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EMC TEST REPORT

Prepared for: **Garmin International, Inc.**

Address: **1200 E. 151st Street**
Olathe, Kansas, 66062, USA

Product: **A05007**

Test Report No: **R20240212-00-E3** **Rev: A**

Approved By:

Fox Lane,
EMC Test Engineer

DATE: **13 January 2025**

Total Pages: **33**

REVISION PAGE

Rev. No.	Date	Description
0	10 January 2025	Issued by FLane Prepared by FLane
A	13 January 2025	Added receiver Spurious emissions Typos fixed Power table corrected – FL

CONTENTS

1.0 SUMMARY OF TEST RESULTS

The worst-case measurements were reported in this report. The EUT has been tested according to the following specifications:

APPLIED STANDARDS AND REGULATIONS		
Standard Section	**Test Type**	**Result**
FCC Part 2.1046 FCC Part 95.2767	Output Power	PASS
FCC Part 2.1053 FCC Part 95.2779	Radiated Spurious Emissions	PASS
FCC Part 15.209	Receiver Spurious Emissions	PASS
FCC Part 2.1049 FCC Part 95.2773, 95.2779	Emissions Masks/ Occupied Bandwidth	PASS
FCC Part 2.1055 (a)(2), (b), (d) FCC Part 95.2765 (b)	Frequency Stability Under Voltage and Temp Variation	PASS

*Device is powered by 12VDC external battery

See Section 4 for details on the test methods used for each test.

2.0 EUT DESCRIPTION

2.1 EQUIPMENT UNDER TEST

The Equipment Under Test (EUT) was a mobile transceiver.

EUT	A05007
FCC ID:	IPH-05007
EUT Received	25 November 2024
EUT Tested	4 December 2024 – 13 December 2024
Serial No.	8PR000027
Operating Band	151.82 – 154.60 MHz
Device Type	☐ GMSK ☐ GFSK ☐ BT BR ☐ BT EDR 2MB ☐ BT EDR 3MB ☐ 802.11x ☒ VHF
Power Supply / Voltage	12VDC external battery: EWI(ASIA) GROUP LTD model 320-01372-00 car charger

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 (MHz)
Channel 1	151.820
Channel 3	151.940
Channel 5	154.600

These channels are described in FCC Part 95.2763 “MURS Channels”
This EUT was set to transmit in a worse-case scenario with modulation on.

2.3 EUT SETUP

Device was powered by a car charger which was powered by a 12VDC external battery and connected to a Garmin Navigator, M/N: A04856, FCC ID: IPH-04856. VHF Antenna port was connected to 50ohm load for all radiated emissions testing.

2.4 DESCRIPTION OF SUPPORT UNITS

A Garmin Navigator, M/N: A04856, FCC ID: IPH-04856.

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
NCC CAB Identification No:	US0177

Environmental conditions varied slightly throughout the tests:

Relative humidity of 35 ± 4%
Temperature of 22 ± 3° Celsius

3.2 TEST PERSONNEL

No.	PERSONNEL	TITLE	ROLE
1	Fox Lane	Test Engineer	Testing and Report
2	Ethan Schmidt	Test Engineer	Testing

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, 2024	July 18, 2026
Keysight MXE Signal Analyzer (26.5GHz)	N9038A	MY56400083	July 17, 2024	July 18, 2026
Keysight EXA Signal Analyzer	N9010A	MY56070862	July 18, 2023	July 17, 2025
SunAR RF Motion	JB1	A082918-1	July 17, 2024	July 17, 2025
EMCO Horn Antenna	3117	29616	June 12, 2024	June 12, 2025
Agilent Preamp*	87405A	3207A01475	May 2, 2024	May 2, 2026
ETS Red Preamplifier (Orange)*	3115-PA	00218576	January 22, 2024	January 22, 2026
MiniCircuits High Pass Filter*	VHF-1320+	15542	June 5, 2023	June 5, 2025
ETS – Lindgren- VSWR on 10m Chamber	10m Semi-anechoic chamber-VSWR	4740 Discovery Drive	May 15, 2024	May 15, 2027
NCEE Labs-NSA on 10m Chamber*	10m Semi-anechoic chamber-NSA	NCEE-001	May 22, 2024	May 22, 2026
RF Cables (3m Ant. to Control room Bulkhead)	MFR-57500	1E3874	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	01E3874	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
TDK Emissions Lab Software	V11.25	700307	NA	NA

*Internal Characterization

3.4 General Test Procedure and Setup for Radio Measurements

Measurement type presented in this report (Please see the checked box below):

Conducted ☒

The conducted measurements were performed by connecting the output of the transmitter directly into a spectrum analyzer using an impedance matched cable and connector soldered to the EUT in place of the antenna. The information regarding resolution bandwidth, video bandwidth, span and the detector used can be found in the graphs provided in Appendix C. All the radio measurements were performed using the sections from ANSI C63.10, details about the section used can be found in the spectrum analyzer titles on the graph.

Figure 1 - Bandwidth Measurements Test Setup

Radiated ☒

All the radiated measurements were taken at a distance of 3m from the EUT. The information regarding resolution bandwidth, video bandwidth, span and the detector used can be found in the graphs provided in Appendix C. All the radio measurements were performed using the sections from ANSI C63.10, details about the section used can be found in the spectrum analyzer titles on the graph.

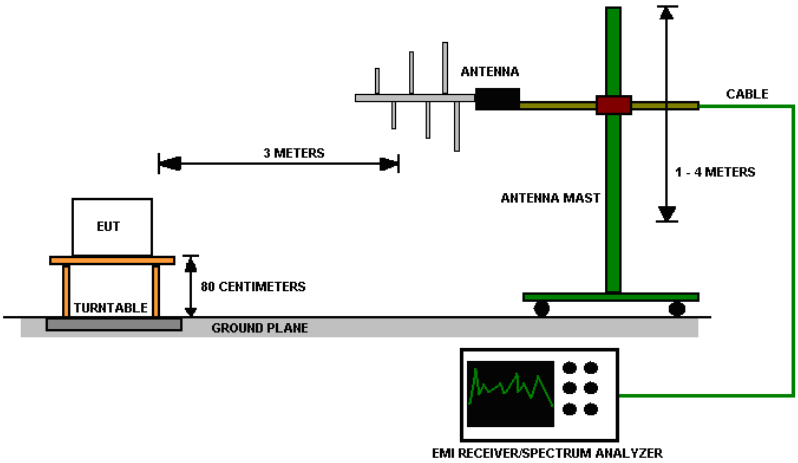

Figure 2 - Radiated Emissions Test Setup

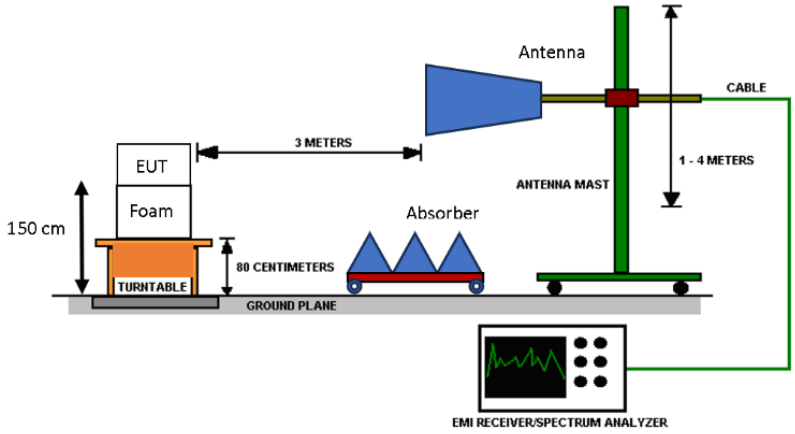

Figure 3 - Radiated Emissions Test Setup, >1GHz

4.0 DETAILED RESULTS

4.1 TRANSMITTER SPURIOUS EMISSIONS

Test Method: ANSI C63.26:2015:

1. Section 5.5, “Radiated Emissions Testing”
2. Section 5.7, “Unwanted conducted emissions measurement”

Limits for radiated emissions measurements:
Emissions radiated outside of the specified bands shall be applied to the limits in 95.2779 as followed:

Transmitting Frequency (MHz)	Frequency Band	Limit (dB)
151.820 151.880 151.940	≥12.5kHz removed from center frequency	50 + 10log(P)
154.570 154.600	≥50kHz removed from center frequency	43 + 10log(P)

Where P is equal to the output power of the transmitter in Watts.
See Section 4.3 for output power measurement.

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 from 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 10dB 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 10 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.

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.

EUT operating conditions
Details can be found in section 2.3 of this report.

Test results:

Quasi-Peak Measurements, Part 95								
Frequency	**Level**	**Limit**	**Margin**	**Height**	**Angle**	**Pol**	**Channel**	**Modulation**
MHz	**dBµV/m**	**dBµV/m**	**dB**	**cm.**	**deg.**			
243.7238	39.19	75.22	36.03	108.56	253.25	V	1	VHF
246.685	38.97	75.22	36.25	105.40	253.25	V	1	VHF
299.7768	39.34	75.22	35.88	268.44	311.25	V	1	VHF
243.7238	39.19	75.22	36.03	108.56	253.25	V	3	VHF
246.685	38.97	75.22	36.25	105.40	253.25	V	3	VHF
299.7768	39.34	75.22	35.88	268.44	311.25	V	3	VHF
154.5953	44.34	NA	NA	106.00	279.75	V	5	VHF
239.2958	37.87	82.22	44.35	107.31	259.00	V	5	VHF
296.4043	39.02	82.22	43.2	203.55	298.00	V	5	VHF

**All other emissions were found to be at least 20 dB below the limit and not tabulated.

Example of limit calculation:
rated powered P = 2W
Rated power converted to Field strength:
33dBm + 107 – 11.77 = 128.23dBuV/m @3m
Limit = 50 + 10log(P) = 53.01dB below the transmitter rated power for Ch 1/2/3
Limit = 43 + 10log(P) = 46.01dB below the transmitter rated power for Ch 4/5
Limit in dBuV/m @3m = 128.23 – 53.01 = 75.22dBuV/m @3m for Ch 1/2/3
Limit in dBuV/m @3m = 128.23 – 46.01 = 82.22dBuV/m @3m for Ch 4/5

Frequencies with N/A's in their limit/margin columns are fundamental frequencies and not evaluated to limits here.

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. EUT was investigated for intermodulation. No intermodulation was found above system's noise floor

4.3 RECEIVER SPURIOUS EMISSIONS

Test Method:
ANSI C63.10-2020, 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.
4. Intermodulation was investigated and found to be below system noise floor

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 from 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 10dB 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 10 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.

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.

EUT operating conditions

Details can be found in section 2.1 of this report.

Test results:

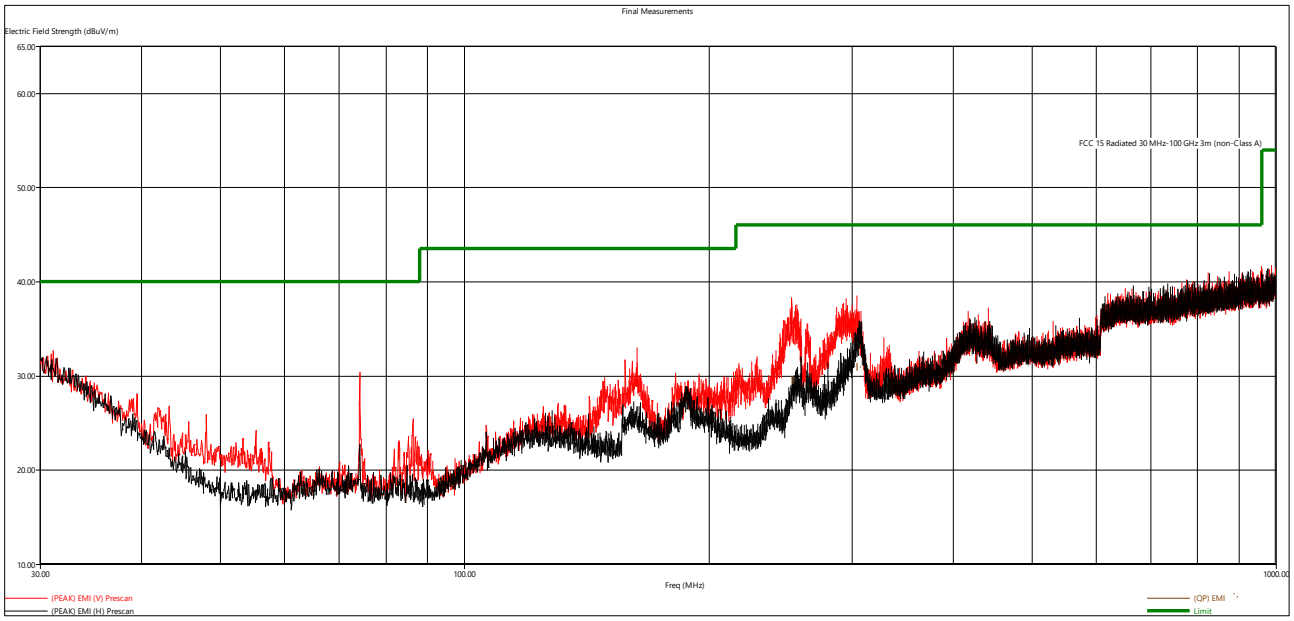

Figure 4 - Radiated Emissions Plot, Receive

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

Quasi-Peak Measurements								
Frequency	**Level**	**Limit**	**Margin**	**Height**	**Angle**	**Pol**	**Channel**	**Modulation**
MHz	**dBµV/m**	**dBµV/m**	**dB**	**cm.**	**deg.**			
252.919920	29.46	46.02	16.56	105.29	274.50	V	RX	
304.186560	30.87	46.02	15.15	201.65	96.50	V	RX	

The EUT was maximized in all 3 orthogonal axes. The worst-case is shown in the plot and table above. All other measurements were found to be at least 6 dB below the limit and were not tabulated.

4.2 CONDUCTED SPURIOUS EMISSIONS

Test Method:
ANSI C63.26-2015, Section 5.7.4

Limits of spurious emissions:
Emissions radiated outside of the specified bands shall be applied to the limits in 95.2779 as followed:

Transmitting Frequency (MHz)	Frequency Band	Limit (dB)
151.820 151.880 151.940	≥12.5kHz removed from center frequency	50 + 10log(P) or 70dB whichever is less attenuation
154.570 154.600	≥50kHz removed from center frequency	43 + 10log(P)

Test procedures:
Device was connected directly to spectrum analyzer and spurious measurements were investigated from 30MHz to 2GHz.

Deviations from test standard:
None.

Test setup:
Test setup details can be found in section 3.4 of this report.

EUT operating conditions:
Details can be found in section 2.3 of this report.

Test results:
Note that the line shown on the plot(s) is not a limit line. It is a line for reference.

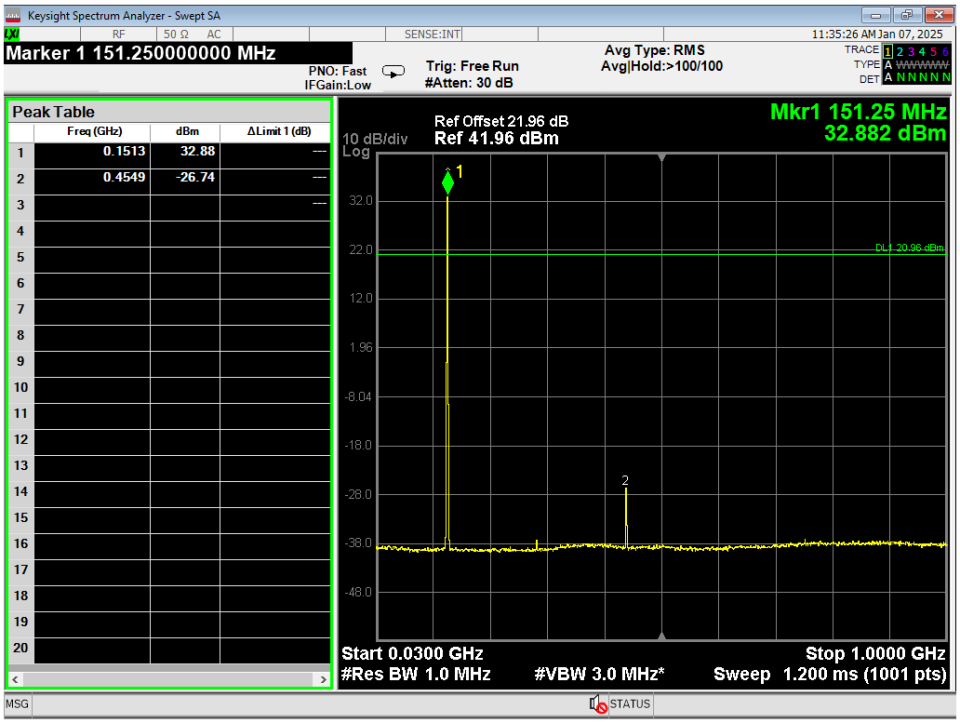

Figure 5 - Conducted Spurious emissions, VHF, Ch1, 30MHz – 1GHz

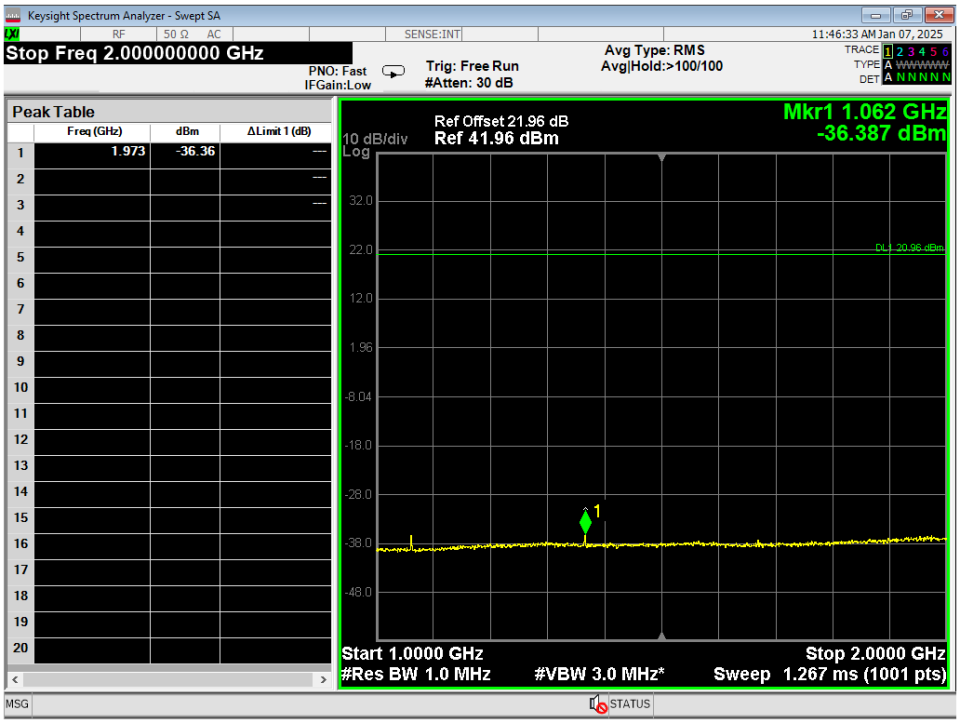

Figure 6 - Conducted Spurious emissions, VHF, Ch1, 1GHz – 2GHz

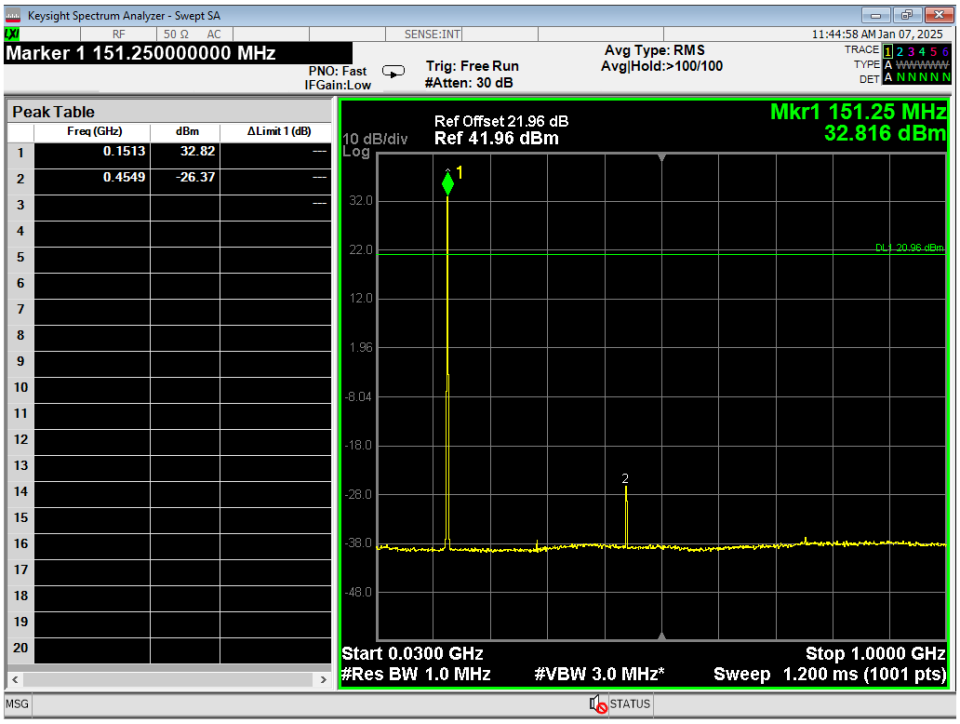

Figure 7 - Conducted Spurious emissions, VHF, Ch3, 30MHz – 1GHz

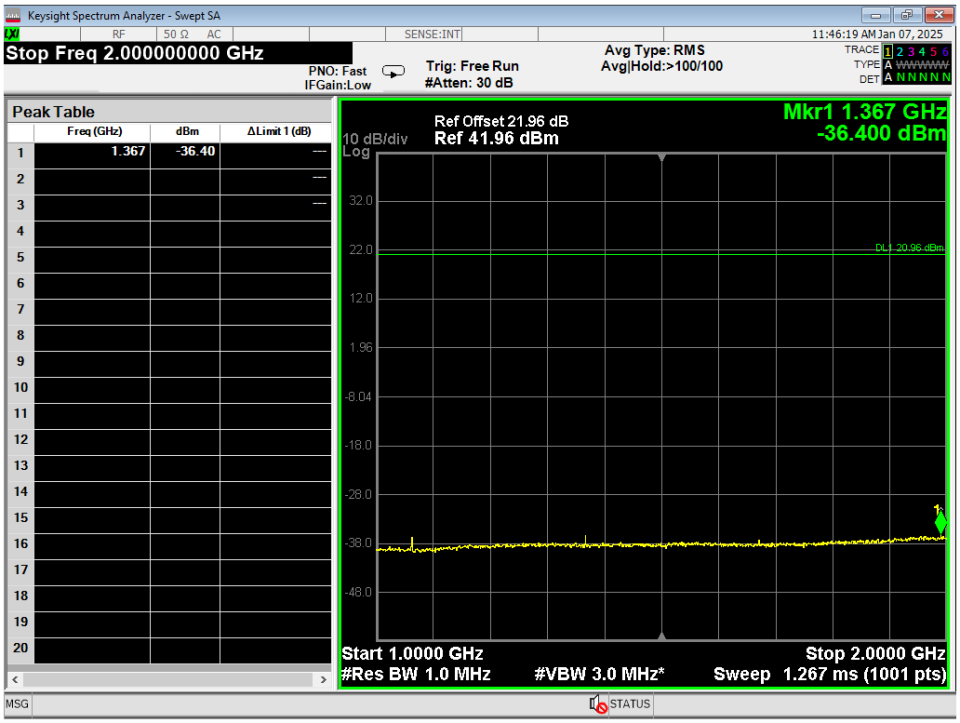

Figure 8 - Conducted Spurious emissions, VHF, Ch3, 1GHz – 2GHz

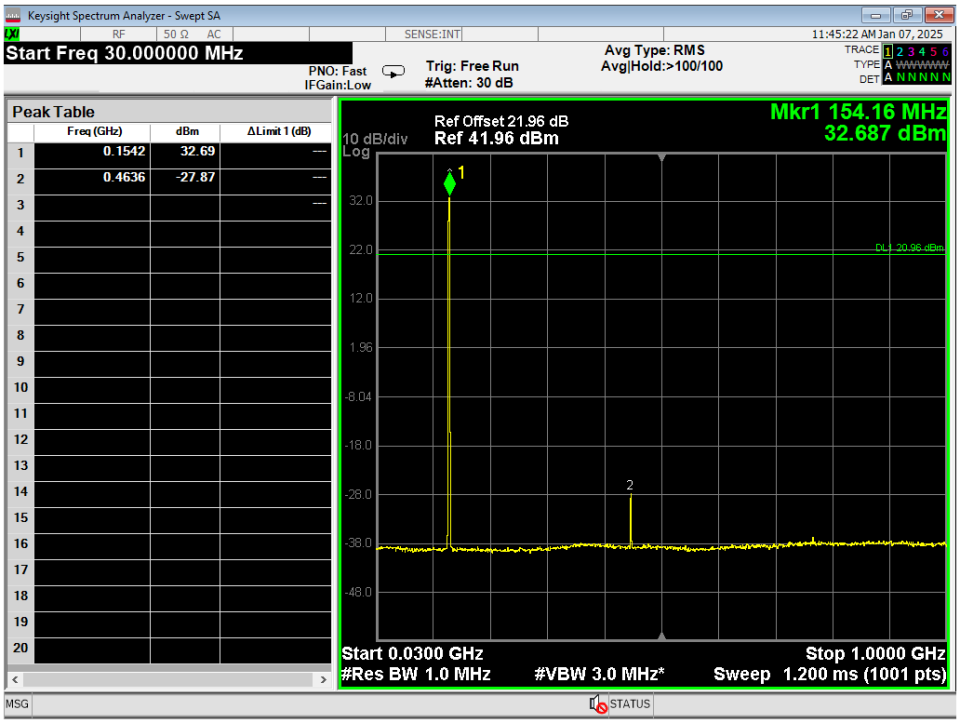

Figure 9 - Conducted Spurious emissions, VHF, Ch5, 30MHz – 1GHz

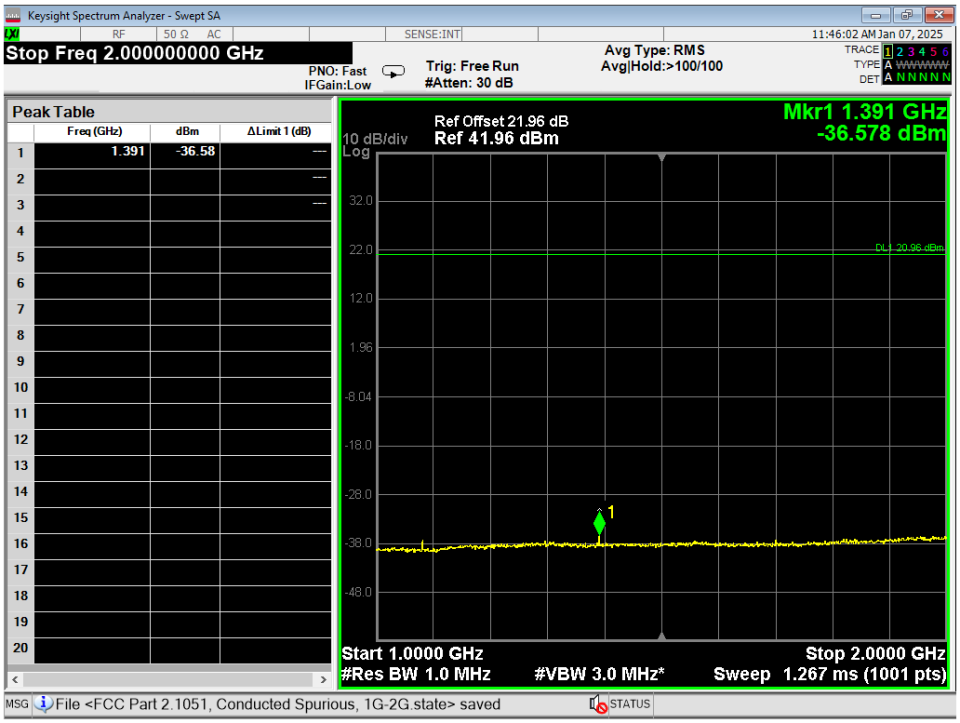

Figure 10 - Conducted Spurious emissions, VHF, Ch5, 1GHz – 2GHz

4.3 OUTPUT POWER

Test Method:
ANSI C63.26 Section(s) 5.2.4.3.1 “General procedure for measuring average power of a narrowband signal with a spectrum/signal analyzer or EMI receiver”

FCC Part 95.2767 MURS transmitting power limit:
Each MURS transmitter type must be designed such that the transmitter power output does not exceed 2 Watts under normal operating conditions.

Test procedures:
a) Set the RBW ≥ OBW.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 2 × OBW.
d) Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period).
e) Detector = Peak
f) Trace mode = Max Hold
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the amplitude level.
Note: EUT was transmitting at 100% duty cycle for this test

Deviations from test standard:
No deviation.

Test setup:
See section 3.4 for further information regarding set-up.

EUT operating conditions:
See section 2.3 for more information

Test results:
Limit = 33 dBm (2000 mW)

Output Power

CHANNEL FREQUENCY (MHz)	OUTPUT POWER (dBm)	OUTPUT POWER (mW)	Detector	RESULT
151.82	32.472	1766.85	Peak	PASS
151.94	32.458	1761.16	Peak	PASS
154.60	32.507	1781.15	Peak	PASS

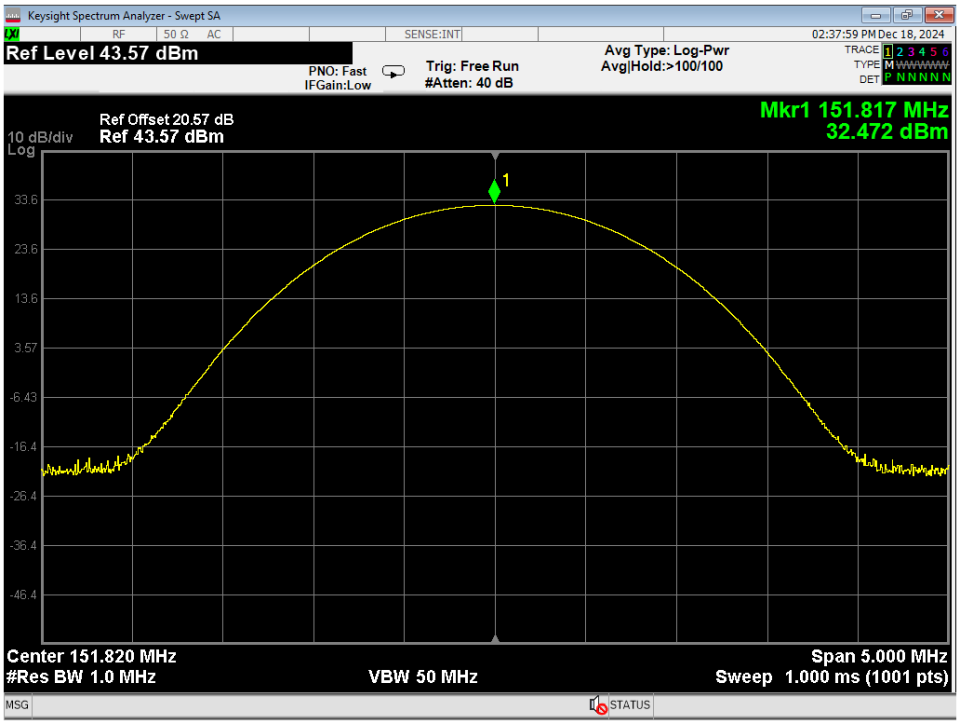

Figure 11 –Output Power, 151.820 MHz

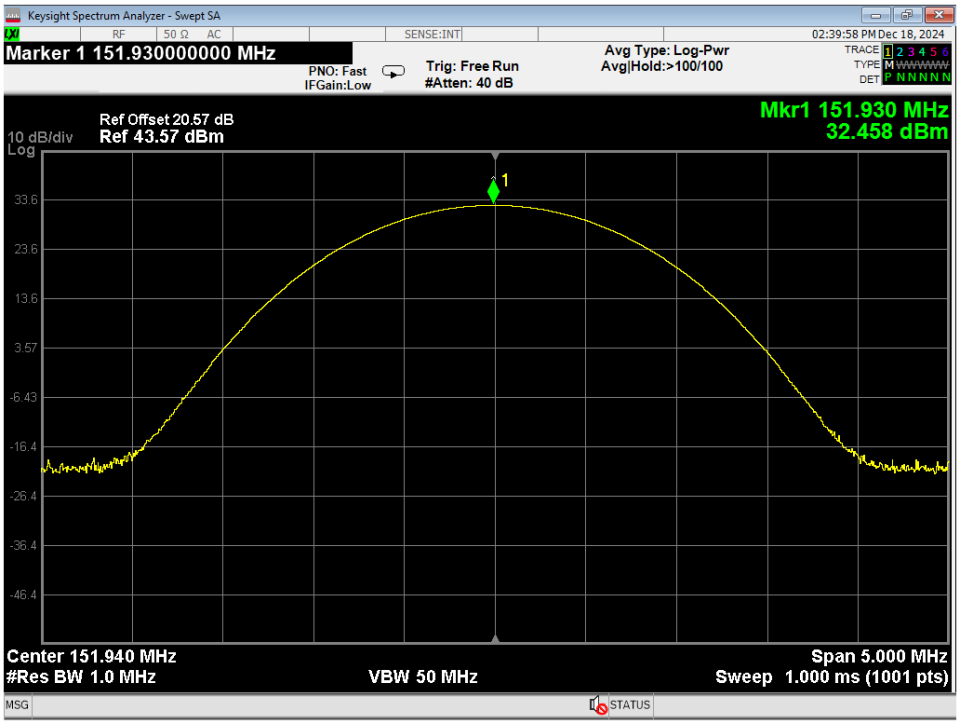

Figure 12 –Output Power, 151.940 MHz

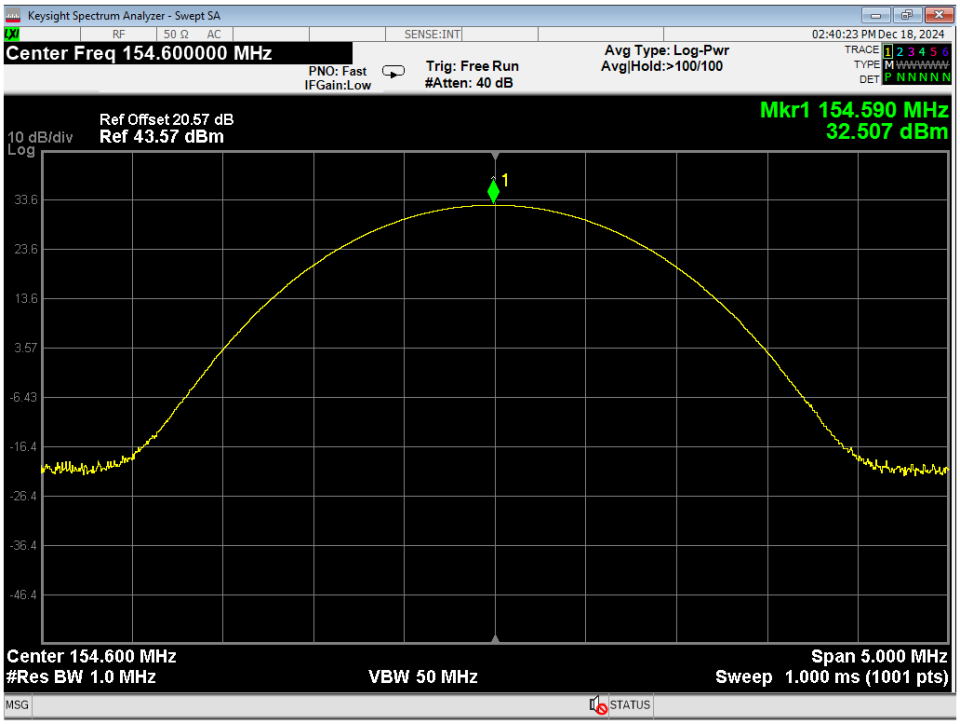

Figure 13 –Output Power, 154.600 MHz

4.4 BANDWIDTH AND EMISSIONS MASK

Test Method: ANSI C63.26,
Section(s) 5.4.4, 5.7.3, Annex I

Limits:

FCC Part 95.2773 MURS authorized bandwidths:

Each MURS transmitter type must be designed to meet the emission bandwidth limitations in this section.

(a) The occupied bandwidth of emissions transmitted on the center frequencies 151.820 MHz, 151.880 MHz, and 151.940 MHz must not exceed 11.25 kHz.

(b) The occupied bandwidth of emissions transmitted on the center frequencies 154.570 MHz and 154.600 MHz must not exceed 20.0 kHz.

FCC Part 95.2773 MURS authorized bandwidths:

Channel Center Frequencies	Paragraphs
151.820, 151.880 and 151.940	(1), (2)
154.570 & 154.600, without audio filter	(5), (6), (7)

(1) 7.27(fd−2.88 kHz) dB on any frequency removed from the channel center frequency by a displacement frequency (fd in kHz) that is more than 5.625 kHz, but not more than 12.5 kHz. RBW = 300 Hz

(2) 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation, on any frequency removed from the channel center frequency by more than 12.5 kHz. RBW = 30 kHz

(3) 25 dB on any frequency removed from the channel center frequency by more than 10 kHz, but not more than 20 kHz. RBW = 300 Hz

(4) 35 dB on any frequency removed from the channel center frequency by more than 20 kHz, but not more than 50 kHz. RBW = 300 Hz

(5) 83 log (fd ÷ 5) dB on any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) that is more than 5 kHz, but not more than 10 kHz. RBW = 300 Hz

(6) 29 log (fd2 ÷ 11) dB or 50 dB, whichever is the lesser attenuation on any frequency removed from the channel center frequency by a displacement frequency (fd in kHz) that is more than 10 kHz, but not more than 50 kHz. RBW = 300 Hz

(7) 43 + 10 log(P) dB on any frequency removed from the channel center frequency by more than 50 kHz. RBW = 30 kHz

(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) and (3) through (6) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency ranges specified in paragraphs (b)(2) and (7) of this section is measured with a reference bandwidth of at least 30 kHz.

Test procedures:
The EUT was connected to the spectrum analyzer directly with a low-loss shielded coaxial cable. The bandwidth used for testing was same as those required in 95.2773(c).

Deviations from test standard:
No deviation

EUT operating conditions:
See section 2.3 for more information.

Test results:

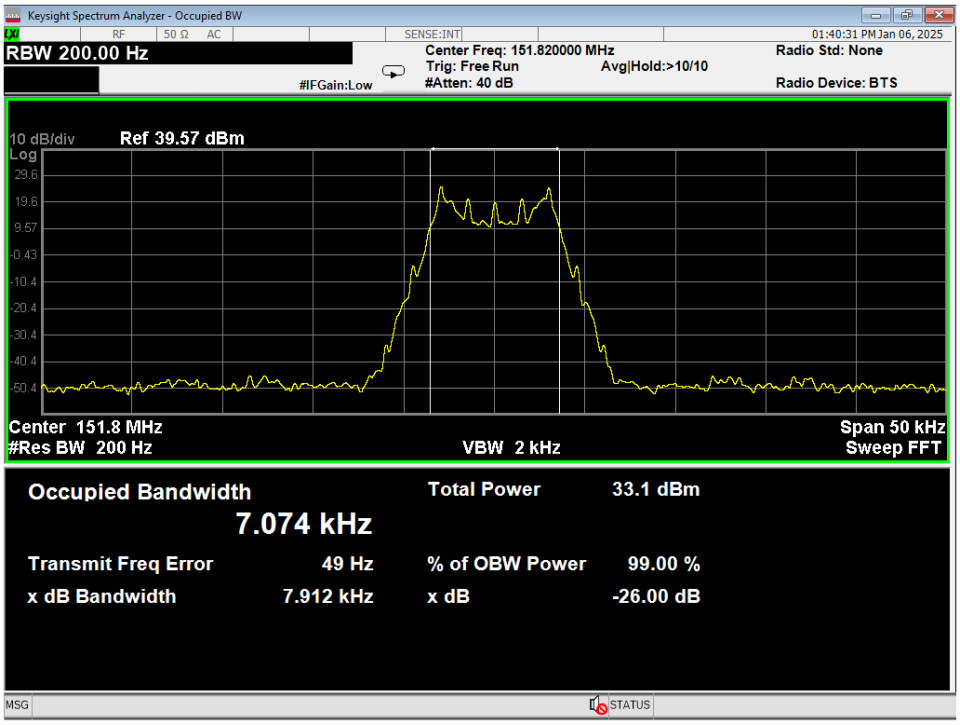

Figure 14 - Bandwidth, 151.820 MHz

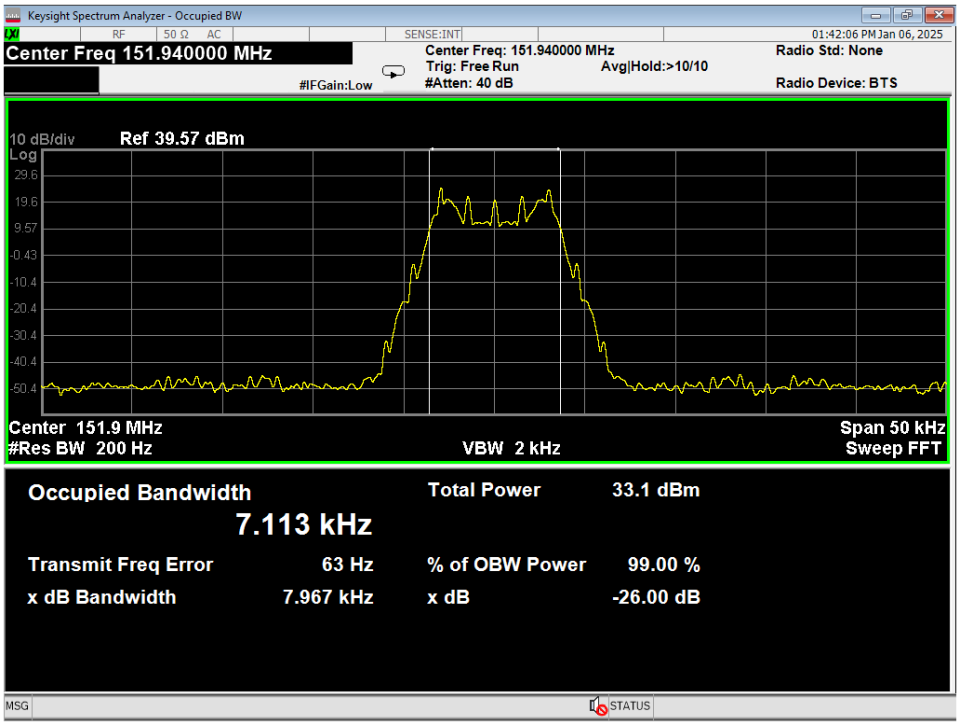

Figure 15 - Bandwidth, 151.940 MHz

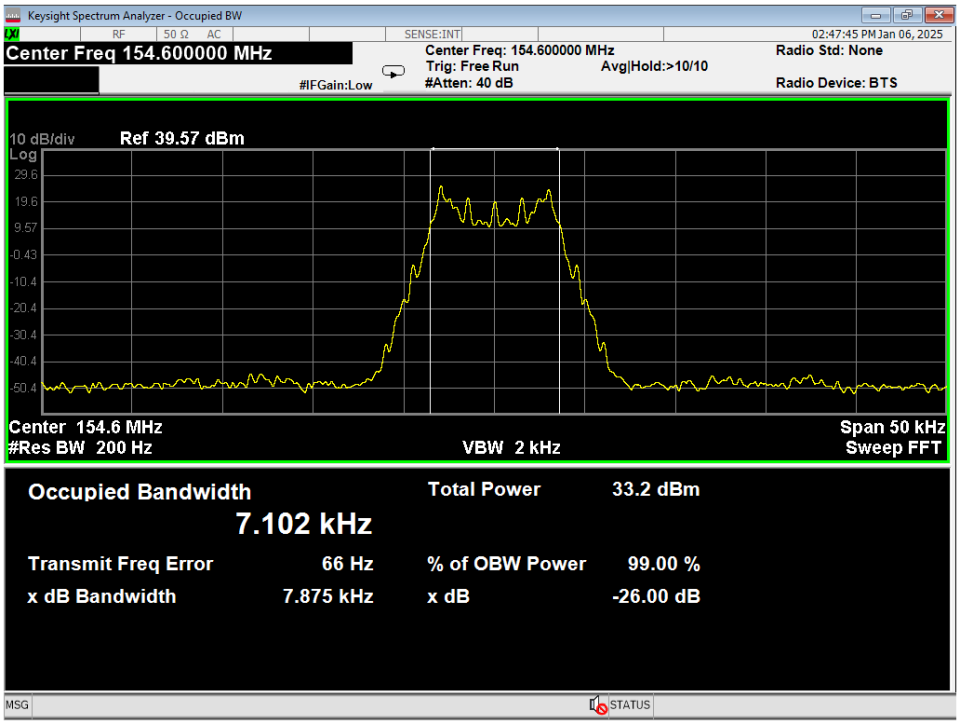

Figure 16 - Bandwidth, 154.600 MHz

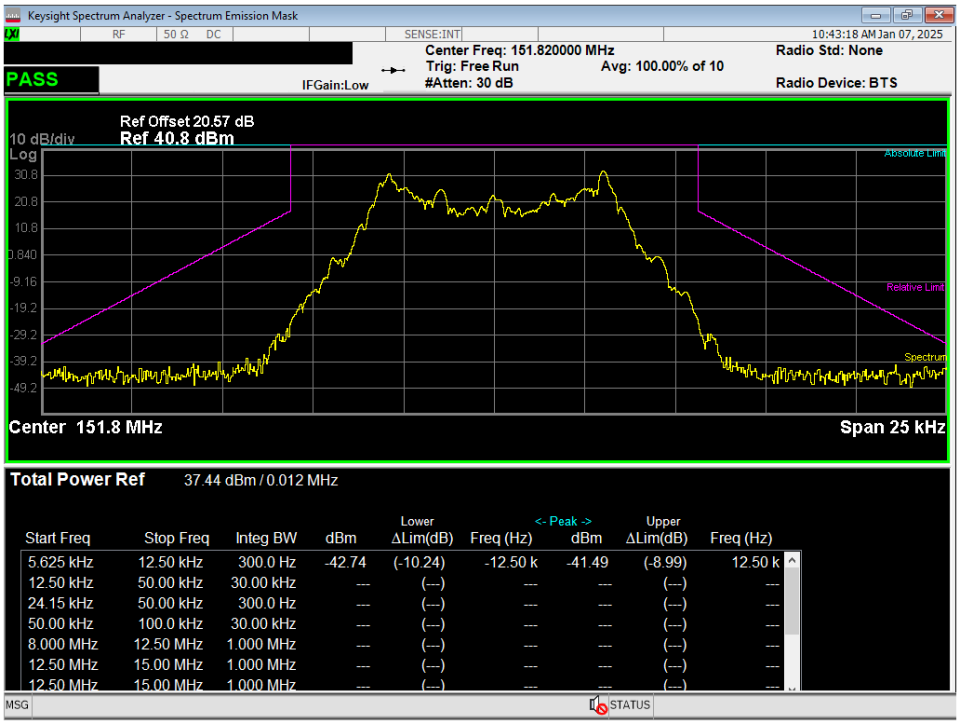

Figure 17 - Emissions Mask, Ch1, 95.2779(b)(1)

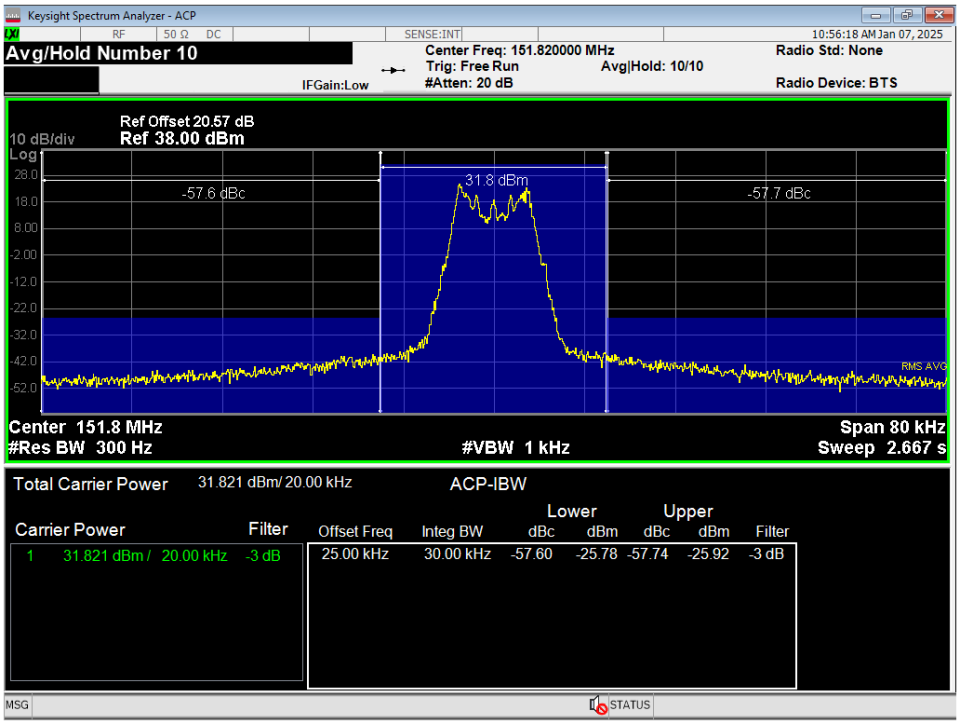

Figure 18 - Emissions Mask, Ch1, 95.2779(b)(2)

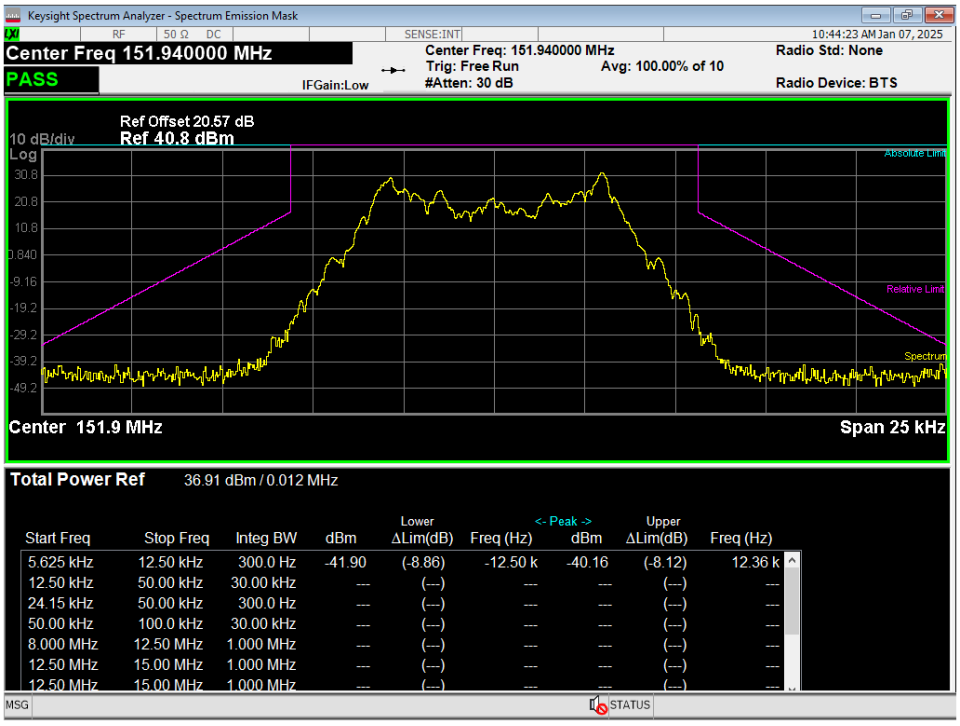

Figure 19 - Emissions Mask, Ch3, 95.2779(b)(1)

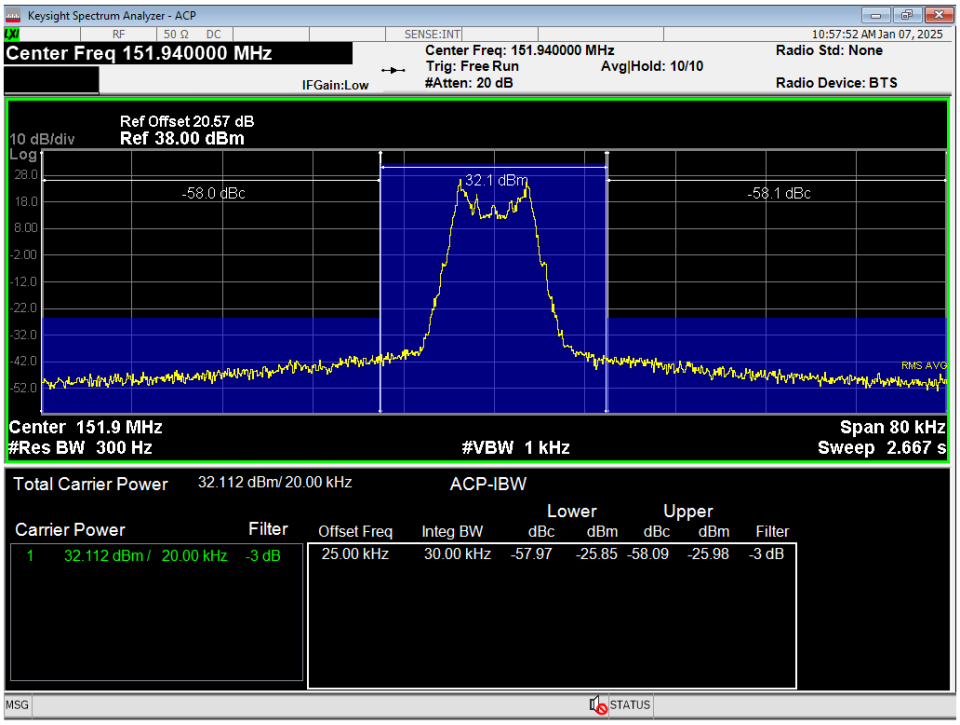

Figure 20 - Emissions Mask, Ch3, 95.2779(b)(2)

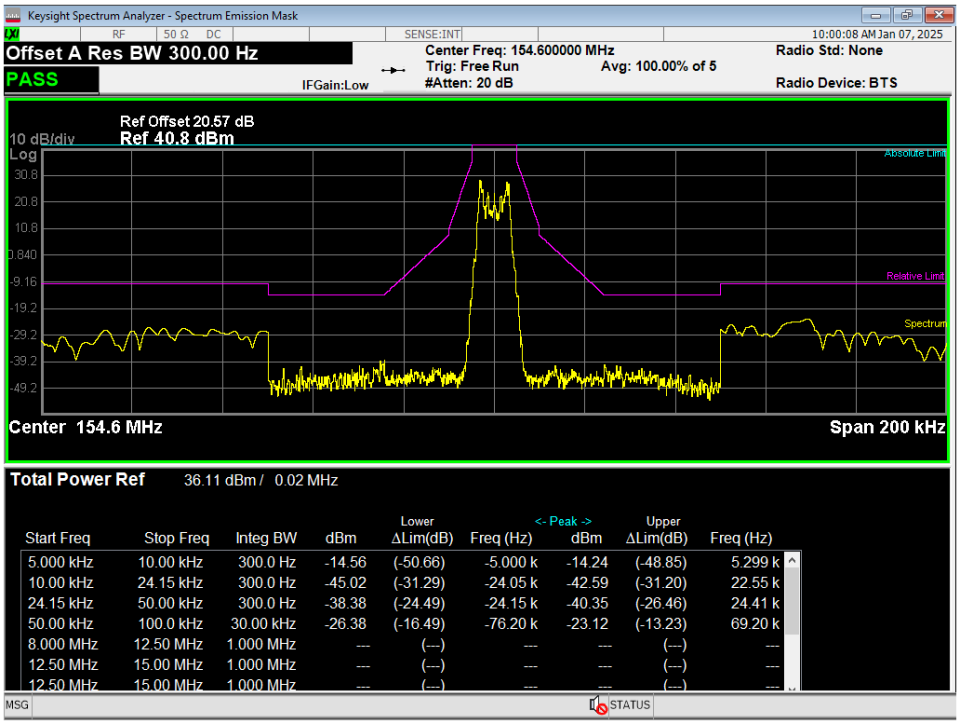

Figure 21 - Emissions Mask, Ch5, 95.2779(b)(5,6,7)

4.5 FREQUENCY STABILITY MEASUREMENTS

Test Method: ANSI C63.26,
Section(s) 5.6.3 “Procedure for frequency stability testing”

Limits:
FCC Part 95.2763 MURS frequency accuracy:
Each MURS transmitter type must be designed to meet the applicable frequency tolerance and stability requirements of this section.
(b) MURS transmitters that operate with an emission bandwidth greater than 6.25 kHz must be designed such that the carrier frequencies remain within ±5.0 ppm of the channel center frequencies specified in §95.2763 during normal operating conditions.

Test procedures:
Radiated power was measured on a spectrum analyzer with resolution bandwidth and video bandwidth set to 200 Hz and 1 kHz respectively. The frequency error functionality on the receiver was used. The temperature was varied from -20°C to +55°C.

Deviations from test standard:
No deviation

Test setup:
See section 3.4 for test setup for conducted emissions.

EUT operating conditions:
Device was set to transmit in the Lowest, Mid and Highest frequencies in its operating range.

Test results:

Frequency Stability, Temperature Variation

Temp in C°	-20	-10	0	10	20	30	40	55			
Freq (MHz)	Deviation (Hz)								limit (Hz)	limit (ppm)	Result
151.82	-3	-12	32	53	22	34	43	280	759.1	5	Pass
151.94	1	-4	25	61	23	38	52	335	759.7	5	Pass
154.6	2	7	23	52	22	37	64	389	773	5	Pass

Frequency Stability, Voltage Variation

	Deviation (Hz)				
Freq (MHz)	10.2V	12.0V	13.8V	Limit (Hz)	Result
151.82	49	52	41	759.1	Pass
151.94	50	54	45	759.7	Pass
154.60	48	54	46	773	Pass

APPENDIX A: SAMPLE CALCULATION

Field Strength Calculation

The field strength is calculated 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 = RA + AF – (-CF + AG) + AV

where FS = Field Strength

RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain
AV = Averaging Factor (if applicable)

Assume a receiver reading of 55 dBμV is obtained. The Antenna Factor of 12 and a Cable Factor of 1.1 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dBμV/m.

FS = 55 + 12 – (-1.1 + 20) + 0 = 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

AV is calculated by the taking the 20*log(T_{on}/100) where T_{on} is the maximum transmission time in any 100ms window.

EIRP Calculations

In cases where direct antenna port measurement is not possible or would be inaccurate, output power is measured in EIRP. The maximum field strength is measured at a specified distance and the EIRP is calculated using the following equation;

EIRP (Watts) = [Field Strength (V/m) x antenna distance (m)]^2 / 30
Power (watts) = 10^[Power (dBm)/10] / 1000
Voltage (dBμV) = Power (dBm) + 107 (for 50Ω measurement systems)
Field Strength (V/m) = 10^[Field Strength (dBμV/m) / 20] / 10^6
Gain = 1 (numeric gain for isotropic radiator)
Conversion from 3m field strength to EIRP (d=3):
EIRP = [FS(V/m) x d^2]/30 = FS [0.3] for d = 3
EIRP(dBm) = FS(dBμV/m) – 10(log 10^9)+ 10log[0.3] = FS(dBμV/m) - 95.23
10log(10^9) is the conversion from micro to milli

APPENDIX B – MEASUREMENT UNCERTAINTY

NCEE Labs does not add uncertainty values to measurement levels.
Where relevant, the following measurement uncertainty levels have been for tests performed in this test report:

Test	Frequency Range	Uncertainty Value (dB)
Radiated Emissions, 3m	30MHz - 1GHz	±4.31
Radiated Emissions, 3m	1GHz - 18GHz	±5.08
Emissions limits, conducted	150 kHz – 30MHz	±3.03
Antenna port conducted	9 kHz – 25 GHz	±0.50

Values were calculated per CISPR 16-4-2:2011

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

REPORT END