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Amended
FCC/ISED Test Report

Prepared for:	**Lynq Technologies**
Address:	**4760 Walnut St Ste 108 Boulder, CO 80301**
EUT:	**LNQ2900**
FCC ID: **IC ID:**	**2ARHMLNQ2900** **24896-LNQ2900**
Test Report No:	**R230330-00-E2B**
Approved by:	**Blake Winter** **EMC Test Engineer** **iNARTE EMC-50662-E**
DATE:	**July 1, 2024**
Total Pages:	**33**

ilac-MRA A2LA ACCREDITED
TESTING LABORATORY
CERTIFICATE NO. 1953.01

REVISION PAGE

Rev. No.	Date	Description
0	4 April 2024	Issued by BWinter Reviewed by KVepuri Prepared by BWinter
A	18 April 2024	Revision A by BWinter 1. For Unrestricted Band Edge, change from dBm or dBuV to dB because it is relative.
B	1 July 2024	Revision B by BWinter Cover Page: Add FCC ID and IC ID.

CONTENTS

1.0 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

(1) US Code of Federal Regulations, Title 47, Part 15
(2) ISED RSS-Gen, Issue 5
(3) ISED RSS-247, Issue 2

ANSI C63.10-2013 was used as a test method, with guidance from KBD 558074 D01 v05

SUMMARY			
Standard Section	**Test Type and Limit**	**Result**	**Remark**
FCC 15.203	Unique Antenna Requirement	Pass	Internal antenna
FCC 15.35 RSS-Gen, 6.10	Duty cycle of pulsed emissions	Informative only	Not Applicable; the duty cycle is >98%.
FCC 15.209 RSS-Gen, 7.1	Receiver Radiated Emissions	Pass	Meets the requirement of the limit.
FCC 15.247(a)(1)(i) RSS-247, 5.1(c)	Maximum Bandwidth, Limit: Max. 250kHz	Pass	Meets the requirement of the limit.
FCC 15.247(b)(1) RSS-247, 5.1	Maximum Peak Output Power, Limit: Max. 24 dBm	Pass	Meets the requirement of the limit.
FCC 15.209 RSS-Gen, 8.9 RSS-247, 5.5	Transmitter Radiated Emissions	Pass	Meets the requirement of the limit.
FCC 15.247(a) (1) (i) RSS-247, 5.1(c)	Frequency hopping system, Limit: Max. 0.4 Seconds in 20 Second Period	Pass	Customer attests that the EUT meets the requirement
FCC 15.209, 15.205 RSS-Gen, 8.9 RSS-247, 5.5	Band Edge Measurement, Limit: 20dB less than the peak value of fundamental frequency	Pass	Meets the requirement of the limit.
FCC 15.207 RSS-Gen. 8.8	Conducted AC Emissions	Pass	Meets the requirement of the limit.

2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

Summary
The Equipment Under Test (EUT) was a LNQ2900 LORA device manufactured by Lynq Technologies. It operates in the 902 to 928 MHz band and has transmit and receive capabilities.

EUT	LNQ2900
EUT Received	11/10/2023
EUT Tested	11/22/2023 - 3/19/2024
Serial No.	011480 (assigned by NCEE Labs), conducted 011481 (assigned by NCEE Labs), radiated
Operating Band	902 – 928 MHz
Device Type	FHSS
Power Supply	USB power supply, SN P161400162A1
Antenna	Internal

NOTE: For more detailed features description, please refer to the manufacturer's specifications or user's manual.

2.2 DESCRIPTION OF TEST MODES

The EUT operates on, and was tested at the frequencies below:

Channel	Frequency
Low	902.3
Middle	915.0
High	927.7

These are the only three representative channels tested in the frequency range according to FCC Part 15.31 and RSS-Gen Table A1. See the operational description for a list of all channel frequency and designations.

This EUT was set to transmit in a worse-case scenario with modulation on. The manufacturer modified the unit to transmit continuously on the lowest, highest and one channel in the middle.

2.3 DESCRIPTION OF SUPPORT UNITS

None

3.0 LABORATORY DESCRIPTION

3.1 LABORATORY DESCRIPTION

All testing was performed at the following Facility:

The Nebraska Center for Excellence in Electronics (NCEE Labs)
4740 Discovery Drive
Lincoln, NE 68521

A2LA Certificate Number:	1953.01
FCC Accredited Test Site Designation No:	US1060
Industry Canada Test Site Registration No:	4294A-1
NCC CAB Identification No:	US0177

Environmental conditions varied slightly throughout the tests.

3.2 TEST PERSONNEL

No.	PERSONNEL	TITLE	ROLE
1	Blake Winter	Test Engineer	Testing and Report
2	Karthik Vepuri	Test Engineer	Review

Notes:
All personnel are permanent staff members of NCEE Labs. No testing or review was sub-contracted or performed by sub-contracted personnel.

3.3 TEST EQUIPMENT

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE	CALIBRATION DUE DATE
Keysight MXE Signal Analyzer (44GHz)**	N9038A	MY59050109	July 17, 2023	July 17, 2025
Keysight MXE Signal Analyzer (26.5GHz)**	N9038A	MY56400083	July 17, 2023	July 17, 2025
SunAR RF Motion	JB1	A091418	July 26, 2023	July 26, 2024
ETS EMCO Red Horn Antenna	3115	00218576	July 31, 2023	July 31, 2024
ETS EMCO Amplifier*	3115-PA	00218576	January 22, 2024	January 22, 2026
Trilithic High Pass Filter*	6HC330	23042	June 5, 2023	June 5, 2025
ETS – Lindgren- VSWR on 10m Chamber***	10m Semi-anechoic chamber-VSWR	4740 Discovery Drive	July 30, 2020	July 30, 2024
NCEE Labs-NSA on 10m Chamber*	10m Semi-anechoic chamber-NSA	NCEE-001	May 25, 2022	May 25, 2024
TDK Emissions Lab Software	V11.25	700307	NA	NA
RF Cable (preamplifier to antenna)*	MFR-57500	90-195-040	June 5, 2023	June 5, 2025
RF Cable (antenna to 10m chamber bulkhead)*	FSCM 64639	01E3872	June 5, 2023	June 5, 2025
RF Cable (10m chamber bulkhead to control room bulkhead)*	FSCM 64639	01E3864	June 5, 2023	June 5, 2025
RF Cable (control room bulkhead to test receiver)*	FSCM 64639	01F1206	June 5, 2023	June 5, 2025
N connector bulkhead (10m chamber)*	PE9128	NCEEBH1	June 5, 2023	June 5, 2025
N connector bulkhead (control room)*	PE9128	NCEEBH2	June 5, 2023	June 5, 2025
Keysight MXE Signal Analyzer (44GHz)**	N9038A	MY59050109	July 17, 2023	July 17, 2025

*Internal Calibration
**2 year cal cycle
***4 year cal cycle

Notes:
All equipment is owned by NCEE Labs and stored permanently at NCEE Labs facilities.

4.0 DETAILED RESULTS

Radio Measurements					
CHANNEL	**Occupied Bandwidth (kHz)**	**20 dB Bandwidth (kHz)**	**Conducted Power (dBm)**	**Conducted Power (mW)**	**RESULT**
Low	126.4	144.8	29.50	891.3	Pass
Mid	126.6	144.6	29.55	901.6	Pass
High	126.2	144.2	29.71	935.4	Pass
20 dB Bandwidth Limit = 250 kHz max			Peak Output Power Limit = 30 dBm;		

Unrestricted Band-Edge							
CHANNEL	**Band edge /Measurement Frequency (MHz)**	**Relative Highest out of band level (dB)**	**Relative Fundamental (dB)**	**Measurement Type**	**Delta (dB)**	**Min Delta (dB)**	**Result**
Low	902	-74.33	-29.80	Peak	44.53	20	Pass
High	928	66.95	108.07	Peak	41.12	20	Pass

Peak Vs Average Limit- Restricted Band-Edge						
CHANNEL	**Band edge /Measurement Frequency (MHz)**	**Highest out of band level (dBuV/m @ 3m)**	**Measurement Type**	**Limit (dBuV/m @ 3m)***	**Margin**	**Result**
Low	608-614	31.57	Peak	46.02	14.45	Pass
High	960-1000	37.42	Peak	53.98	16.56	Pass
*Limit shown is the peak limit taken from FCC Part 15.209; Peak values are compared to average limit to show compliance.						

4.1 DUTY CYCLE

The duty cycle is > 98%.

4.2 RADIATED EMISSIONS

Test Method: ANSI C63.10:2013, Section 6.5, 6.6

Limits for radiated emissions measurements:

Emissions radiated outside of the specified bands shall be applied to the limits in 15.209 as followed:

FREQUENCIES (MHz)	FIELD STRENGTH (μV/m)	MEASUREMENT DISTANCE (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 * log * Emission level (μV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20dB under any condition of modulation.

Test procedures:

a. The EUT was placed on the top of a rotating table above the ground plane in a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The table was 0.8m high for measurements form 30MHz-1Ghz and 1.5m for measurements from 1GHz and higher.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna was a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are used to make the measurement.

d. For each suspected emission, the EUT was arranged to maximize its emissions and then the antenna height was varied from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum emission reading.

e. The test-receiver system was set to use a peak detector with a specified resolution bandwidth. For spectrum analyzer measurements, the composite maximum of several analyzer sweeps was used for final measurements.

f. If the emission level of the EUT in peak mode was 6dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 6 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. The EUT was maximized in all 3 orthogonal positions. The results are presented for the axis that had the highest emissions.

h. The orientation with the worst-case emissions was used for final measurements.

i. Receive mode emissions were tested and found to be within the measurement noise floor of the test laboratory

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequencies below 1GHz.

2. The resolution bandwidth 1 MHz for all measurements and at frequencies above 1GHz, A peak detector was used for all measurements above 1GHz. Measurements were made with an EMI Receiver.

Deviations from test standard:

No deviation.

Test setup:

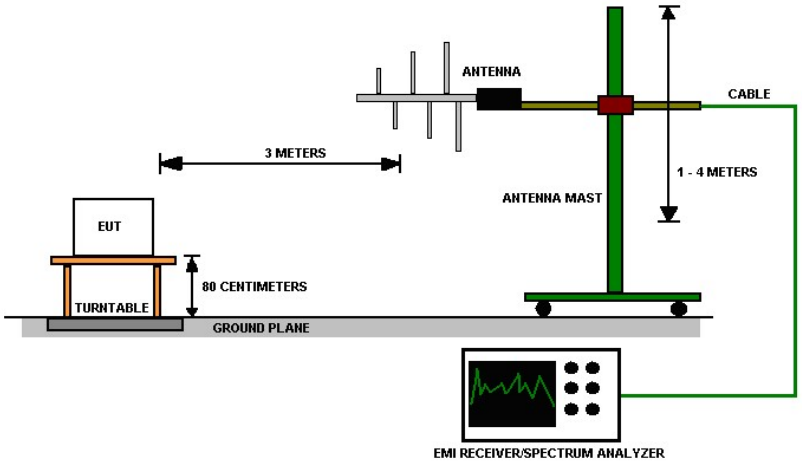

Figure 1 - Radiated Emissions Test Setup, 30MHz – 1GHz

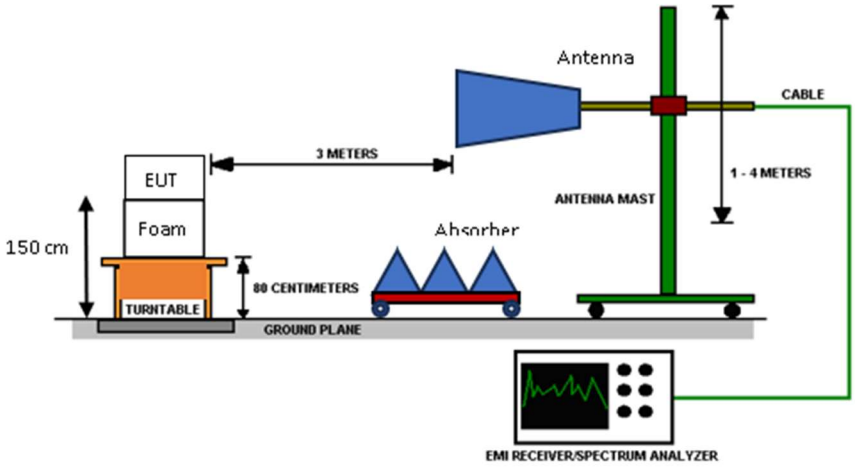

Figure 2 - Radiated Emissions Test Setup, 1GHz - 18GHz

EUT operating conditions
The EUT was powered by internal battery unless specified and set to transmit continuously on the lowest frequency channel, highest frequency channel and one in the middle of its operating range.

Test results:

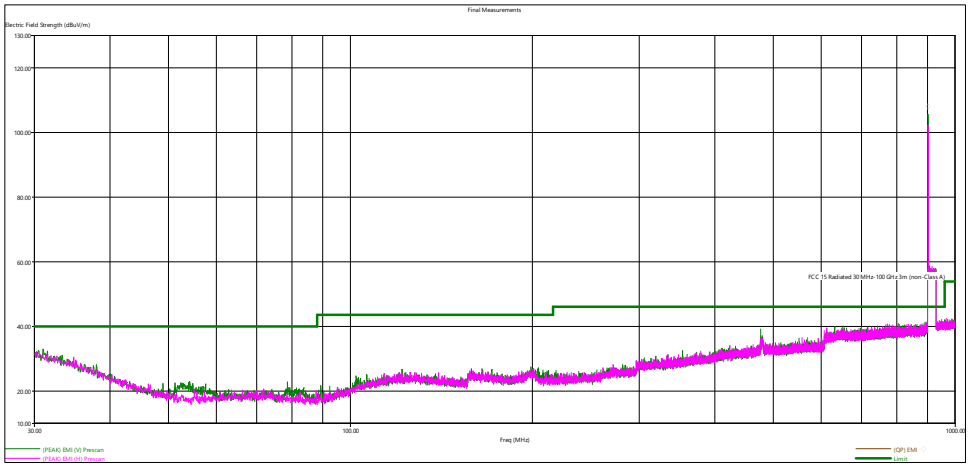

Figure 3 - Radiated Emissions Plot, 30 MHz-1 GHz Low Channel

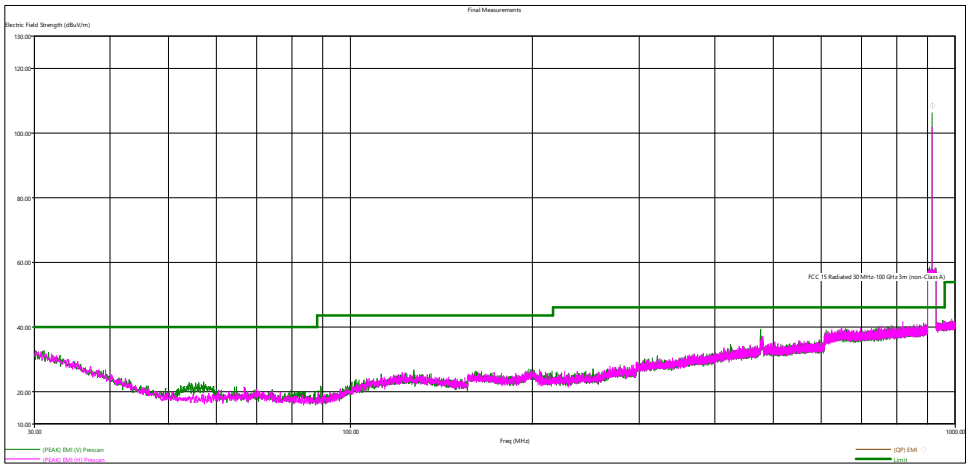

Figure 4 - Radiated Emissions Plot, 30 MHz-1 GHz, Mid Channel

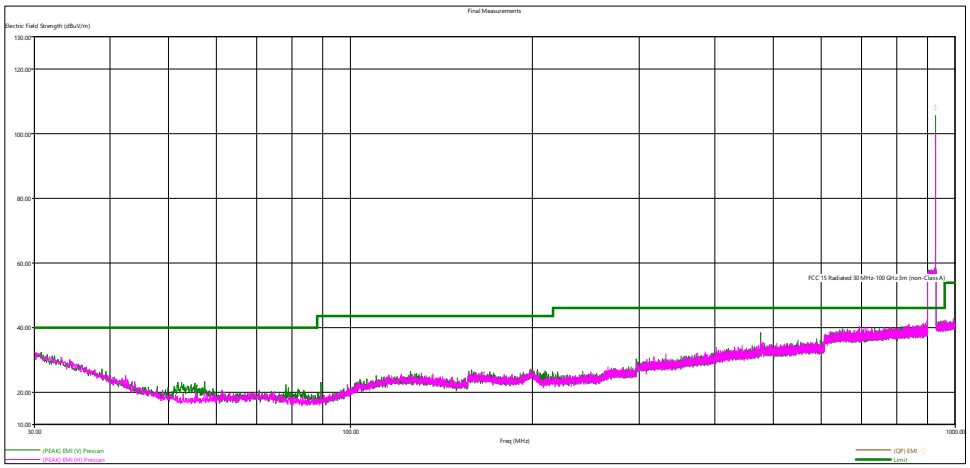

Figure 5 - Radiated Emissions Plot, 30 MHz-1 GHz High Channel

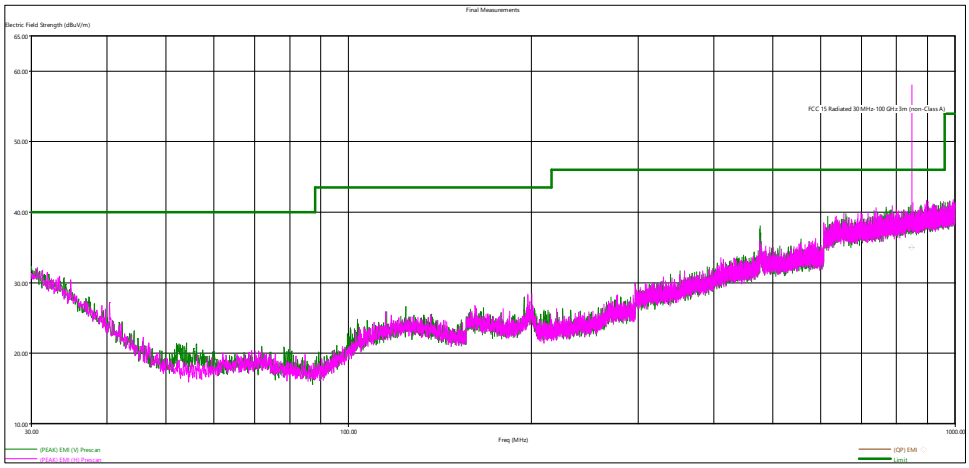

Figure 6 - Radiated Emissions Plot, 30 MHz-1 GHz Receive Mode

REMARKS:
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value - Emission level.
5. The EUT was measured in both the horizontal and vertical orientation. It was found that the Horizontal position produced the highest emissions, and this orientation was used for all testing. See Annex A for test photos.

Quasi-Peak Measurements, 30 MHz -1 GHz*							
Frequency	**Level**	**Limit**	**Margin**	**Height**	**Angle**	**Pol**	**Channel**
MHz	**dBµV/m**	**dBµV/m**	**dB**	**cm.**	**deg.**		
902.315760	108.30	NA	NA	126.23	171.50	V	Low
915.047280	108.67	NA	NA	121.04	177.50	V	Mid
927.693840	108.19	NA	NA	118.95	174.75	V	High
848.547360	35.10	46.02	10.92	178.41	107.50	H	RX

*All other measurements found to be at least 6dB below the limit line.

Peak Measurements, 1 GHz - 10 GHz**							
Frequency	**Level**	**Limit**	**Margin**	**Height**	**Angle**	**Pol**	**Channel**
MHz	**dBµV/m**	**dBµV/m**	**dB**	**cm.**	**deg.**		
1804.48	41.56	NA*	NA	459.01	201.25	H	Low
6316.452000	52.13	NA*	NA	150.00	252.00	H	Low
5489.960000	48.41	NA*	NA	250.65	247.75	H	Mid
6404.914000	56.03	NA*	NA	141.64	250.50	H	Mid
3660.338000	46.26	73.98	27.72	182.35	21.50	V	Mid
9150.530000	55.36	73.98	18.62	192.50	233.25	V	Mid
5566.360000	50.00	NA*	NA	479.37	230.25	H	High
6493.594000	54.37	NA*	NA	198.11	283.25	H	High
3710.684000	48.92	73.98	25.06	185.76	185.50	V	High
9276.520000	53.94	NA*	NA	150.71	230.25	V	High

*Unrestricted harmonics are at least 20dB below the fundamental peak.
**Receive-only scan did not have any peaks within 6dB of the Average Limit Line.

Average Measurements, 1 GHz- 10 GHz**							
Frequency	**Average Level***	**Limit**	**Margin**	**Height**	**Angle**	**Pol**	**Channel**
MHz	**dBµV/m**	**dBµV/m**	**dB**	**cm.**	**deg.**		
1804.48	41.56	NA*	NA	459.01	201.25	H	Low
6316.452000	52.13	NA*	NA	150.00	252.00	H	Low
5489.960000	41.37	NA*	NA	250.65	247.75	H	Mid
6404.914000	50.38	NA*	NA	141.64	250.50	H	Mid
3660.338000	38.07	53.98	15.91	182.35	21.50	V	Mid
9150.530000	44.51	53.98	9.47	192.50	233.25	V	Mid
5566.360000	43.02	NA*	NA	479.37	230.25	H	High
6493.594000	45.15	NA*	NA	198.11	283.25	H	High
3710.684000	44.00	53.98	9.98	185.76	185.50	V	High
9276.520000	43.38	NA*	NA	150.71	230.25	V	High

The EUT was maximized in all 3 orthogonal axes. The worst-case (z-axis) is shown in the table above.
*In unrestricted bands, harmonics are at least 20dB below fundamental levels.
**Receive-only mode did not have any peaks within 6dB of the Average Limit Line.

4.3 PEAK OUTPUT POWER

Test Method: ANSI C63.10, Section(s) 11.9.2.2.2

Limits of bandwidth measurements:
For an FHSS system with 50 channels or more, the output power is required to be less than 1000 mW or 30 dBm.

Conducted power was measured.

Test procedure: Conducted

Deviations from test standard:
No deviation.

Test setup:

See Section 4.2

EUT operating conditions:
The EUT was powered by USB and set to transmit continuously on the lowest frequency channel, highest frequency channel and one in the middle of its operating range.

Test results:
Refer to section 4.0 for the results table.

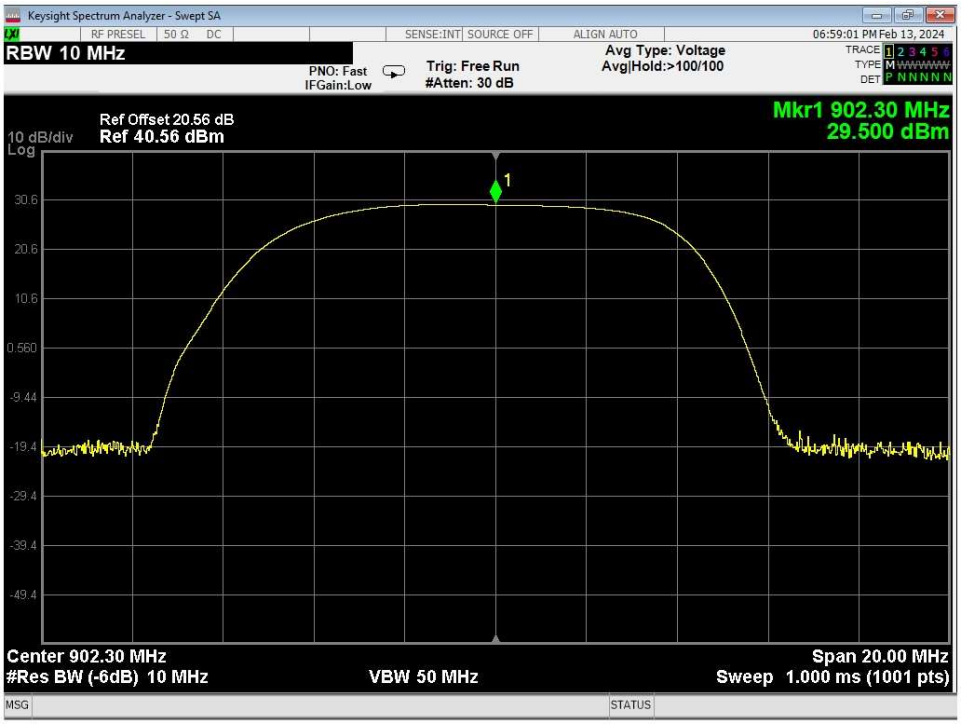

Figure 7 – Output Power, Low Channel.

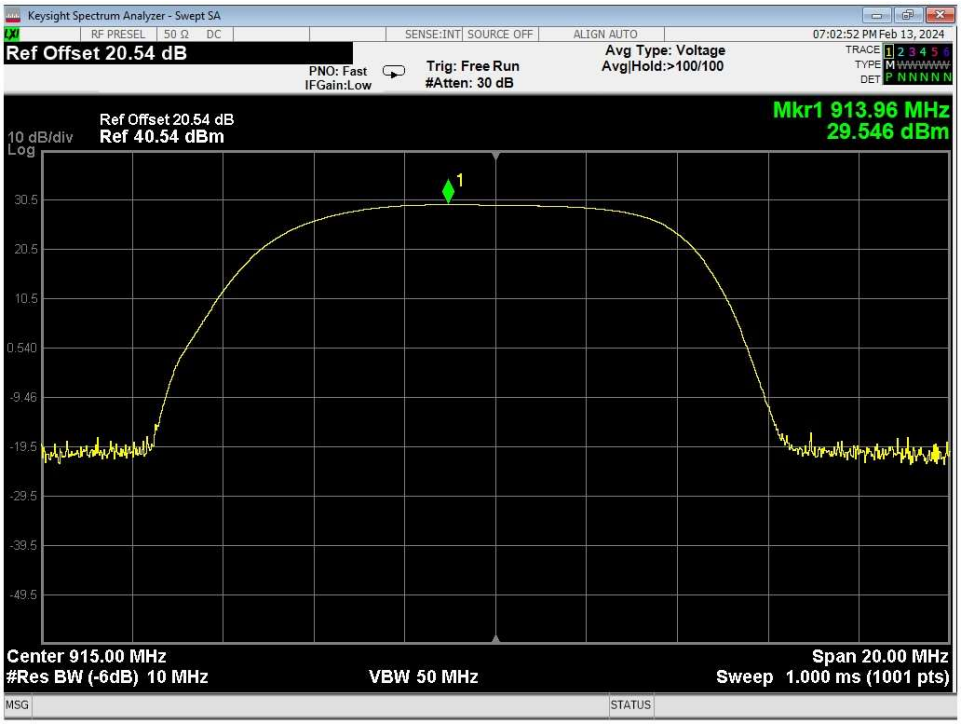

Figure 8 – Output Power, Mid Channel

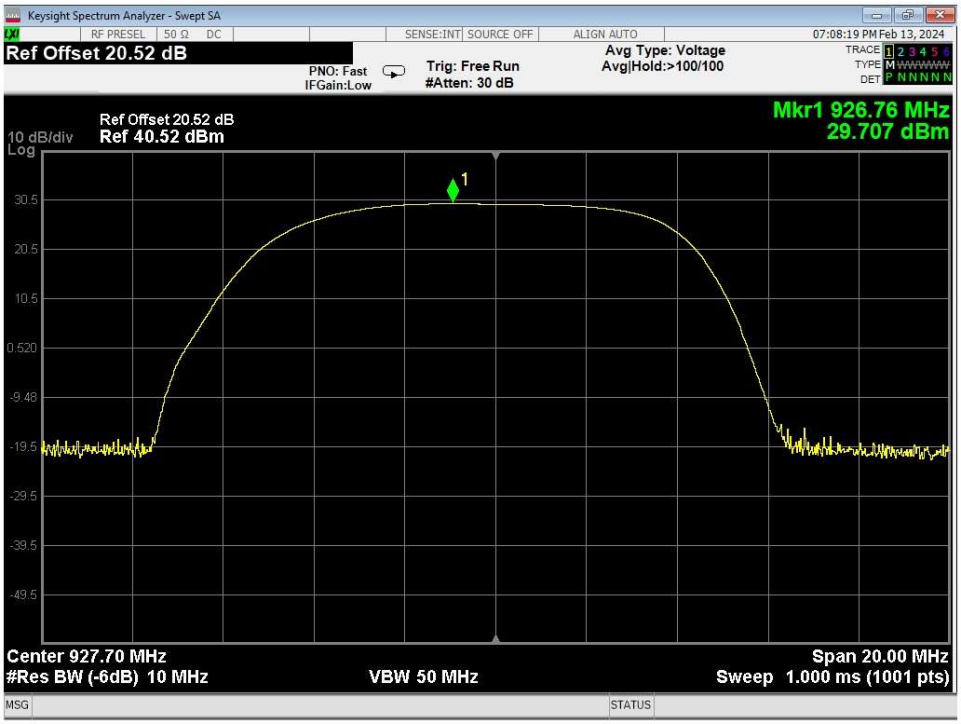

Figure 9 – Output Power, High Channel

4.4 BANDWIDTH

Test Method: ANSI C63.10, Section(s) 6.9.2 (20 dB BW)
ANSI C63.10, Section(s) 6.9.3 (99% BW)

Limits of bandwidth measurements:
From FCC Part 15.247 (1) (i) and RSS-247 5.1(c)

The maximum allowed 20 dB bandwidth of the hopping channel is 250 kHz.

Test procedures:
Bandwidth measurement was taken at a distance of 3m from the EUT. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 kHz RBW.

The 20dB bandwidth is defined as the bandwidth of which is higher than peak power minus 20dB.

The 99% occupied bandwidth was measured using the test receiver's occupied bandwidth function.

Test setup:

All the measurements were done at 3m test distance while operating at low, mid, and high channels. See Section 4.3 for more details.

Deviations from test standard:
No deviation.

Test setup:

The transmitter was connected to the receiver through a 20dB attenuator.

EUT operating conditions:
The EUT was powered by USB and set to transmit continuously on the lowest frequency channel, highest frequency channel and one in the middle of its operating range.

Test results:

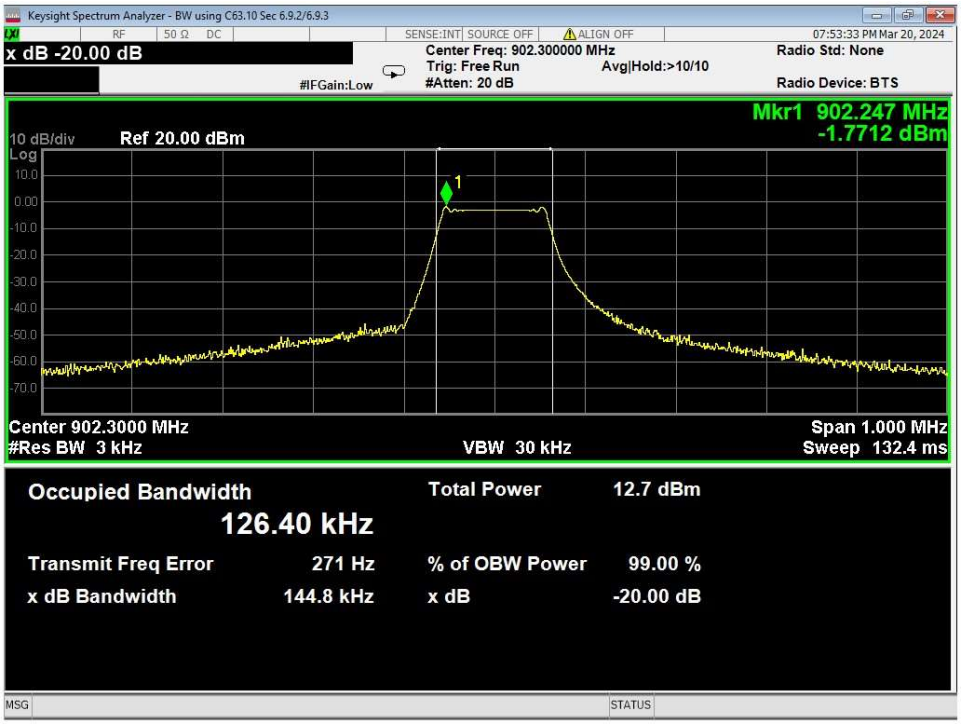

Figure 10 –Bandwidth, Low Channel

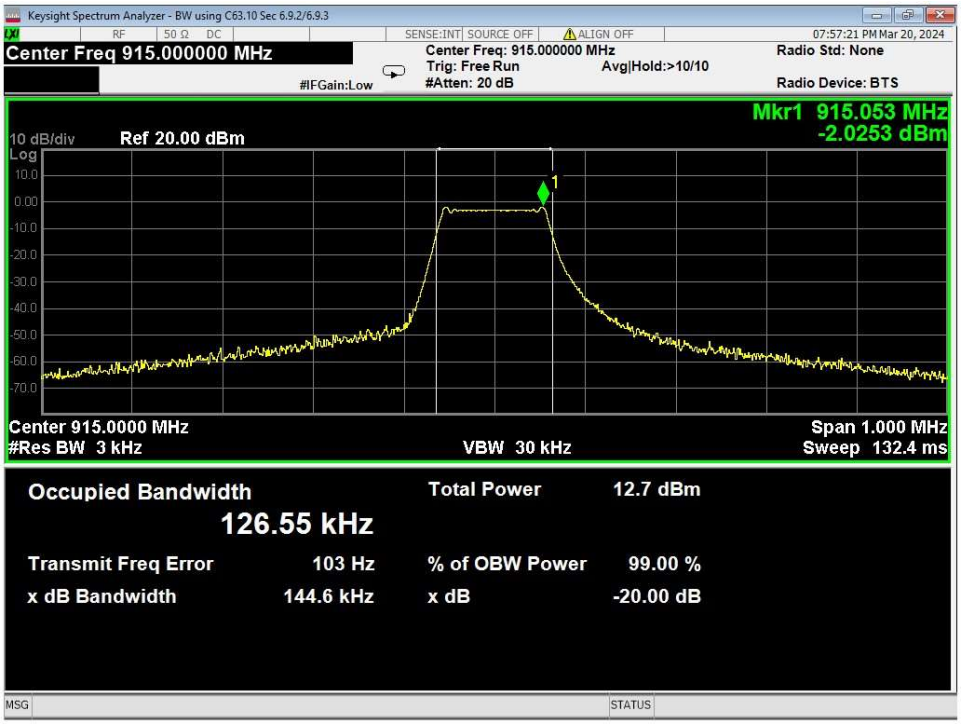

Figure 11 - Bandwidth, Mid Channel

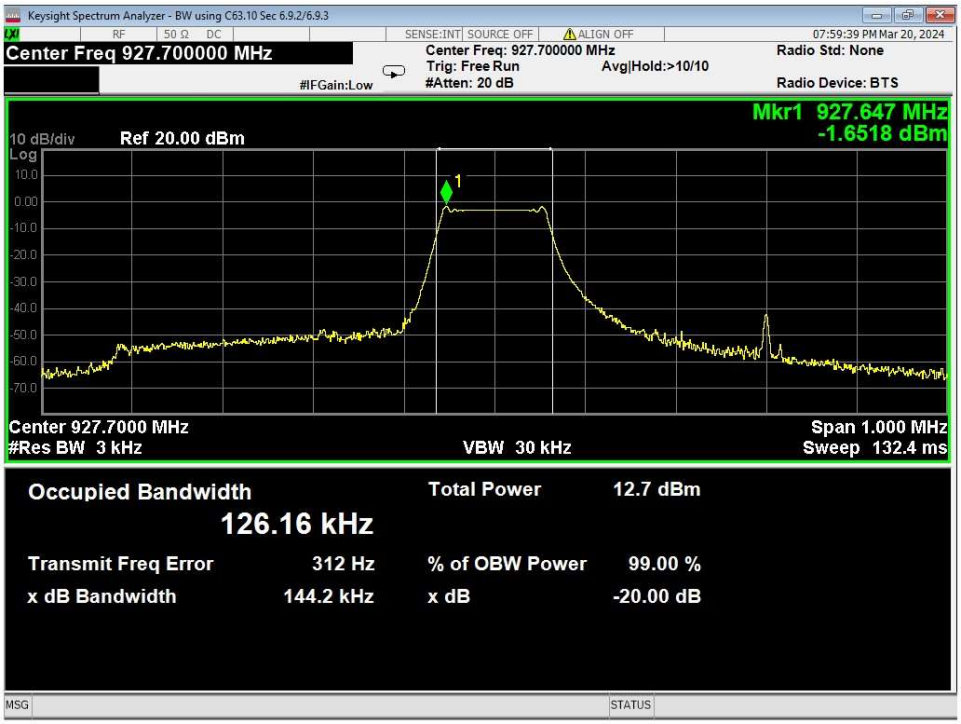

Figure 12 - Bandwidth, High Channel

4.5 BANDEDGES

Test Method: ANSI C63.10, Section(s) 6.10.6

Limits of bandedge measurements:
For emissions outside of the allowed band of operation (902 – 928MHz), the emission level needs to be 20dB under the maximum fundamental field strength. However, if the emissions fall within one of the restricted bands from 15.205 the field strength levels need to be under that of the limits in 15.209.

Test procedures:
All measurements were taken at a distance of 3m from the EUT.

The EUT was maximized in all 3 orthogonal positions in a similar manner as described in Section 4.2.

Deviations from test standard:
No deviation.

Test setup:
All the measurements were done at 3m test distance while operating on the highest and lowest channel depending on which band edge was investigated.

EUT operating conditions:
The EUT was powered by internal battery unless specified and set to transmit continuously on the lowest frequency channel and the highest frequency channel.

Test results:

Refer to section 4.0 for the results table.

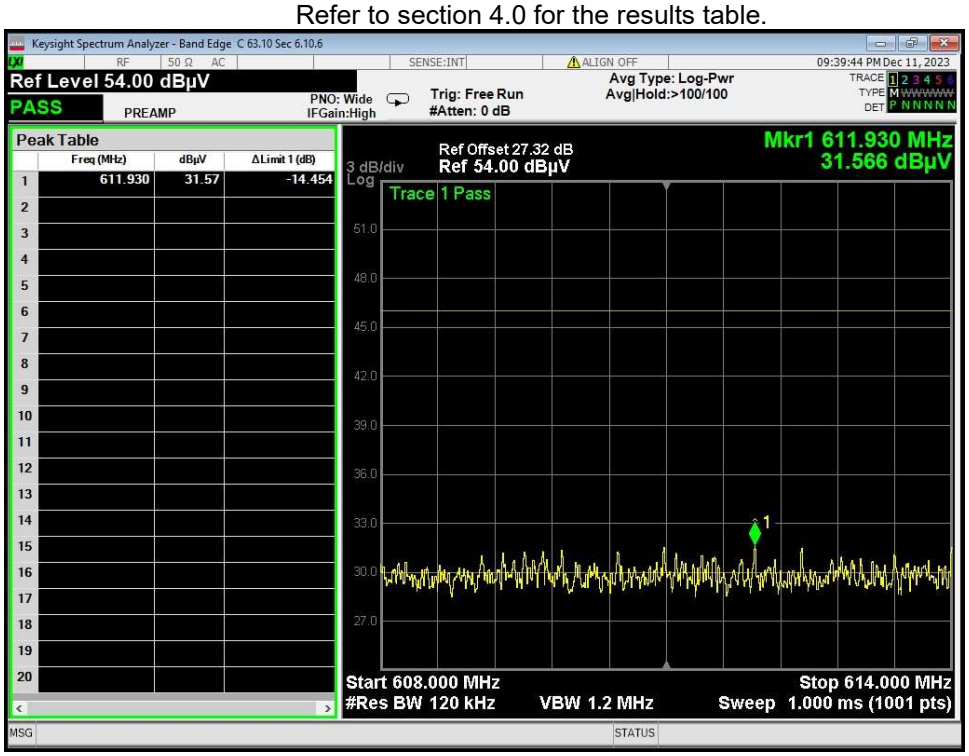

Figure 13 –Band-edge Measurement, Low Channel, Restricted Frequency

Figure 14 –Band-edge Measurement, Low Channel, Unrestricted Frequency

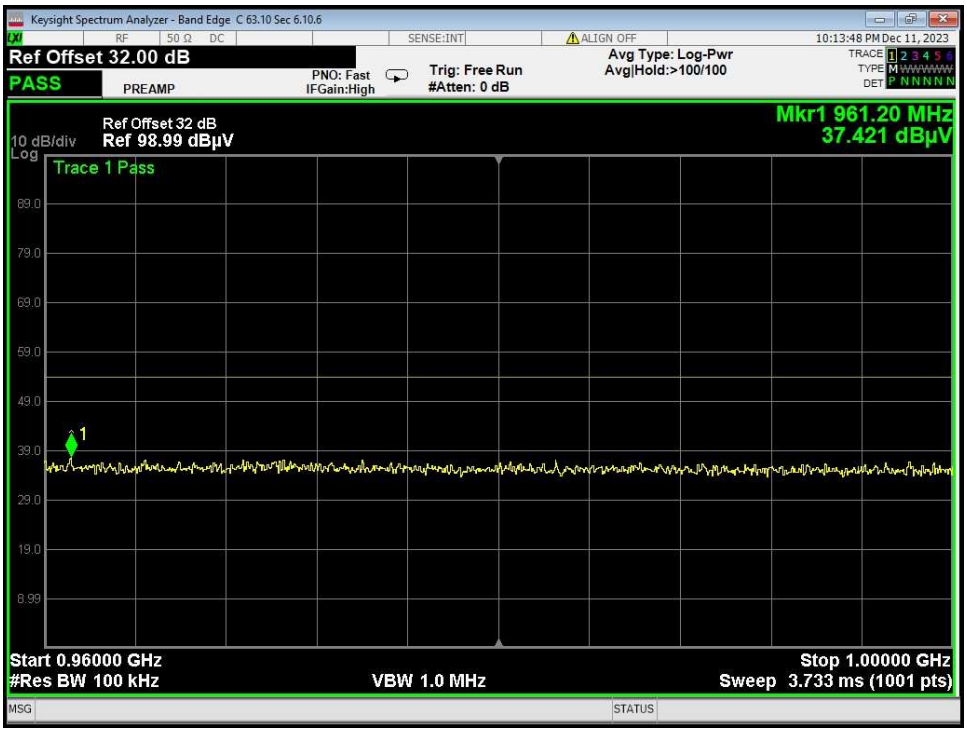

Figure 15 –Band-edge Measurement, High Channel, Restricted Frequency

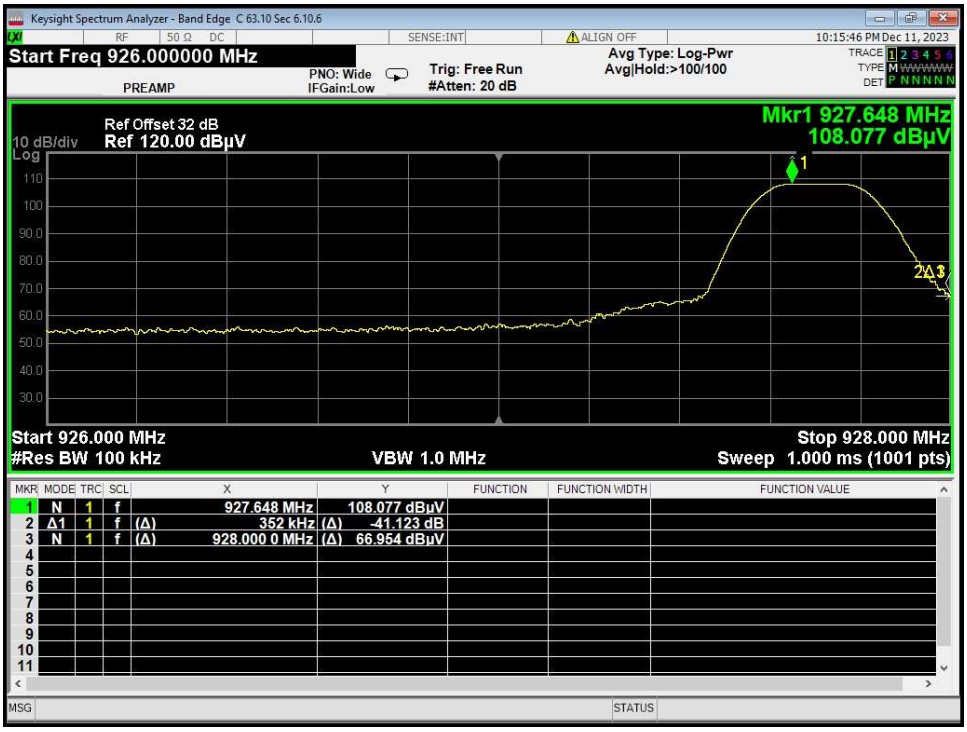

Figure 16 – Band-edge Measurement, High Channel, Unrestricted Frequency

4.6 CARRIER FREQUENCY SEPARATION, NUMBER OF HOPPING CHANNELS, TIME OF OCCUPANCY

Test Method: ANSI C63.10, Section 7.8.2, 7.8.3, 7.8.4

Limits for Time of Occupancy
Average time of occupancy on any frequency should not exceed 0.4 seconds within a 20 second period.

Test procedures:
The method from FCC DA 00-705

Test setup:
Radiated measurements.

EUT operating conditions:
The EUT was powered by USB and set to Hopping mode (which requires a 2nd device).

Test results:

On time recorded was 280.8ms

Time of Occupancy =
280.8ms < 400ms (15.247 Limit)

Total Hop Count =
168 Channels (as attested by the customer)

Frequency Separation: Customer attests that the minimum frequency separation meets the requirements:

Separation: 150kHz
20dB Bandwidth: 144.8kHz

Channel List					
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	902.475	57	910.875	113	919.275
2	902.625	58	911.025	114	919.425
3	902.775	59	911.175	115	919.575
4	902.925	60	911.325	116	919.725
5	903.075	61	911.475	117	919.875
6	903.225	62	911.625	118	920.025
7	903.375	63	911.775	119	920.175
8	903.525	64	911.925	120	920.325
9	903.675	65	912.075	121	920.475
10	903.825	66	912.225	122	920.625
11	903.975	67	912.375	123	920.775
12	904.125	68	912.525	124	920.925
13	904.275	69	912.675	125	921.075
14	904.425	70	912.825	126	921.225
15	904.575	71	912.975	127	921.375
16	904.725	72	913.125	128	921.525
17	904.875	73	913.275	129	921.675
18	905.025	74	913.425	130	921.825
19	905.175	75	913.575	131	921.975
20	905.325	76	913.725	132	922.125
21	905.475	77	913.875	133	922.275
22	905.625	78	914.025	134	922.425
23	905.775	79	914.175	135	922.575
24	905.925	80	914.325	136	922.725
25	906.075	81	914.475	137	922.875
26	906.225	82	914.625	138	923.025
27	906.375	83	914.775	139	923.175
28	906.525	84	914.925	140	923.325
29	906.675	85	915.075	141	923.475
30	906.825	86	915.225	142	923.625
31	906.975	87	915.375	143	923.775
32	907.125	88	915.525	144	923.925
33	907.275	89	915.675	145	924.075
34	907.425	90	915.825	146	924.225
35	907.575	91	915.975	147	924.375
36	907.725	92	916.125	148	924.525
37	907.875	93	916.275	149	924.675
38	908.025	94	916.425	150	924.825
39	908.175	95	916.575	151	924.975
40	908.325	96	916.725	152	925.125
41	908.475	97	916.875	153	925.275
42	908.625	98	917.025	154	925.425
43	908.775	99	917.175	155	925.575
44	908.925	100	917.325	156	925.725
45	909.075	101	917.475	157	925.875
46	909.225	102	917.625	158	926.025
47	909.375	103	917.775	159	926.175
48	909.525	104	917.925	160	926.325
49	909.675	105	918.075	161	926.475
50	909.825	106	918.225	162	926.625
51	909.975	107	918.375	163	926.775
52	910.125	108	918.525	164	926.925
53	910.275	109	918.675	165	927.075
54	910.425	110	918.825	166	927.225
55	910.575	111	918.975	167	927.375
56	910.725	112	919.125	168	927.525

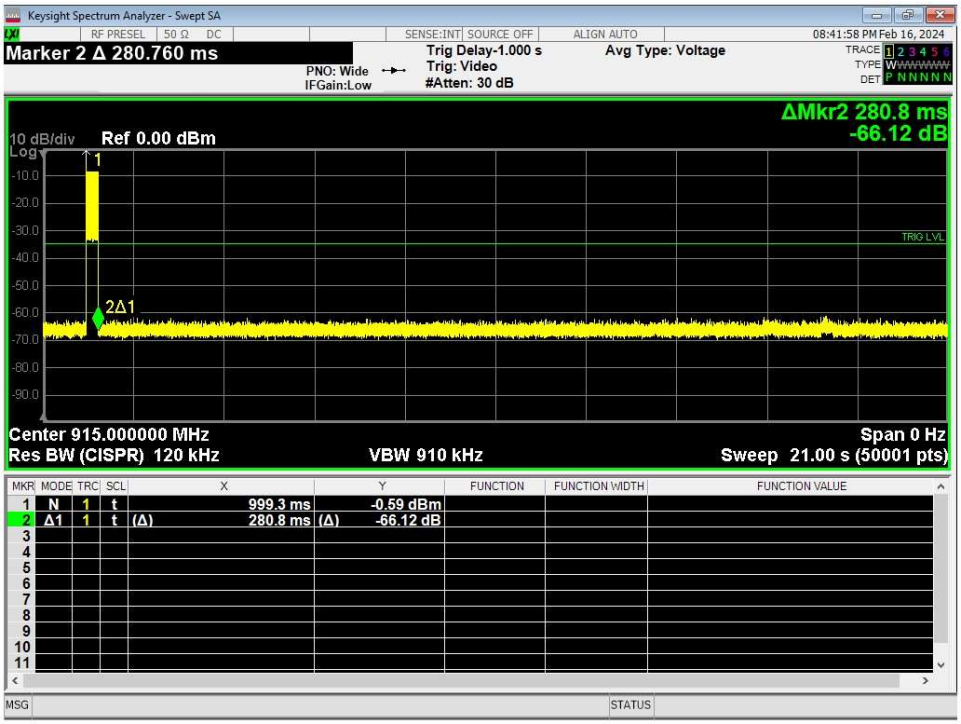

Figure 17 – On time

4.7 CONDUCTED AC MAINS EMISSIONS

Test Method: ANSI C63.10-2013, Section(s) 6.2

Limits for conducted emissions measurements:

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Notes:
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

Test Procedures:

a. The EUT was placed 0.8m above a ground reference plane and 0.4 meters from the conducting wall of a shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provides 50 ohm/ 50uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference as well as the ground.
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits are not reported.
d. Results were compared to the 15.207 limits.

Deviation from the test standard:
No deviation

EUT operating conditions:
Details can be found in section 2.1 of this report. USB power supply was used for AC Conducted Emissions.

Test Results:

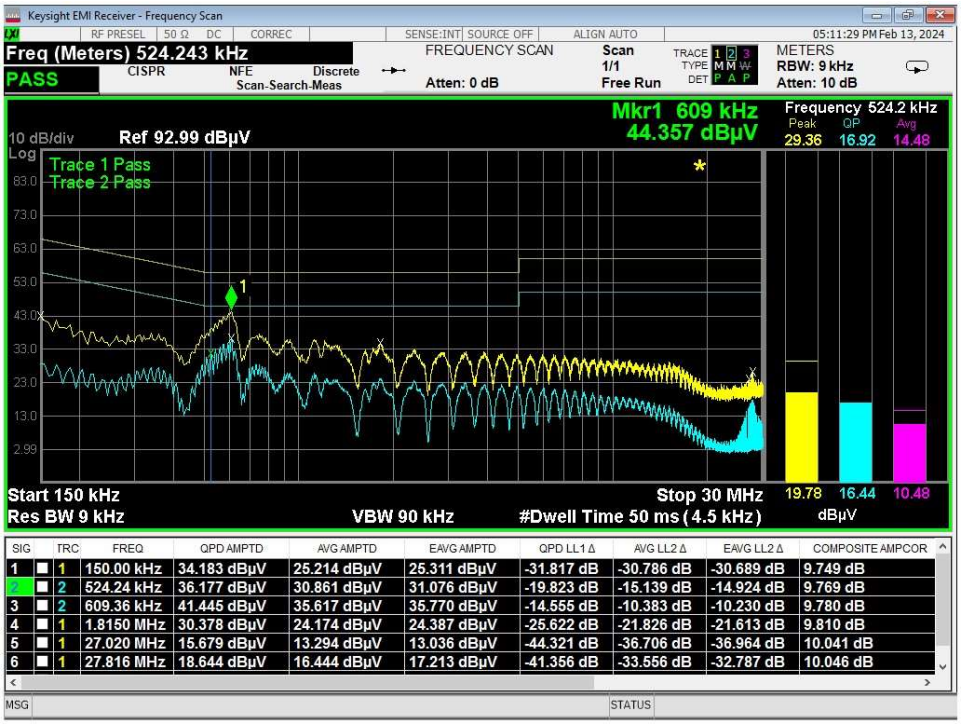

Figure 18 - Conducted Emissions, Line

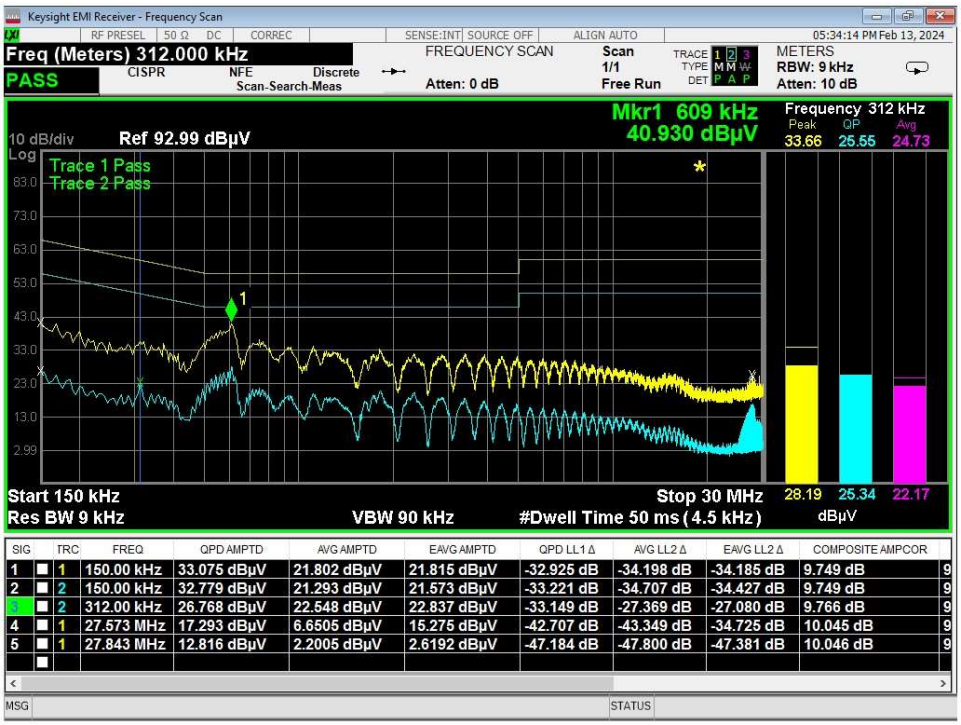

Figure 19 - Conducted Emissions, Neutral

APPENDIX A: SAMPLE CALCULATION

Radiated Emissions

The field strength is calculated in decibels (dB) by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = R + AF - (-CF + AG)$$

where FS = Field Strength

R = Receiver Amplitude Receiver reading in dBµV

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Preamplifier Amplifier Gain

Assume a receiver reading of 55.00 dBµV is obtained. The Antenna Factor of 12.00 and a Cable Factor of 1.10 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.10 dBµV/m.

FS = 55.00 + 12.00 – (-1.10 + 20.00) = 48.1 dBµV/m

The 48.1 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m = Common Antilogarithm [(48.1 dBµV/m)/20]= 254.1 µV/m

Conducted Emissions

Receiver readings are compared directly to the conducted emissions limits in decibels (dB) by adding the cable loss and LISN insertion loss to the receiver reading. The basic equations with a sample calculation is as follows;

$$FS = R + IL - (-CF)$$

where V = Conducted Emissions Voltage Measurement

R = Receiver reading in dBµV

IL = LISN Insertion Loss

CF = Cable Attenuation Factor

APPENDIX B – MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels apply to tests performed in this test report:

Test	Frequency Range	NCEE Labs Uncertainty Value (dB)	Maximum Uncertainty Values per CISPR 16-4-2:2011/A1:2018
AC Line Conducted Emissions	150kHz - 30MHz	3.03	3.60
Radiated Emissions, 3m	30MHz - 1GHz	4.19	5.34
Radiated Emissions, 3m	1GHz – 18GHz	5.08	5.48

Expanded uncertainty values are calculated to a confidence level of 95%.

NCEE Labs meets the maximum uncertainty requirements per CISPR 16-4-2:2011/A1:2018, and therefore does not require a minimum passing margin to state that an EUT is less than the field strength limits of the applicable CISPR, IEC or EN limit per CISPR 16-4-2:2011/A1:2018, Section 4.1.

NCEE Labs employs tilting when testing at 3m test distance. The maximum uncertainty associated with this method is used.

Maximum uncertainty values show the worst-case of all test distances used.

REPORT END