBW:3MHz, Internal Att. 10dB. PA E1252, LPF E980, Bilog E601, AR-5 Cable set.
Date	2023-01-31 11:26:06

Formal Data

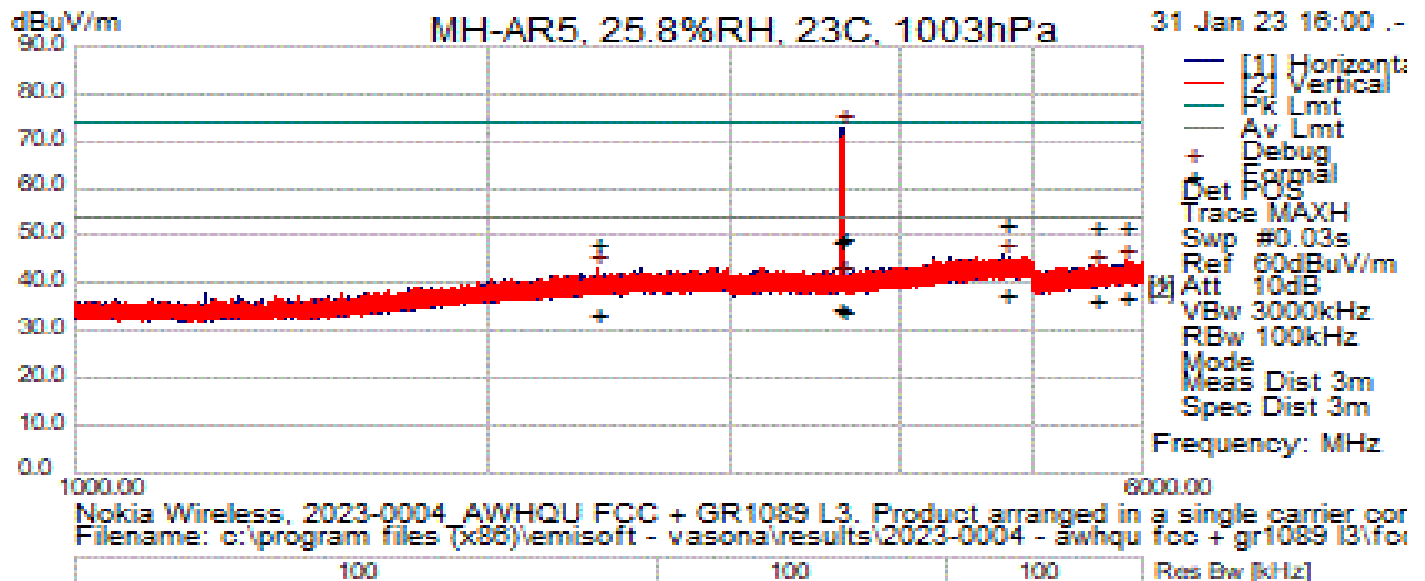
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
297.011	49.97	1.79	-13.08	38.67	QuasiMax	H	169	353	46.00	-7.33	Pass	
74.275	49.23	1.00	-19.94	30.30	QuasiMax	V	141	22	40.00	-9.70	Pass	
82.946	45.27	1.07	-17.88	28.47	QuasiMax	V	129	29	40.00	-11.53	Pass	
33.582	37.12	0.89	-10.72	27.30	QuasiMax	V	107	329	40.00	-12.70	Pass	
37.372	32.55	0.87	-12.71	20.71	QuasiMax	V	114	90	40.00	-19.29	Pass	
149.313	27.98	1.42	-8.89	20.51	QuasiMax	V	114	186	43.50	-22.99	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
74.296667	52.77	1.01	-19.94	33.84	Debug	V	100	45	40.00	-6.16	Pass	
33.330333	42.83	0.89	-10.58	33.14	Debug	V	100	270	40.00	-6.86	Pass	
297.008667	49.46	1.79	-13.08	38.16	Debug	H	185	0	46.00	-7.84	Pass	
82.412333	48.10	1.07	-18.01	31.16	Debug	V	100	0	40.00	-8.84	Pass	
35.884667	39.54	0.88	-11.92	28.49	Debug	V	100	45	40.00	-11.51	Pass	
148.501667	39.15	1.42	-8.91	31.66	Debug	V	100	180	43.50	-11.84	Pass	
150.021333	38.66	1.42	-8.87	31.22	Debug	V	100	180	43.50	-12.28	Pass	
130.524333	37.63	1.34	-9.48	29.49	Debug	V	200	90	43.50	-14.01	Pass	
448.005333	40.10	1.80	-10.21	31.69	Debug	H	100	315	46.00	-14.31	Pass	
915.933333	32.32	2.84	-3.56	31.60	Debug	H	185	0	46.00	-14.40	Pass	
124.995333	36.57	1.31	-9.67	28.21	Debug	V	100	45	43.50	-15.29	Pass	
111.383	38.35	1.25	-11.64	27.96	Debug	V	100	315	43.50	-15.54	Pass	
249.996	38.03	1.70	-9.94	29.80	Debug	H	285	45	46.00	-16.20	Pass	
259.890	38.43	1.72	-11.08	29.07	Debug	V	100	45	46.00	-16.93	Pass	
155.194667	33.26	1.45	-9.70	25.00	Debug	V	100	180	43.50	-18.50	Pass	
300.015667	38.47	1.79	-13.13	27.13	Debug	H	185	0	46.00	-18.87	Pass	
408.397	35.56	1.80	-10.64	26.72	Debug	V	300	45	46.00	-19.28	Pass	
185.620333	35.33	1.55	-13.80	23.08	Debug	V	200	45	43.50	-20.42	Pass	
159.980	31.34	1.46	-10.45	22.36	Debug	V	100	90	43.50	-21.14	Pass	
263.931667	33.75	1.73	-11.53	23.95	Debug	V	100	45	46.00	-22.05	Pass	
222.771333	34.73	1.65	-15.15	21.23	Debug	V	385	315	46.00	-24.77	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.

RE 1GHz – 6GHz



Test Information

Results Title	Radiated E 3m 1-18GHz
File Name	fcc 15 re 1hz-6ghz.emi
Test Laboratory	MH-AR5, 25.8%RH, 23C, 1003hPa
Test Engineer	CP/HS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0004_AWHQU FCC + GR1089 L3. Product arranged in a single carrier configuration (1CC NR20). Carrier 1 set at 3624.99 MHz; Modulation = TM3.1a, TX Power = 37 dBm per port. -48 V DC.
Configuration	FCC 15 Class B, RE 1GHz-6GHz at 3 meter. ESW E1511, RBW: 100KHz, VBW:3MHz, Internal Att. 10dB. PA E1388, External Att E1570 6dB, Horn E1073, AR-5 Cable set.
Date	2023-01-31 16:01:36

Formal Data

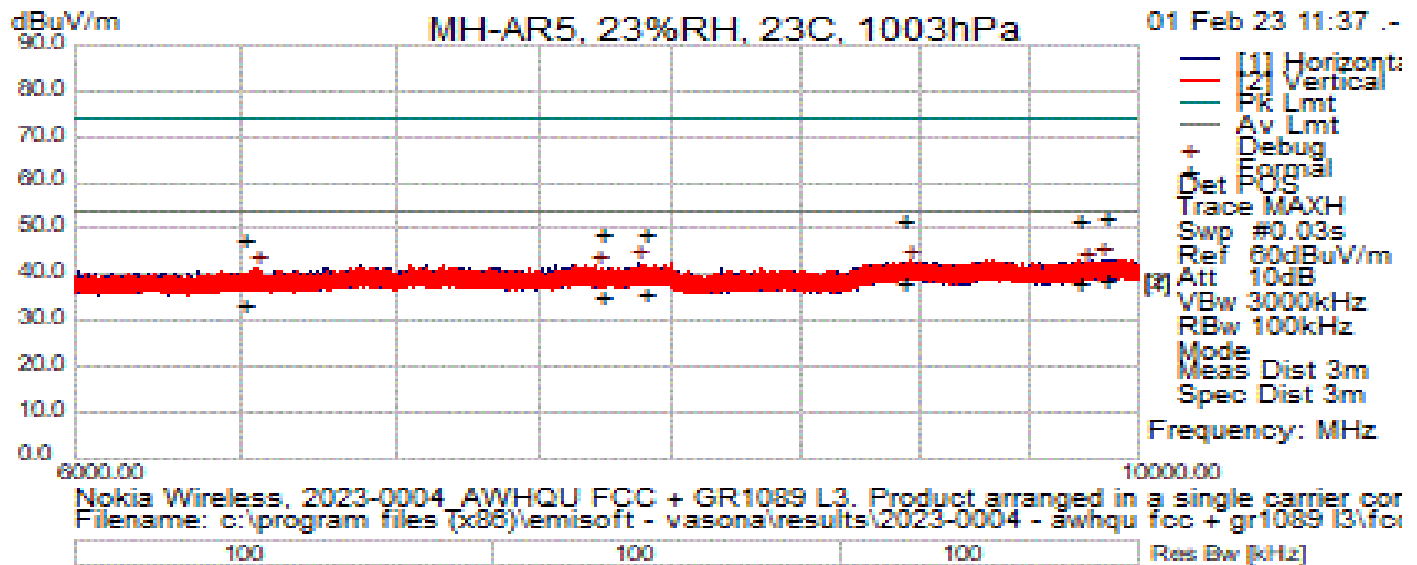
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4770.622	22.00	10.01	5.58	37.59	AvgMax	H	365	256	54.00	-16.41	Pass	
5839.022	19.75	10.51	6.74	37.00	AvgMax	V	245	236	54.00	-17.00	Pass	
5544.836	19.97	10.41	6.41	36.79	AvgMax	V	184	214	54.00	-17.21	Pass	
3613.239	20.41	9.32	4.76	34.49	AvgMax	V	351	359	54.00	-19.51	Pass	
3635.827	20.30	9.34	4.79	34.43	AvgMax	V	262	327	54.00	-19.57	Pass	
2405.439	20.91	8.52	4.05	33.48	AvgMax	V	126	337	54.00	-20.52	Pass	
4770.622	36.89	10.01	5.58	52.48	PeakMax	H	365	256	74.00	-21.52	Pass	
5839.022	34.53	10.51	6.74	51.78	PeakMax	V	245	236	74.00	-22.22	Pass	
5544.836	34.92	10.41	6.41	51.74	PeakMax	V	184	214	74.00	-22.26	Pass	
3635.827	35.42	9.34	4.79	49.54	PeakMax	V	262	327	74.00	-24.46	Pass	
3613.239	35.11	9.32	4.76	49.19	PeakMax	V	351	359	74.00	-24.81	Pass	
2405.439	36.08	8.52	4.05	48.65	PeakMax	V	126	337	74.00	-25.35	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
3622.499951	59.03	9.33	4.77	73.13	Debug	H	200	352	54.00	19.13	Fail	TX exempt.
4758.388641	30.27	10.01	5.57	45.84	Debug	H	300	180	54.00	-8.16	Pass	
5827.722188	27.54	10.50	6.73	44.77	Debug	V	385	90	54.00	-9.23	Pass	
3613.239	27.20	9.32	4.76	41.29	Debug	V	100	355	54.00	-12.71	Pass	
3635.827	26.75	9.34	4.79	40.87	Debug	V	100	355	54.00	-13.13	Pass	
2403.036	30.64	8.52	4.05	43.20	Debug	V	100	355	54.00	-10.80	Pass	
5535.036	26.80	10.41	6.40	43.60	Debug	V	100	355	54.00	-10.40	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.

RE 6GHz – 10GHz



Test Information

Results Title	Radiated E 3m 1-18GHz
File Name	fcc 15 re 6hz-10ghz.emi
Test Laboratory	MH-AR5, 23%RH, 23C, 1003hPa
Test Engineer	HS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0004_AWHQU FCC + GR1089 L3. Product arranged in a single carrier configuration (1CC NR20). Carrier 1 set at 3624.99 MHz; Modulation = TM3.1a, TX Power = 37 dBm per port. -48 V DC.
Configuration	FCC 15 Class B, RE 6GHz-10GHz at 3 meter. ESW E1511, RBW: 100KHz, VBW: 3MHz, Internal Att. 10dB. PA E1388, HPF E1587 Horn E1073, AR-5 Cable set.
Date	2023-02-01 11:37:53

Formal Data

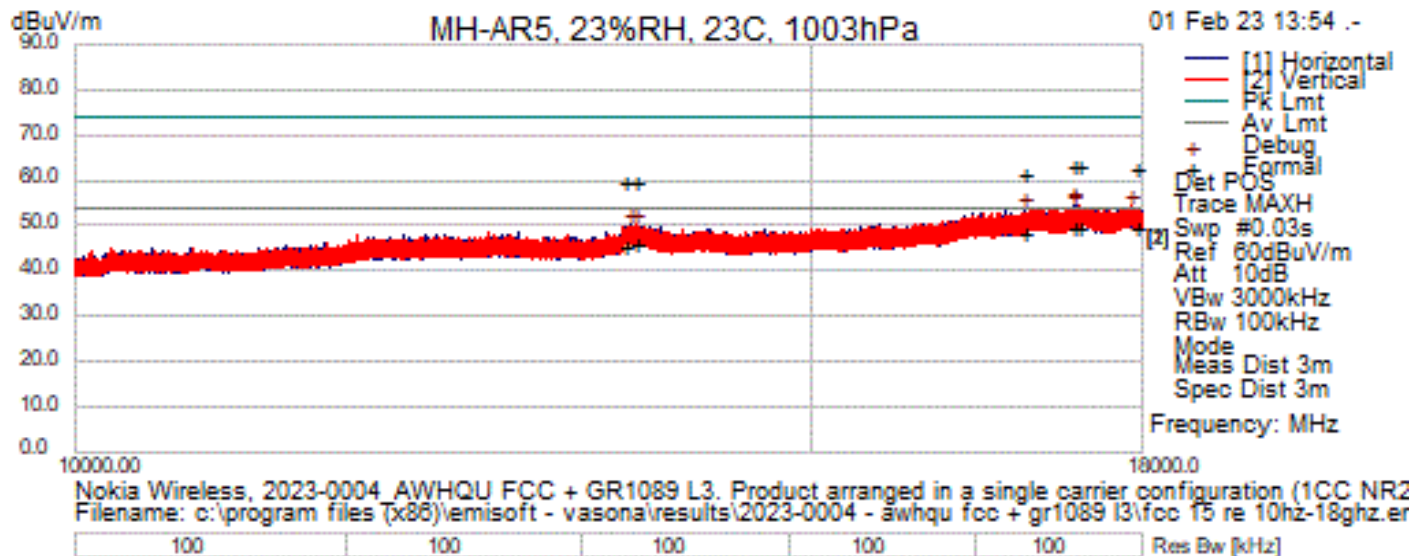
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
9837.268	24.66	6.12	8.11	38.90	AvgMax	H	349	168	54.00	-15.10	Pass	
8923.931	25.47	5.80	7.25	38.52	AvgMax	H	337	244	54.00	-15.48	Pass	
9717.940	24.30	6.17	7.96	38.43	AvgMax	V	109	196	54.00	-15.57	Pass	
7883.473	22.91	5.71	7.17	35.79	AvgMax	H	262	323	54.00	-18.21	Pass	
7730.254	22.46	5.75	7.20	35.41	AvgMax	V	142	236	54.00	-18.59	Pass	
6509.344	20.55	5.65	7.27	33.46	AvgMax	V	101	255	54.00	-20.54	Pass	
9837.268	38.15	6.12	8.11	52.39	PeakMax	H	349	168	74.00	-21.61	Pass	
8923.931	39.18	5.80	7.25	52.23	PeakMax	H	337	244	74.00	-21.77	Pass	
9717.940	38.01	6.17	7.96	52.13	PeakMax	V	109	196	74.00	-21.87	Pass	
7883.473	36.45	5.71	7.17	49.33	PeakMax	H	262	323	74.00	-24.67	Pass	
7730.254	36.03	5.75	7.20	48.97	PeakMax	V	142	236	74.00	-25.03	Pass	
6509.344	35.06	5.65	7.27	47.97	PeakMax	V	101	255	74.00	-26.03	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
9825.155599	29.19	6.13	8.10	43.42	Debug	H	385	45	54.00	-10.58	Pass	
7867.333267	29.92	5.74	7.18	42.83	Debug	H	200	225	54.00	-11.17	Pass	
9744.759	28.05	6.16	8.00	42.20	Debug	V	100	354	54.00	-11.80	Pass	
7708.048	28.85	5.71	7.20	41.77	Debug	V	100	354	54.00	-12.23	Pass	
6543.963	28.48	5.66	7.27	41.41	Debug	V	100	354	54.00	-12.59	Pass	
8958.290	29.71	5.79	7.27	42.77	Debug	H	100	354	54.00	-11.23	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.

RE 10GHz – 18GHz



Test Information

Results Title	Radiated E 3m 1-18GHz
File Name	fcc 15 re 10hz-18ghz.emi
Test Laboratory	MH-AR5, 23%RH, 23C, 1003hPa
Test Engineer	HS
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0004_AWHQU FCC + GR1089 L3. Product arranged in a single carrier configuration (1CC NR20). Carrier 1 set at 3624.99 MHz; Modulation = TM3.1a, TX Power = 37 dBm per port. -48 V DC.
Configuration	FCC 15 Class B, RE 10GHz-18GHz at 3 meter. ESW E1511, RBW: 100KHz, VBW: 3MHz, Internal Att. 10dB. PA E1388, HPF E1587 Horn E1073, AR-5 Cable set.
Date	2023-02-01 13:58:27

Formal Data

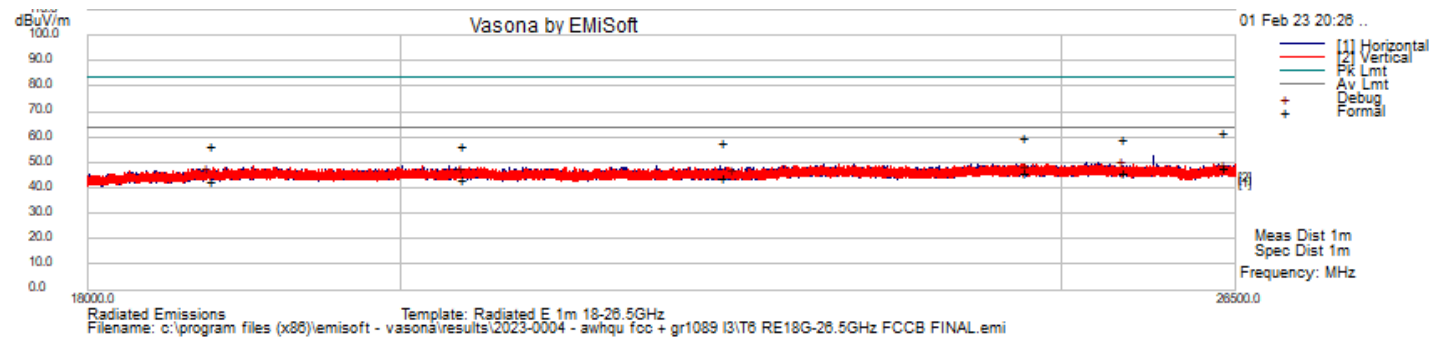
Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17366.509	26.52	8.74	14.46	49.73	AvgMax	H	204	258	54.00	-4.27	Pass	
17933.239	26.40	8.77	14.31	49.48	AvgMax	V	293	275	54.00	-4.52	Pass	
17328.378	26.38	8.60	14.46	49.44	AvgMax	H	140	188	54.00	-4.56	Pass	
16870.033	25.67	8.57	14.16	48.40	AvgMax	H	385	26	54.00	-5.60	Pass	
13605.643	27.46	7.89	10.55	45.90	AvgMax	V	176	39	54.00	-8.10	Pass	
13525.389	27.26	7.84	10.51	45.61	AvgMax	H	138	262	54.00	-8.39	Pass	
17328.378	40.26	8.60	14.46	63.32	PeakMax	H	140	188	74.00	-10.68	Pass	
17366.509	39.98	8.74	14.46	63.18	PeakMax	H	204	258	74.00	-10.82	Pass	
17933.239	39.73	8.77	14.31	62.81	PeakMax	V	293	275	74.00	-11.19	Pass	
16870.033	39.03	8.57	14.16	61.76	PeakMax	H	385	26	74.00	-12.24	Pass	
13605.643	41.41	7.89	10.55	59.85	PeakMax	V	176	39	74.00	-14.15	Pass	
13525.389	41.19	7.84	10.51	59.54	PeakMax	H	138	262	74.00	-14.46	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
17333.227	31.55	8.62	14.46	54.63	Debug	H	300	180	54.00	0.63	Fail	
13613.493	31.71	7.90	10.55	50.16	Debug	V	285	45	54.00	-3.84	Pass	
17888.407	30.88	8.78	14.33	53.99	Debug	V	100	354	54.00	-0.01	Pass	
17314.428	31.08	8.55	14.46	54.09	Debug	H	100	354	54.00	0.09	Fail	
16870.009	31.03	8.57	14.16	53.76	Debug	H	100	354	54.00	-0.24	Pass	
13571.379	31.60	7.87	10.53	50.00	Debug	H	100	354	54.00	-4.00	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.

RE 18GHz – 26.5GHz



Test Information

Results Title	Radiated E 1m 18-26.5GHz
File Name	T6 RE18G-26.5GHz FCCB FINAL.emi
Test Laboratory	MH-AR5, 23%RH, 23.9C, 1002hPa
Test Engineer	MJS/BB
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0004_AWHQU FCC + GR1089 L3. Product arranged in a single carrier configuration (1CC NR20). Carrier 1 set at 3624.99 MHz; Modulation = TM3.1a, TX Power = 37 dBm per port. -48 V DC.
Configuration	FCC 15 Class B, RE 18GHz-26.5GHz at 1 meter. ESW E1511, RBW: 100KHz, VBW:3 MHz, Internal Att. 0dB. PA E1601, HPF E1587 Horn E1526 Cables E1528, E1529.
Date	2023-02-01 20:26:18

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
26408.293	36.60	13.15	-1.90	47.85	AvgMax	V	138	321	63.50	-15.65	Pass	
24696.684	34.26	12.59	-0.76	46.09	AvgMax	H	187	82	63.50	-17.41	Pass	
25529.306	34.10	13.15	-1.49	45.76	AvgMax	V	205	111	63.50	-17.74	Pass	
22301.349	34.95	11.91	-3.14	43.72	AvgMax	V	151	27	63.50	-19.78	Pass	
20428.297	36.86	11.20	-4.96	43.09	AvgMax	H	242	34	63.50	-20.41	Pass	
18767.047	38.15	10.55	-5.88	42.82	AvgMax	V	178	180	63.50	-20.68	Pass	
26408.293	50.65	13.15	-1.90	61.91	PeakMax	V	138	321	83.50	-21.59	Pass	
24696.684	48.00	12.59	-0.76	59.83	PeakMax	H	187	82	83.50	-23.67	Pass	
25529.306	47.67	13.15	-1.49	59.33	PeakMax	V	205	111	83.50	-24.17	Pass	
22301.349	49.13	11.91	-3.14	57.90	PeakMax	V	151	27	83.50	-25.60	Pass	
20428.297	50.42	11.20	-4.96	56.66	PeakMax	H	242	34	83.50	-26.84	Pass	
18767.047	51.70	10.55	-5.88	56.36	PeakMax	V	178	180	83.50	-27.14	Pass	

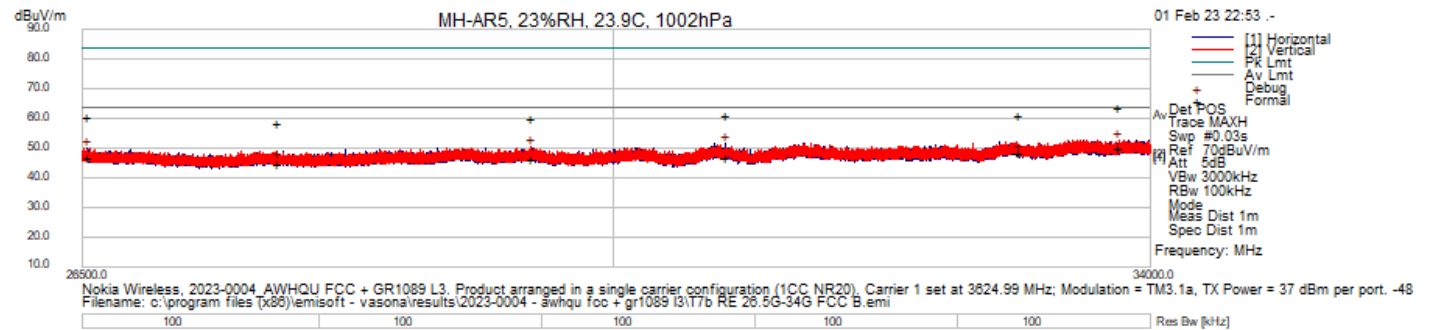
Preview Data

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
18738.798	40.02	10.51	-5.92	44.62	Debug	V	100	354	63.50	-18.88	Pass	
20414.927	38.47	11.20	-4.98	44.69	Debug	H	100	354	63.50	-18.81	Pass	
22366.063	35.23	11.92	-3.05	44.10	Debug	V	100	354	63.50	-19.40	Pass	
24693.959	33.54	12.58	-0.75	45.37	Debug	H	100	354	63.50	-18.13	Pass	
25508.944	36.06	13.04	-1.47	47.64	NoTune	V	100	354	63.50	-15.86	Pass	

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
26403.681	34.92	13.13	-1.90	46.15	NoTune	V	100	354	63.50	-17.35	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.

RE 26.5 GHz – 34 GHz



Test Information

Results Title	Radiated E 1m 26.5-40GHz
File Name	T7b RE 26.5G-34G FCC B.emi
Test Laboratory	MH-AR5, 23%RH, 23.9C, 1002hPa
Test Engineer	MJS/BB
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0004_AWHQU FCC + GR1089 L3. Product arranged in a single carrier configuration (1CC NR20). Carrier 1 set at 3624.99 MHz; Modulation = TM3.1a, TX Power = 37 dBm per port. -48 V DC.
Configuration	FCC 15 Class B, RE 26.5GHz-34GHz at 1 meter. ESW E1511, RBW: 100KHz, VBW:3MHz, Internal Att. 0dB. PA E1601, HPF E1588 Horn E1526 Cables E1528, E1529.
Date	2023-02-01 22:53:24

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
33755.551	34.14	14.72	1.11	49.97	AvgMax	V	195	355	63.50	-13.53	Pass	
32969.484	32.95	14.61	0.50	48.07	AvgMax	H	195	346	63.50	-15.43	Pass	
26526.050	35.70	13.06	-1.90	46.86	AvgMax	H	116	211	63.50	-16.64	Pass	
30794.101	33.61	14.60	-1.46	46.75	AvgMax	H	151	240	63.50	-16.75	Pass	
29427.400	33.62	14.15	-1.78	45.99	AvgMax	V	129	90	63.50	-17.51	Pass	
27729.644	33.81	13.18	-2.17	44.81	AvgMax	V	129	119	63.50	-18.69	Pass	
33755.551	47.91	14.72	1.11	63.74	PeakMax	V	195	355	83.50	-19.76	Pass	
32969.484	46.04	14.61	0.50	61.16	PeakMax	H	195	346	83.50	-22.34	Pass	
30794.101	47.68	14.60	-1.46	60.82	PeakMax	H	151	240	83.50	-22.68	Pass	
26526.050	49.36	13.06	-1.90	60.51	PeakMax	H	116	211	83.50	-22.99	Pass	
29427.400	47.67	14.15	-1.78	60.04	PeakMax	V	129	90	83.50	-23.46	Pass	
27729.644	47.40	13.18	-2.17	58.40	PeakMax	V	129	119	83.50	-25.10	Pass	

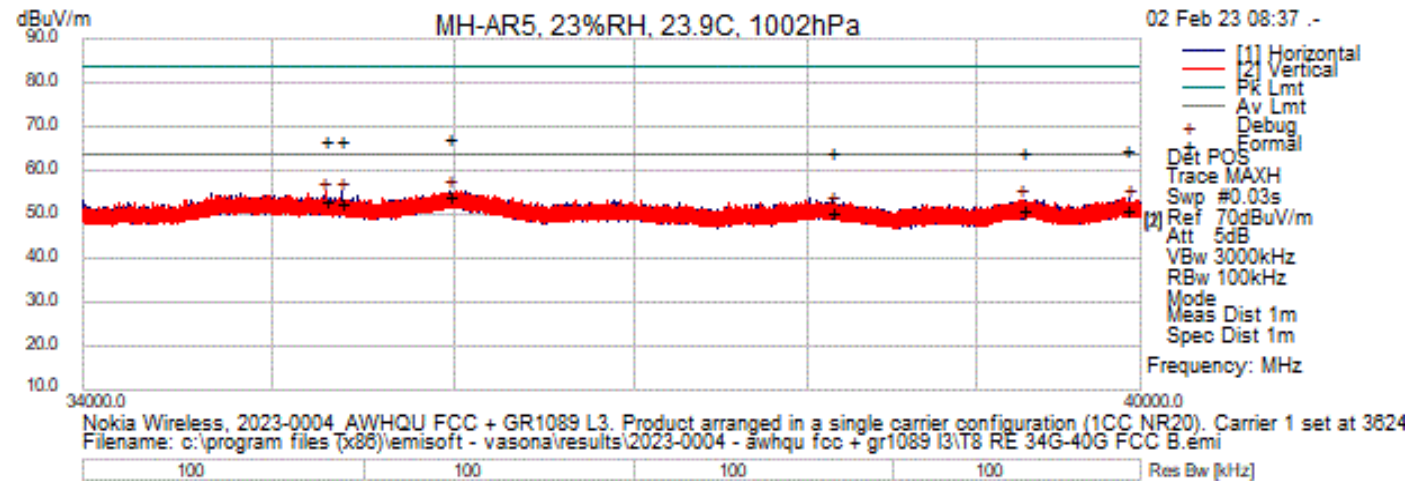
Preview Data

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
33755.551	36.77	14.72	1.11	52.60	Debug	V	150	22	63.50	-10.90	Pass	
30794.101	38.42	14.60	-1.46	51.56	Debug	H	100	88	63.50	-11.94	Pass	
29427.400	38.17	14.15	-1.78	50.54	Debug	V	200	286	63.50	-12.96	Pass	
26526.050	38.81	13.06	-1.90	49.96	Debug	H	100	330	63.50	-13.54	Pass	

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
27729.644	34.71	13.18	-2.17	45.71	Debug	V	100	355	63.50	-17.79	Pass	
32969.484	33.60	14.61	0.50	48.71	Debug	H	100	355	63.50	-14.79	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.

RE 34 GHz – 40 GHz



Test Information

Results Title	Radiated E 1m 26.5-40GHz
File Name	T8 RE 34G-40G FCC B.emi
Test Laboratory	MH-AR5, 23%RH, 23.9C, 1002hPa
Test Engineer	MJS/BB
Test Software	Vasona by EMISoft, version 6.061
Equipment	Nokia Wireless
EUT Details	2023-0004_AWHQU FCC + GR1089 L3. Product arranged in a single carrier configuration (1CC NR20). Carrier 1 set at 3624.99 MHz; Modulation = TM3.1a, TX Power = 37 dBm per port. -48 V DC.
Configuration	FCC 15 Class B, RE 34GHz -40Ghz at 1 meter. ESW E1511, RBW: 100KHz, VBW:3 MHz, Internal Att. 0dB. PA E1601, HPF E1588 Horn E1526 Cables E1528, E1529.
Date	2023-02-02 08:38:37

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
35972.271	35.96	15.97	2.14	54.07	AvgMax	H	122	16	63.50	-9.43	Pass	
35295.962	36.79	15.89	0.27	52.95	AvgMax	H	100	4	63.50	-10.55	Pass	
35379.026	36.73	15.93	-0.02	52.64	AvgMax	H	163	93	63.50	-10.86	Pass	
39921.162	34.18	16.85	0.13	51.16	AvgMax	H	103	339	63.50	-12.34	Pass	
39284.609	35.50	16.77	-1.35	50.92	AvgMax	V	174	100	63.50	-12.58	Pass	
38148.809	34.69	16.45	-0.73	50.41	AvgMax	V	109	212	63.50	-13.09	Pass	
35972.271	49.43	15.97	2.14	67.54	PeakMax	H	122	16	83.50	-15.96	Pass	
35295.962	50.68	15.89	0.27	66.84	PeakMax	H	100	4	83.50	-16.66	Pass	
35379.026	50.71	15.93	-0.02	66.62	PeakMax	H	163	93	83.50	-16.88	Pass	
39921.162	47.94	16.85	0.13	64.92	PeakMax	H	103	339	83.50	-18.58	Pass	
38148.809	48.68	16.45	-0.73	64.40	PeakMax	V	109	212	83.50	-19.10	Pass	
39284.609	48.87	16.77	-1.35	64.29	PeakMax	V	174	100	83.50	-19.21	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
39924.326	36.34	16.85	0.14	53.33	Debug	H	100	354	63.50	-10.17	Pass	
39280.058	37.89	16.77	-1.35	53.31	Debug	V	100	354	63.50	-10.19	Pass	
38149.597	36.13	16.45	-0.73	51.85	Debug	V	100	354	63.50	-11.65	Pass	
35971.838	37.26	15.97	2.14	55.37	Debug	H	100	354	63.50	-8.13	Pass	
35291.545	38.88	15.89	0.29	55.05	Debug	H	100	354	63.50	-8.45	Pass	
35381.446	39.18	15.93	-0.03	55.08	Debug	H	100	354	63.50	-8.42	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.

7. FCC Section 2.1055 - Measurement of Frequency Stability

Frequency Stability testing was completed AWHQU AirScale Micro 4T4R n48 40W with Center Frequency 3624.99 MHz. Testing was performed from 1/25/2023 through 1/26/2023 on the EUT, which was in the T02 Thermal chamber of the Global Product Compliance Laboratory (GPCL) test facility located in Building 4, Room 4-280, Murray Hill, NJ, by Joe Bordonaro from GPCL.

The temperatures to which the EUT was subjected ranged from a high temperature of +50°C system ambient to a low temperature of -30°C system ambient with measurements recorded at 10°C increments

Frequency Stability performance was verified by measuring Frequency Tolerance using an MXA Signal Analyzer. Frequency Tolerance is a measurement of the difference between the actual transmit frequency and the assigned frequency (3624.99 MHz).

Baseline Measurement at +25°C

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.3002
0.5	-2.1030
1.0	1.2937
1.5	-1.0432
2.0	586.87mHz
2.5	178.80mHz
3.0	1.7205
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +50°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-115.4mHz
0.5	-2.0813
1.0	2.4181
1.5	1.0505
2.0	-1.2300
2.5	87.632mHz
3.0	-2.9374
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +40°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.5692
0.5	-1.4001
1.0	-806.8mHz
1.5	221.03mHz
2.0	1.1176
2.5	-2.1360
3.0	1.0605
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	735.76mHz
0.5	-2.4282
1.0	-2.9167
1.5	-569.16mHz
2.0	-1.8836
2.5	507.81mHz
3.0	1.4844
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-1.7168
0.5	1.2170
1.0	-2.6545
1.5	-4.2554
2.0	-2.2327
2.5	-1.9483
3.0	-490.0mHz
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.0080
0.5	550.80mHz
1.0	-1.6662
1.5	-960.7mHz
2.0	1.0039
2.5	-50.22mHz
3.0	-1.5118
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at 0°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-1.0028
0.5	367.64mHz
1.0	-2.5657
1.5	236.10mHz
2.0	-2.9295
2.5	-1.3360
3.0	1.2319
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at -10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	407.12mHz
0.5	-1.5344
1.0	-674.4mHz
1.5	2.7578
2.0	-776.2mHz
2.5	-2.5944
3.0	1.5259
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at -20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-999.7mHz
0.5	648.86mHz
1.0	-1.9447
1.5	214.69mHz
2.0	-2.9728
2.5	-1.5372
3.0	1.2689
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at -30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.3031
0.5	943.41mHz
1.0	-1.0813
1.5	-916.4mHz
2.0	1.3024
2.5	-1.6255
3.0	995.89mHz
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Upon return to +25°C.

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.0302
0.5	1.2337
1.0	-2.0804
1.5	-1.6032
2.0	-122.3mHz
2.5	1.0682
3.0	-512.7mHz
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 103% of Nominal Voltage, -49.44VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.4388
0.5	1.0599
1.0	-1.1041
1.5	1.3688
2.0	-1.4499
2.5	315.89mHz
3.0	-206.1mHz
FCC SPECIFICATION	3624.99 MHz (± 0.05 ppm) ± 0.05 ppm = ± 181.25 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 106% of Nominal Voltage, -50.88VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-865.8mHz
0.5	2.2639
1.0	3.1497
1.5	703.22mHz
2.0	1.2563
2.5	1.1862
3.0	142.15mHz
FCC SPECIFICATION	3624.99 MHz (± 0.05 ppm) ± 0.05 ppm = ± 181.25 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 109% of Nominal Voltage, -52.32VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.1394
0.5	-1.3869
1.0	816.70mHz
1.5	1.4046
2.0	-2.2584
2.5	2.5466
3.0	784.50mHz
FCC SPECIFICATION	3624.99 MHz (± 0.05 ppm) ± 0.05 ppm = ± 181.25 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 112% of Nominal Voltage, -53.76VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-732.6mHz
0.5	-1.8966
1.0	740.78mHz
1.5	-1.1367
2.0	425.31mHz
2.5	-2.2343
3.0	569.65mHz
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 115% of Nominal Voltage, -55.20VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.8545
0.5	529.27mHz
1.0	-485.5mHz
1.5	-1.1989
2.0	705.48mHz
2.5	-2.4743
3.0	1.4378
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48.0VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-115.8mHz
0.5	-1.4614
1.0	-373.8mHz
1.5	618.98mHz
2.0	-2.5275
2.5	-52.72mHz
3.0	-1.2329
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -3% of Nominal Voltage, -46.56VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-314.5mHz
0.5	1.4204
1.0	740.49mHz
1.5	-2.5598
2.0	1.2184
2.5	691.56mHz
3.0	1.2742
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -6% of Nominal Voltage, -45.12VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-353.1mHz
0.5	993.03mHz
1.0	1.1206
1.5	-356.3mHz
2.0	1.5431
2.5	997.11mHz
3.0	-1.3429
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

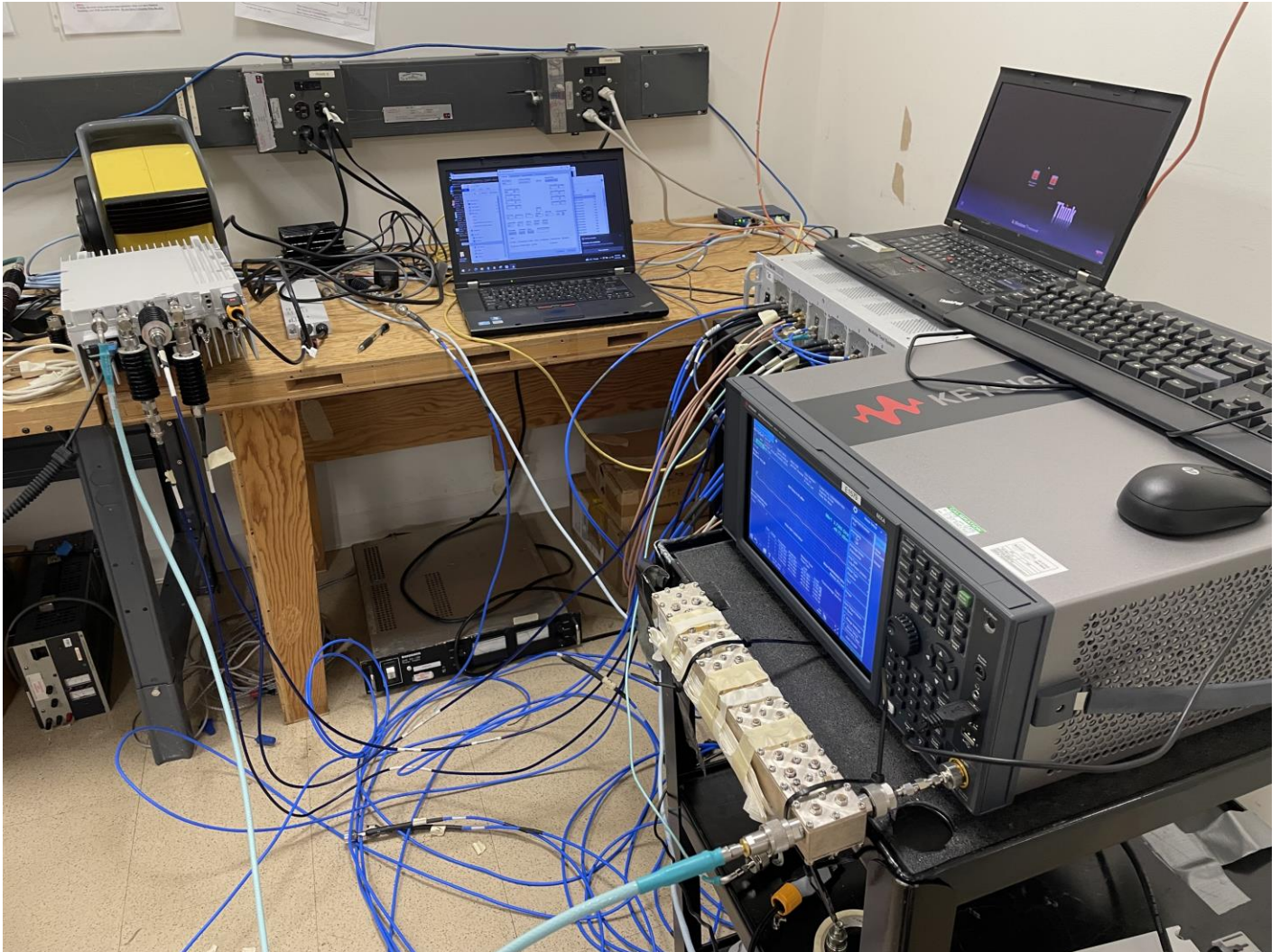
Transmit Frequency Deviation at +25°C at -9% of Nominal Voltage, -43.68VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-443.1mHz
0.5	1.1155
1.0	-973.7mHz
1.5	-1.1694
2.0	-1.3410
2.5	276.19mHz
3.0	1.3768
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -12% of Nominal Voltage, -42.24VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-310.4mHz
0.5	-619.3mHz
1.0	606.16mHz
1.5	3.3841
2.0	-873.0mHz
2.5	1.9651
3.0	2.5326
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

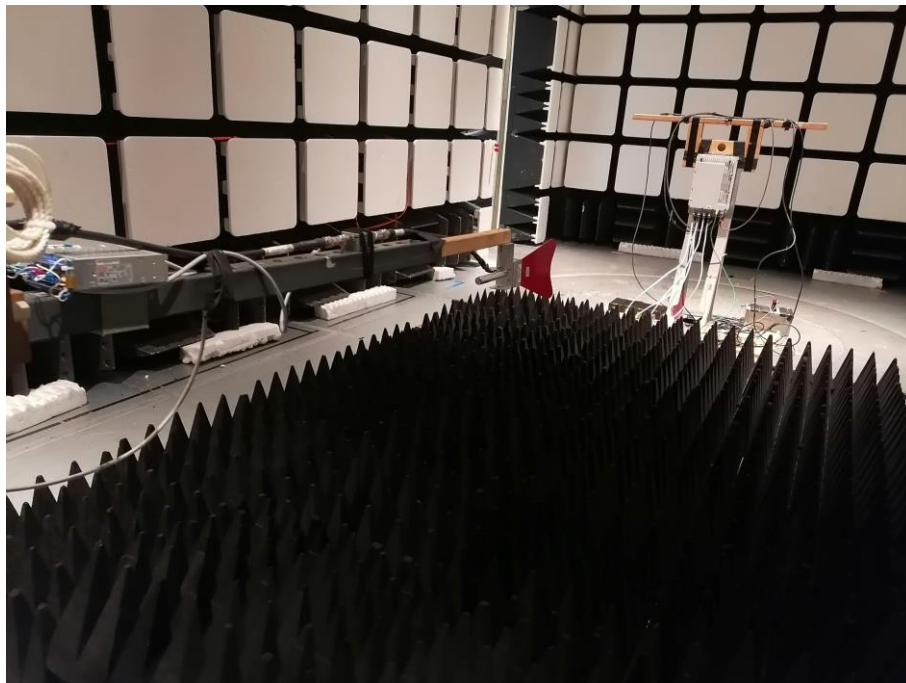
Transmit Frequency Deviation at +25°C at -15% of Nominal Voltage, -40.80VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	2.2756
0.5	894.57mHz
1.0	-699.1mHz
1.5	-1.3462
2.0	-362.5mHz
2.5	-853.6mHz
3.0	-4.3447
FCC SPECIFICATION	3624.99 MHz ($\pm 0.05\text{ppm}$) $\pm 0.05\text{ppm} = \pm 181.25\text{Hz}$
FCC RESULT	PASS

Photographs

Radio Test

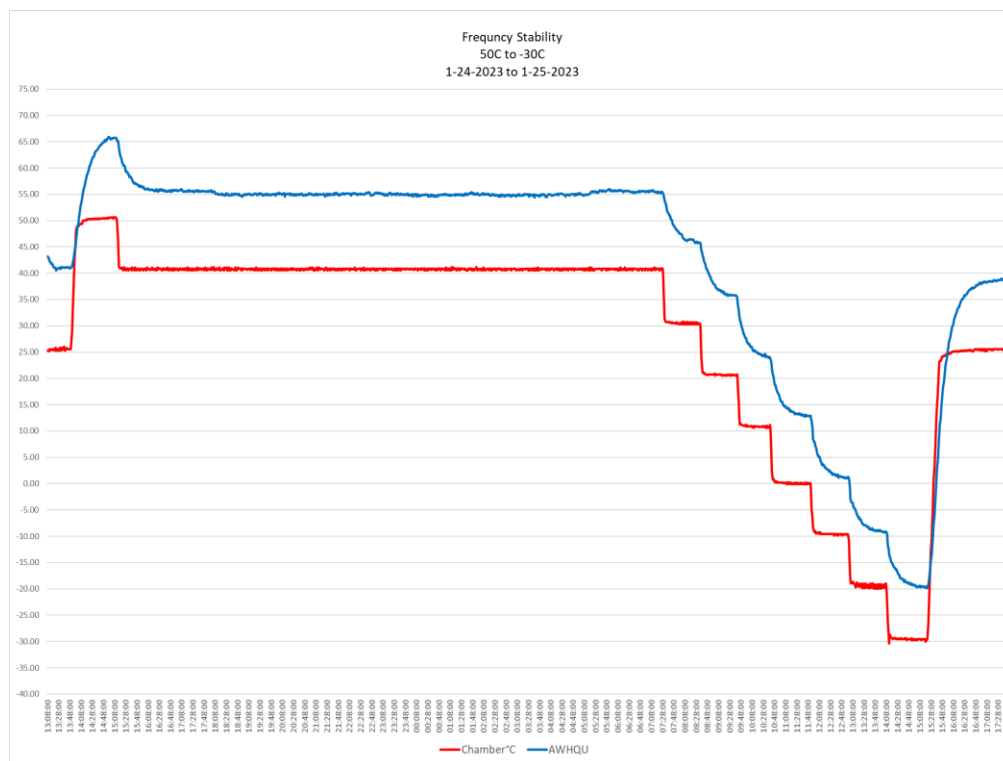


Radiated Emission Test





Frequency Stability Test



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
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
E1156	Weinschel	Attenuator	10dB 0.05GHz-26GHz 25W	74-10-12	1069	CNR-V	CNR-V
E1237	Weinschel	Attenuator	10dB 25 Watt	46-10-34	BH8105	CNR-V	CNR-V
E1155	Weinschel	Attenuator	10dB 25Watt 0.05GHz - 26GHz	74-10-12	1068	CNR-V	CNR-V

Customer Provided Equipment

Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due
Weinschel	Attenuator	30dB 50Watt DC-8.5GHz	24-30-43	BD0153	CNR-V	CNR-V
Weinschel	Attenuator	30dB 50Watt DC-8.5GHz	24-30-33	CD8214	CNR-V	CNR-V
Weinschel	Attenuator	30dB 50Watt DC-8.5GHz	24-30-43	BD1045	CNR-V	CNR-V
Weinschel	Attenuator	30dB 50Watt DC-8.5GHz	24-30-43	BC3948	CNR-V	CNR-V
Micro Coax Utiflex	RF Cable	MFR-64639-228872-001	UF142A-000400-200-2G0	MFR-64639-228872-001	CNR-V	CNR-V
Mini Circuit	Modular Test System		ZTM-53	91701250030	CNR	CNR

CNR-V: Calibration Not Required, Must Be Verified

Test Date: 2/21/23 – 4/12/23

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
AR-5 Cable Set	Megaphase	Cable	Set of 3 Cables 36", 72" and 300"	D230-N1N1 and F230-N1N1	N/A	CNR-V	CNR-V
E1511	Rohde & Schwarz	Test Receiver	EMI Test Receiver 2 Hz - 44 GHz	ESW44	101965	2021-04-07	2023-04-07
E1252	Sonoma Instrument Co.	Amplifier	Amplifier 9KHz-1GHz gain 32dB	310N	185704	2022-11-30	2024-11-30
E980	Trilithic	Filter, Low Pass	PCS	10LC1790-3-AA	PCS-LPF-12	CNR-V	CNR-V
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	CNR-V	CNR-V
E1528	Micro-Coax	Cable	1-40 GHz, 2.92 (m)+2.92 (m), 36 inch., armor, 90 degree bent	UFB142A-Q-0360-2002G0	SFC235840	CNR-V	CNR-V
E1388	KeySight Technologies	Pre-Amplifier	0.5GHz - 18.0GHz, 15dbM	87405C	MY55380142	2021-02-03	2023-02-03
E1588	Reactel, Inc.	Filter, High Pass	20 - 42 GHz	11HS-X20G/42G-K11	22-01	CNR-V	CNR-V
E1587	Reactel, Inc.	Filter, High Pass	6 - 24 GHz	11HS-6G/24G-K11	20-02	CNR-V	CNR-V
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 Date: 1/31/23-2/1/23

Frequency Stability Test Equipment

Asset ID	Manufacturer	Description	Model	Serial	Calibration Date	Calibration Due
TH501-T02	Synergy	Solutions Plus Controller	SPPCM	SP001628	2022-02-16	2024-02-16
TH-T02	Thermotron	Chamber	N/A	6632	CNR	CNR
TH073	Fluke	Digital Multimeter	87-V	25910080	2022-02-24	2024-02-24
TH014	Yokogawa	MVAdvanced portable paperless recorder	MV2048	S5JC04072	2021-02-25	2023-02-25

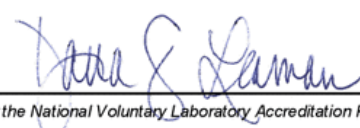
Customer Provided Test Equipment

Customer Asset ID	Manufacturer	Description	Model	Serial	Calibration Date	Calibration Due
MY57431033	KeySight Technologies	MXA Signal Analyzer	N9020B	MY57431033	2022-08-30	2024-08-30

CNR: Calibration Not Required

Test Date: 1/25/23-1/26/23

8. 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