

Report on the Testing of the Savant Systems Inc PB-P2000-00

In accordance with:
FCC 47 CFR part 15.247
ISED RSS-247 Issue 4, July 2025

Prepared for: Savant Systems, Inc
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FCC Accreditation Designation Number US1233
FCC Test Site Registration Number 967699
Innovation, Science, and Economic Development Canada Lab Code 23932

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with the standards listed above.



A2LA Cert. No. 2955.09

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Table 1.1-1 – Modification Record

Issue	Description of Change	Date of Issue
0	First Issue	4/21/2026
1	Second Issue – Added Duty Cycle plot under section 2.8	4/22/2026

1.2 Introduction

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations Section 15.247 and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-247 for the tests documented herein.

Applicant	Lori Pass
Manufacturer	Savant Systems Inc
Applicant's Email Address	lori.pass@savant.com
Host Model Name	Savant Panel Bridge Controller
Host Model Number	PB-P2000-00
Serial Number	NA
FCC ID	ASU-ZP8J4MN1CRV
ISED Certification Number	10052A-ZP8J4MN1CRV
Hardware Version(s)	068-0968-21
Software Version(s)	N/A
Number of Samples Tested	1
Test Specification/Issue/Date	US Code of Federal Regulation (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2026 ISED Canada Radio Standards Specification: RSS-247 – Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices, Issue 4, July 2025.
Order Number	721007920
Date of Receipt of EUT	2/25/2025
Start of Test	2/25/2025
Finish of Test	3/19/2025



Related Document(s)

ANSI C63.10-2020: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Device.

FCC OET KDB 558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules, April 2, 2019

US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2026.

ISED Canada Radio Standards Specification: RSS-GEN – General Requirements for Compliance of Radio Apparatus, Issue 5, Amendment 1 (March 2019), Amendment 2 (February 2021)



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC Part 15.247 and ISED Canada's RSS-247 is shown below.

Table 1.3-1: Test Result Summary

Test Parameter	Test Plan (Yes/No)	Test Result	FCC 47 CFR Rule Part	ISED Canada's RSS	Test Report Page No
Antenna Requirement	Yes	Pass	15.203	-----	10
6 dB Bandwidth	Yes	Pass	15.247(a)(2)	RSS-247 5.2(a)	25
99% Bandwidth	Yes	Pass	-----	RSS-GEN 6.7	25
Fundamental Emission Output Power	Yes	Pass	15.247(b)(3)	RSS-247 5.4(d)	16
Band-Edge Compliance of RF Conducted Emissions	Yes	Pass	15.247(d)	RSS-247 5.5	49
RF Conducted Spurious Emissions	Yes	Pass	15.247(d)	RSS-247 5.5	55
Radiated Spurious Emissions into Restricted Frequency Bands	Yes	Pass	15.205, 15.209	RSS-GEN 8.9, 8.10	60
Power Spectral Density	Yes	Pass	15.247(e)	RSS-247 5.2(b)	40
AC Power Line Conducted Emissions	Yes	Pass	15.207	RSS-GEN 8.8	11

1.4 Product Information

1.4.1 Technical Description

The Savant PB-P2000-00 Panel Bridge Controller is a Power over Ethernet (PoE)-enabled communication gateway designed for integration within Savant smart home systems. It facilitates real-time monitoring and control of connected power modules, supporting up to 40 modules via proprietary Bluetooth Low Energy (BLE) communication.

Table 1.4.1-1 – Wireless Technical Information

Detail	Description
FCC ID	ASU-ZP8J4MN1CRV
IC ID	10052A-ZP8J4MN1CRV
Transceiver Model Name	Savant Panel Bridge Controller
Transceiver Model #	PB-P2000-00
Product Marketing Name (PMN)	Savant Panel Bridge Controller
Frequency Range (MHz)	2402 – 2480 MHz
Modulation Format	GFSK
Number of Channels	40
Channel Bandwidth	2 MHz
Data Rates	1 Mbps, 2 Mbps
Operating voltage	120 VAC
Antenna Type / Gain:	FPC / peak gain typical 2 dBi

A full description and detailed product specification details are available from the manufacturer.

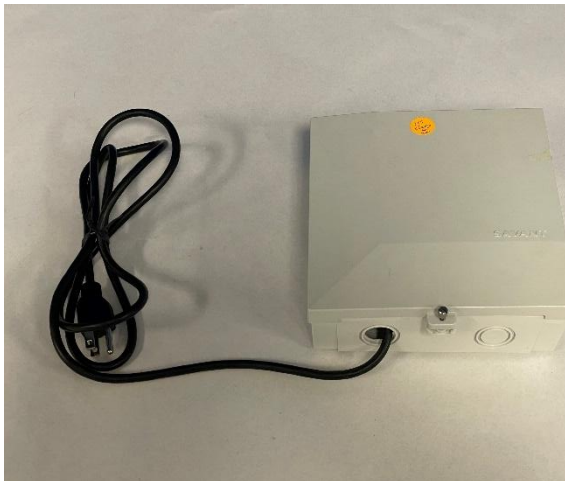


Photo 1.4.1-1 – Top view of the EUT



Photo 1.4.1-2 – Bottom view of the EUT



Photo 1.4.1-3 – Inside view of the EUT

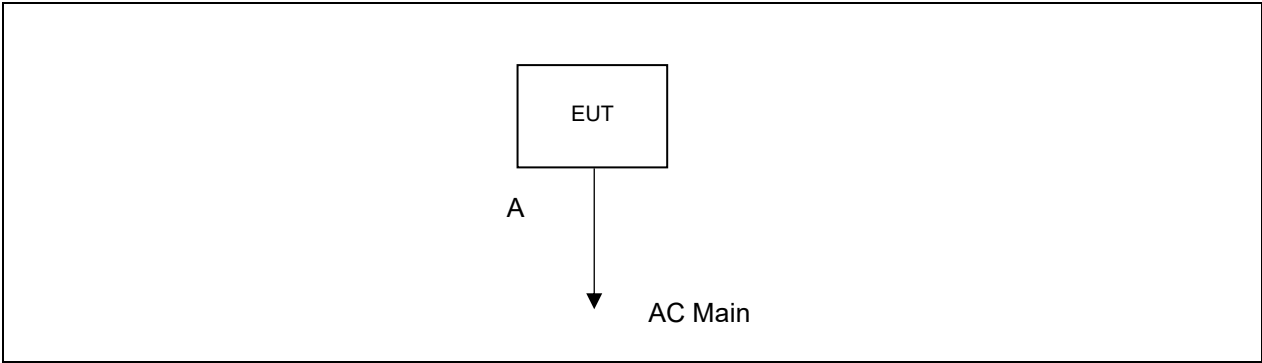


Figure 1.4.1-4: Test Setup Block Diagram

Table 1.4.1-2 – Cable Descriptions

Item	Cable/Port	Length	Shield
A	AC Power cable	170 cm	Yes

Table 1.4.1-3 – Support Equipment Descriptions

Item	Make/Model	Description
N/A	N/A	N/A



1.4.2 Modes of Operation

PB-P2000-00 model contains two BLE radios and each radio provides 2 modes of operation using BLE classifications as outlined below.

Mode of Operation	Frequency Range (MHz)	Number of Channels	Stack / Mode	Data Rates Supported	Classification	Radio
1	2402 – 2480	40	GFSK	1 Mbps	BLE	Nordic Radio 1
2	2402 – 2480	40	GFSK	2 Mbps	BLE	Nordic Radio 1
3	2402 – 2480	40	GFSK	1 Mbps	BLE	Nordic Radio 2
4	2402 – 2480	40	GFSK	2 Mbps	BLE	Nordic Radio 2

1.4.3 Monitoring of Performance

For radiated emissions, the EUT was evaluated in the fixed orientation. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

For RF Conducted measurements, the EUT (standalone module) was connected to the test equipment with a temporary SMA connector at the antenna port.

Power setting during test: 3 dBm

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	Initial State		

The equipment was tested as provided without any modifications.



1.7 Test Location

TÜV SÜD conducted the following tests at our Alpharetta, GA test laboratory.

Test Name	Name of Engineer(s)	Accreditation
Antenna Requirement	Divya Adusumilli	A2LA
AC Power Line Conducted Emissions	Divya Adusumilli	A2LA
Fundamental Emission Output Power	Divya Adusumilli	A2LA
6dB / 99% Bandwidth	Divya Adusumilli	A2LA
Band-Edge Compliance of RF Conducted Emissions	Divya Adusumilli	A2LA
RF Conducted Spurious Emissions	Divya Adusumilli	A2LA
Radiated Spurious Emissions into Restricted Frequency Bands	Divya Adusumilli	A2LA
Power Spectral Density	Divya Adusumilli	A2LA

Office address:
TÜV SÜD America
5945 Cabot Parkway, Suite 100
Alpharetta, GA 30005, USA



2 Test Details

2.1 Antenna Requirement

2.1.1 Specification Reference

FCC Section: 15.203, 15.204

2.1.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.1.3 Date of Test

3/3/2025

2.1.4 Test Method

N/A

2.1.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21.5 °C
Relative Humidity	48.6 %
Atmospheric Pressure	977.4 mbar

2.1.6 Test Results

The EUT utilizes Flexible Printed Circuit (FPC) antenna with peak gain of 2 dBi which is internal to the enclosure and affixed to the PCB, therefore satisfying the requirements of Section 15.203.



2.2 Power Line Conducted Emissions

2.2.1 Specification Reference

FCC Section: 15.207
ISED Canada: RSS-Gen 8.8

2.2.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.2.3 Date of Test

3/19/2025

2.2.4 Test Method

ANSI C63.10 section 6 was the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss

Margin = Corrected Reading - Applicable Limit

2.2.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	23.2 °C
Relative Humidity	49 %
Atmospheric Pressure	980.1 mbar



2.2.6 Test Results – Radio 1 (BLE)

FCC 15, Part B

Conducted RF Emissions, 150 kHz to 30 MHz

Line Under Test Number 1 Results

EUT Name - 721007920 Savant

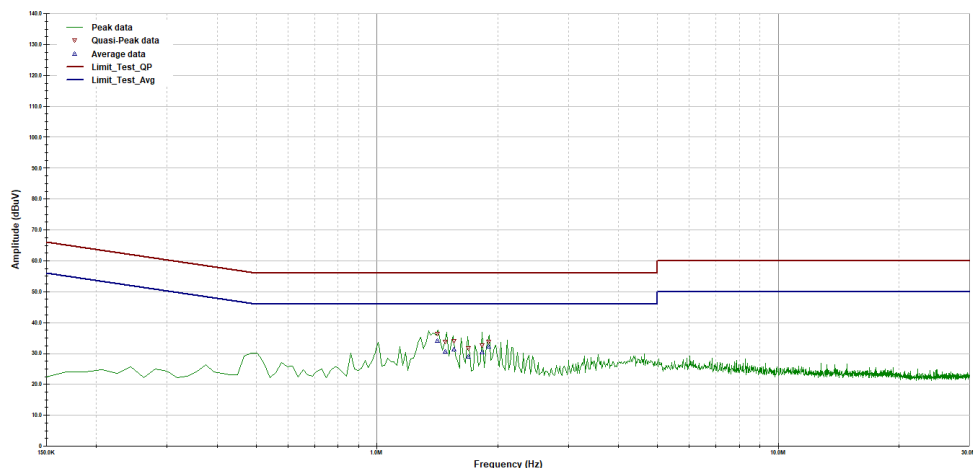
Model Number - PB-P2000-00 - Nordic radio 1

Part Number -

Serial Number -

Voltage - Class:B: 120Vac/50Hz

Operating Mode - Nordic Radio 1 BTLE-1Mbps enabled



Operator: DA

RF Bandwidth: 9kHz
VBW if Analyzer: 30kHz

Temperature = 22C
Relative Humidity = 43%
TEST EQUIPMENT:
LISWISN3011
Cable: 871
Limiter: 168

721007920-Nordic Radio 1 - BTLE .JII

Last Data Update 11:43:48 AM, Thursday, March 27, 2025

Figure 2.2.6-1: Conducted Emission Plot – Line 1

Table 2.2.6-1: Conducted EMI Results-Average – Line 1

Frequency (MHz)	Avg Limit (dBμV)	Avg Level Corr (dBμV)	Avg Level (dBμV)	Corr Fact. (dB)	Avg Margin (dBμV)	Result
1.42	46	34.1	24.4	9.672	-11.9	PASS
1.48	46	30.5	20.8	9.673	-15.5	PASS
1.55	46	31.3	21.6	9.675	-14.7	PASS
1.69	46	28.9	19.2	9.68	-17.1	PASS
1.83	46	30.3	20.6	9.685	-15.7	PASS
1.9	46	32.3	22.6	9.688	-13.7	PASS

Table 2.2.6-2: Conducted EMI Results-QP – Line 1

Frequency (MHz)	QP Limit (dBμV)	QP Level Corr (dBμV)	QP Level (dBμV)	Corr Fact. (dB)	QP Margin (dBμV)	Result
1.42	56	36.3	26.7	9.672	-19.7	PASS
1.48	56	33.9	24.2	9.673	-22.1	PASS
1.55	56	34	24.3	9.675	-22	PASS
1.69	56	31.7	22.1	9.68	-24.3	PASS
1.83	56	32.7	23.1	9.685	-23.3	PASS
1.9	56	33.7	24	9.688	-22.3	PASS



FCC 15, Part B

Conducted RF Emissions, 150 kHz to 30 MHz

Line Under Test Number 2 Results

EUT Name - 721007920 Savant

Model Number - PB-P2000-00 - Nordic radio 1

Part Number -

Serial Number -

Voltage - Class:B: 120Vac/60Hz

Operating Mode - Nordic Radio 1.BTLE-1Mbps enabled

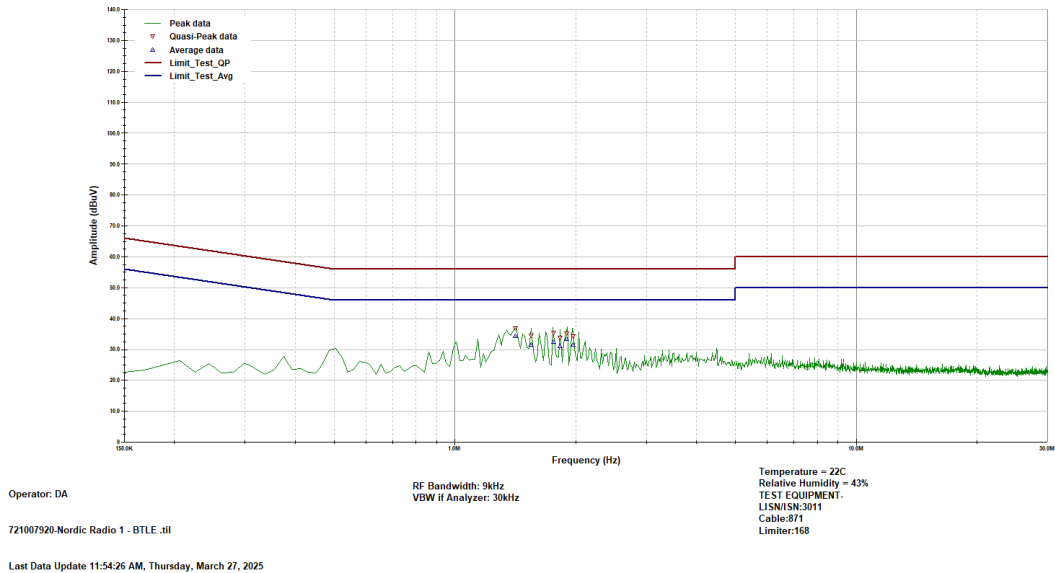


Figure 2.2.6-2: Conducted Emission Plot – Nuetral

Table 2.2.6-3: Conducted EMI Results- Average – Line 2

Frequency (MHz)	Avg Limit (dBμV)	Avg Level Corr (dBμV)	Avg Level (dBμV)	Corr Fact. (dB)	Avg Margin (dBμV)	Result
1.41	46	34.4	24.7	9.66	-11.6	PASS
1.55	46	31.6	21.9	9.665	-14.4	PASS
1.76	46	32.4	22.7	9.673	-13.6	PASS
1.83	46	31.1	21.4	9.675	-14.9	PASS
1.9	46	33.2	23.6	9.678	-12.8	PASS
1.97	46	31.4	21.8	9.68	-14.6	PASS

Table 2.2.6-4: Conducted EMI Results-QP – Line 2

Frequency (MHz)	QP Limit (dBμV)	QP Level Corr (dBμV)	QP Level (dBμV)	Corr Fact. (dB)	QP Margin (dBμV)	Result
1.41	56	36.8	27.1	9.66	-19.2	PASS
1.55	56	34.5	24.9	9.665	-21.5	PASS
1.76	56	35.4	25.7	9.673	-20.6	PASS
1.83	56	33.9	24.2	9.675	-22.1	PASS
1.9	56	35.2	25.5	9.678	-20.8	PASS
1.97	56	34.2	24.5	9.68	-21.8	PASS



2.2.7 Test Results – Radio 2 (BLE)

FCC 15, Part B

Conducted RF Emissions, 150 kHz to 30 MHz

Line Under Test Number 1 Results

EUT Name - 721007920 Savant
Model Number - PB-P2000-00 - Nordic radio 2
Part Number -
Serial Number -
Voltage - Class:B: 120Vac/50Hz
Operating Mode - Nordic Radio 2.BTLE-1Mbps enabled

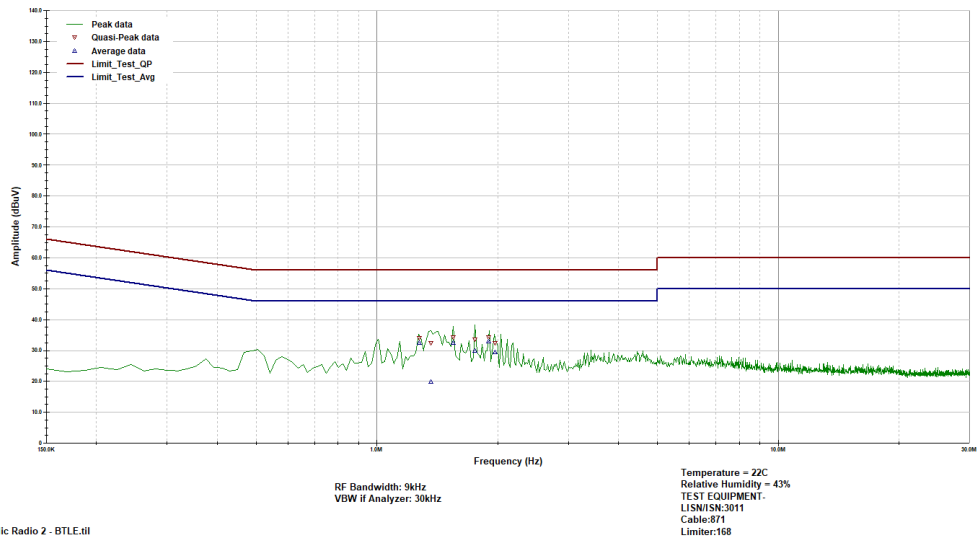


Figure 2.2.7-1: Conducted Emission Plot – Line 1

Table 2.2.7-1: Conducted EMI Results- Average – Line 1

Frequency (MHz)	Avg Limit (dBμV)	Avg Level Corr (dBμV)	Avg Level (dBμV)	Corr Fact. (dB)	Avg Margin (dBμV)	Result
1.28	46	32.4	22.7	9.669	-13.6	PASS
1.36	46	19.8	10.1	9.671	-26.2	PASS
1.55	46	32.5	22.8	9.675	-13.5	PASS
1.76	46	29.8	20.1	9.683	-16.2	PASS
1.9	46	32.8	23.1	9.688	-13.2	PASS
1.97	46	29.4	19.7	9.69	-16.6	PASS

Table 2.2.7-2: Conducted EMI Results-QP – Line 1

Frequency (MHz)	QP Limit (dBμV)	QP Level Corr (dBμV)	QP Level (dBμV)	Corr Fact. (dB)	QP Margin (dBμV)	Result
1.28	56	34.2	24.5	9.669	-21.8	PASS
1.36	56	32.3	22.6	9.671	-23.7	PASS
1.55	56	34.3	24.6	9.675	-21.7	PASS
1.76	56	33.5	23.8	9.683	-22.5	PASS
1.9	56	34.3	24.6	9.688	-21.7	PASS
1.97	56	32.5	22.8	9.69	-23.5	PASS



FCC 15, Part B

Conducted RF Emissions, 150 kHz to 30 MHz

Line Under Test Number 2 Results

EUT Name - 721007920 Savant
 Model Number - PB-P2000-00 - Nordic radio 2
 Part Number -
 Serial Number -
 Voltage - Class:B: 120Vac/60Hz
 Operating Mode - Nordic Radio 2.BTLE-1Mbps enabled

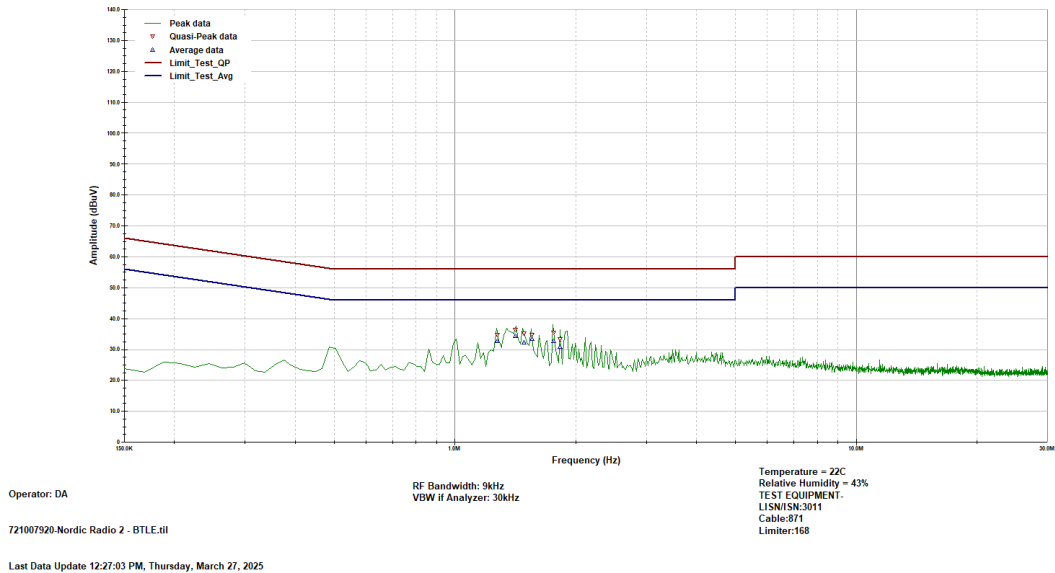


Figure 2.2.7-2: Conducted Emission Plot – Nuetral

Table 2.2.7-3: Conducted EMI Results- Average – Line 2

Frequency (MHz)	Avg Limit (dBμV)	Avg Level Corr (dBμV)	Avg Level (dBμV)	Corr Fact. (dB)	Avg Margin (dBμV)	Result
1.28	46	32.7	23.1	9.655	-13.3	PASS
1.41	46	34.3	24.7	9.66	-11.7	PASS
1.48	46	32.2	22.5	9.662	-13.8	PASS
1.55	46	33.4	23.7	9.665	-12.6	PASS
1.76	46	32.7	23.1	9.673	-13.3	PASS
1.83	46	30.7	21	9.675	-15.3	PASS

Table 2.2.7-4: Conducted EMI Results-QP – Line 2

Frequency (MHz)	QP Limit (dBμV)	QP Level Corr (dBμV)	QP Level (dBμV)	Corr Fact. (dB)	QP Margin (dBμV)	Result
1.28	56	34.7	25	9.655	-21.3	PASS
1.41	56	36.3	26.7	9.66	-19.7	PASS
1.48	56	35.1	25.4	9.662	-20.9	PASS
1.55	56	34.7	25	9.665	-21.3	PASS
1.76	56	35.4	25.8	9.673	-20.6	PASS
1.83	56	33.4	23.8	9.675	-22.6	PASS



2.3 Fundamental Emission Output Power

2.3.1 Specification Reference

FCC Sections: 15.247(b)(3)
ISED Canada: RSS-247 5.4(d)

2.3.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.3.3 Date of Test

3/3/2025

2.3.4 Test Method

The maximum peak conducted output power was measured in accordance with ANSI C63.10 Subclause 11.9.1.1 utilizing the RBW $\geq$ DTS Bandwidth method. The RF output of the equipment under test was directly connected to the input of the analyzer applying suitable attenuation.

2.3.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21.5 °C
Relative Humidity	48.6 %
Atmospheric Pressure	977.4 mbar

2.3.6 Test Results – Radio 1 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.



Table 2.3.6-1: RF Output Power

Frequency [MHz]	Peak Output Power (dBm)	Data Rate
2402	2.1	1 Mbps
2440	2.1	1 Mbps
2480	1.6	1 Mbps
2402	2.1	2 Mbps
2440	2.1	2 Mbps
2480	1.6	2 Mbps

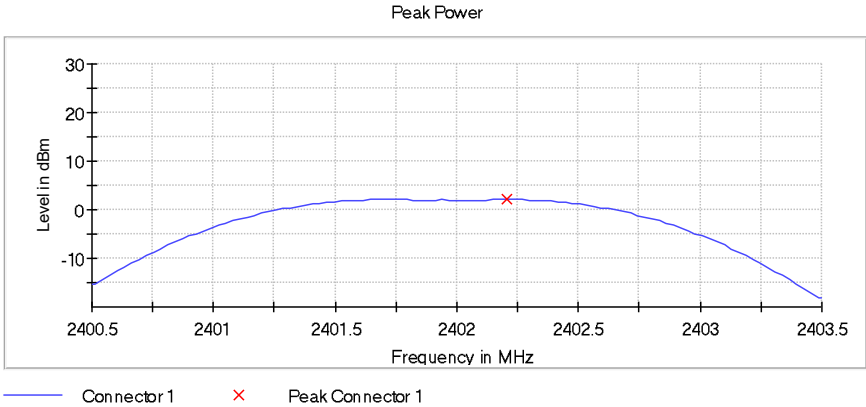


Figure 2.3.6-1: Output Power - LCH – 1 Mbps

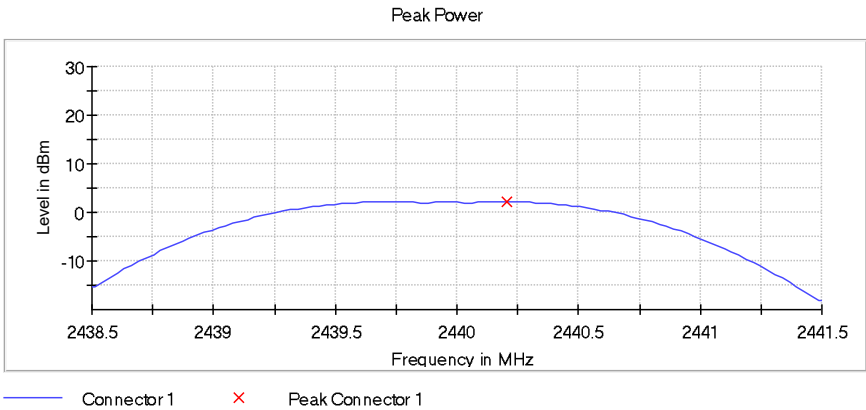


Figure 2.3.6-2: Output Power - MCH – 1 Mbps

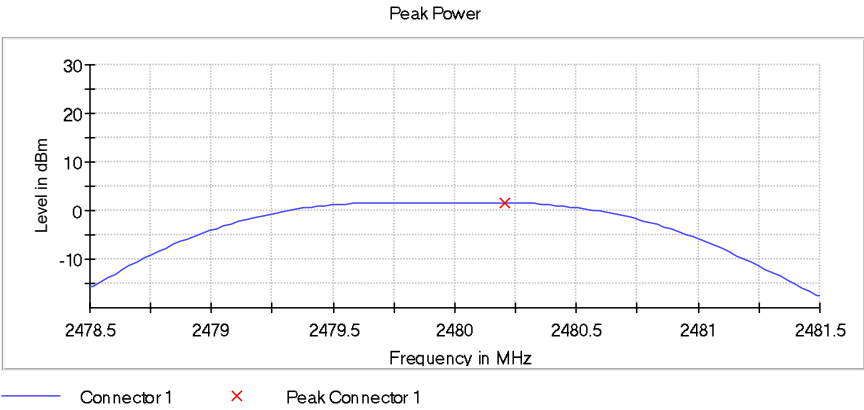


Figure 2.3.6-3: Output Power - HCH - 1 Mbps

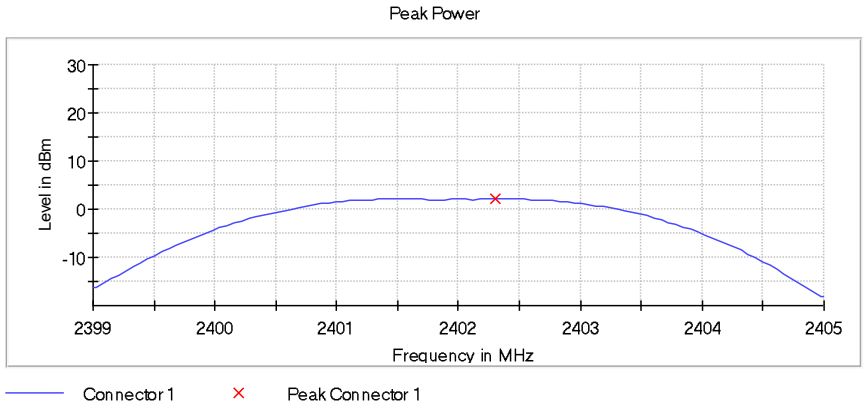


Figure 2.3.6-4: Output Power - LCH – 2 Mbps

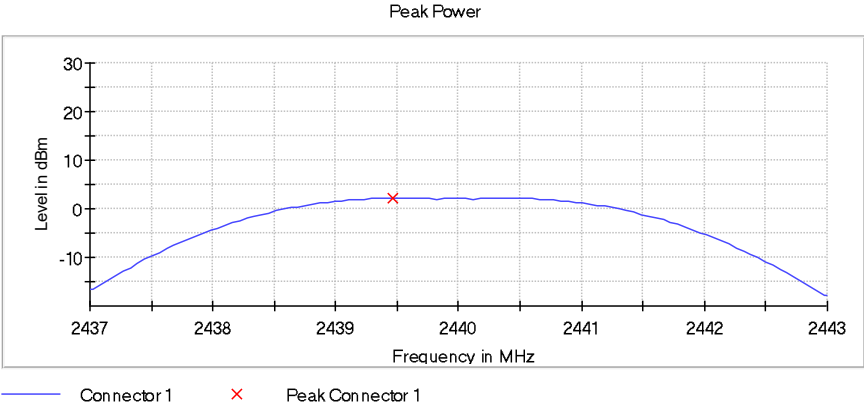


Figure 2.3.6-5: Output Power - MCH – 2 Mbps

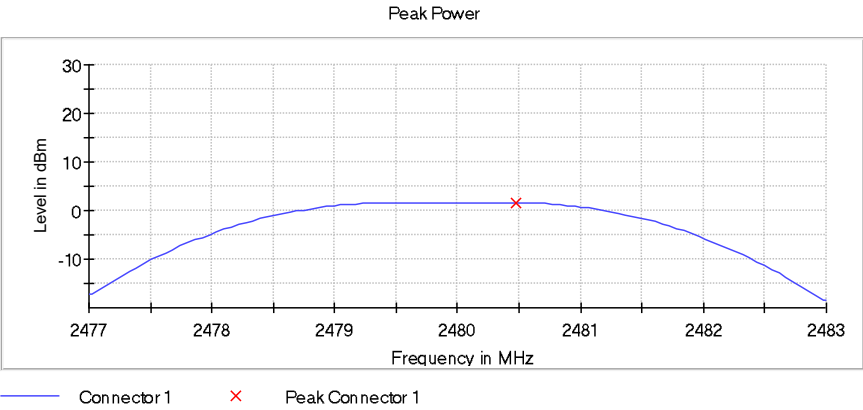


Figure 2.3.6-6: Output Power - HCH - 2 Mbps

Table 2.3.6-2: Sample Measurement Settings – 1 Mbps

Setting	Instrument Value	Target Value
Start Frequency	2.40050 GHz	2.40050 GHz
Stop Frequency	2.40350 GHz	2.40350 GHz
Span	3.000 MHz	3.000 MHz
RBW	1.000 MHz	>= 752.477 kHz
VBW	3.000 MHz	>= 3.000 MHz
Sweep Points	101	~ 101
Sweep time	1.907 μ s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.04 dB	0.50 dB

**Table 2.3.6-3: Sample Measurement Settings – 2 Mbps**

Setting	Instrument Value	Target Value
Start Frequency	2.39900 GHz	2.39900 GHz
Stop Frequency	2.40500 GHz	2.40500 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	≥ 1.188 MHz
VBW	10.000 MHz	≥ 6.000 MHz
Sweep Points	101	~ 101
Sweep time	953.450 ns	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.13 dB	0.50 dB



2.3.7 Test Results – Radio 2 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

Table 2.3.7-1: RF Output Power

Frequency [MHz]	Peak Output Power (dBm)	Data Rate
2402	2.3	1 Mbps
2440	2.4	1 Mbps
2480	1.7	1 Mbps
2402	2.4	2 Mbps
2440	2.4	2 Mbps
2480	1.8	2 Mbps

Peak Power

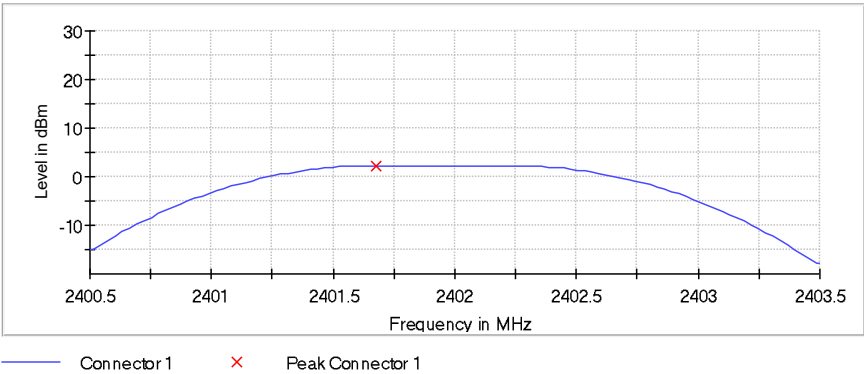


Figure 2.3.7-1: Output Power - LCH – 1 Mbps

Peak Power

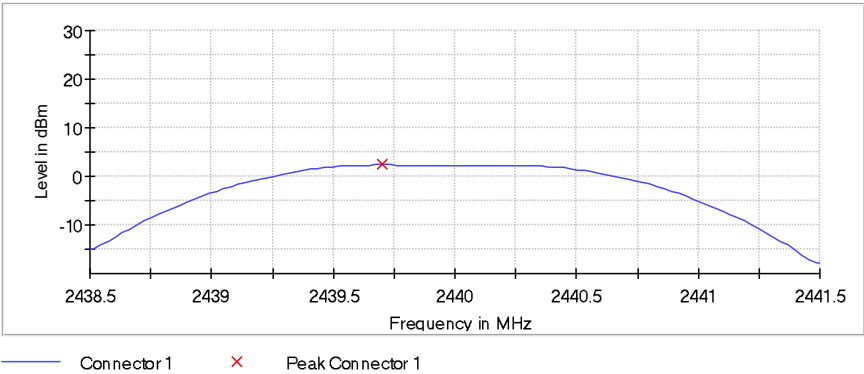


Figure 2.3.7-2: Output Power - MCH – 1 Mbps

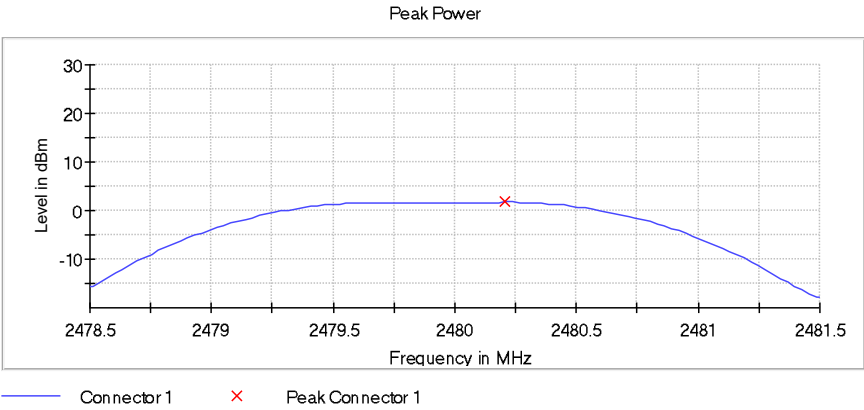


Figure 2.3.7-3: Output Power - HCH - 1 Mbps

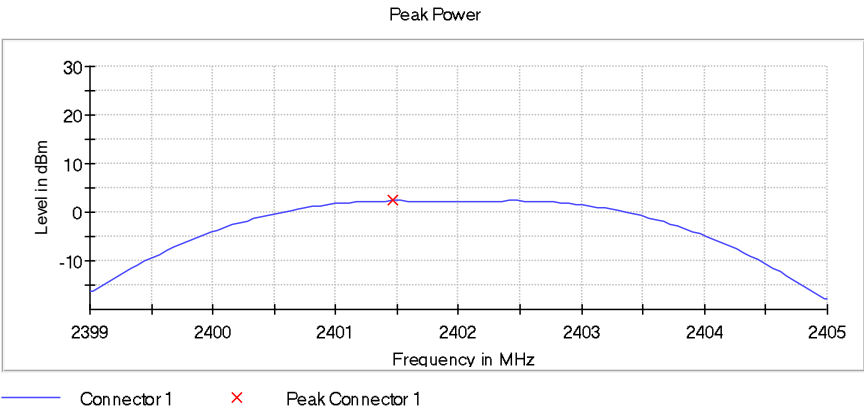


Figure 2.3.7-4: Output Power - LCH – 2 Mbps

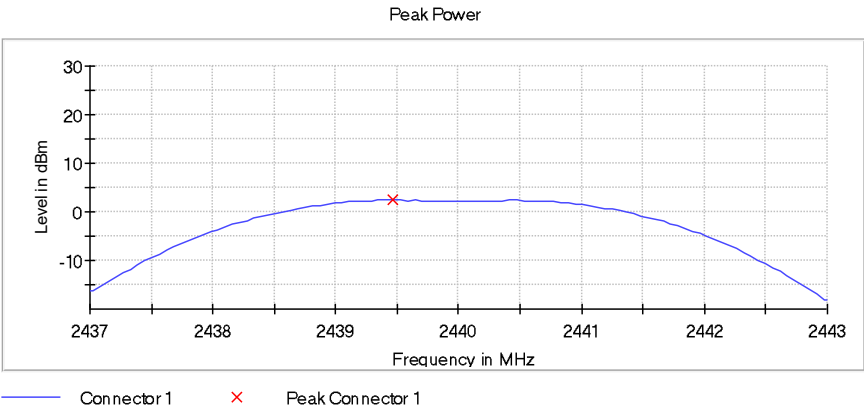


Figure 2.3.7-5: Output Power - MCH – 2 Mbps

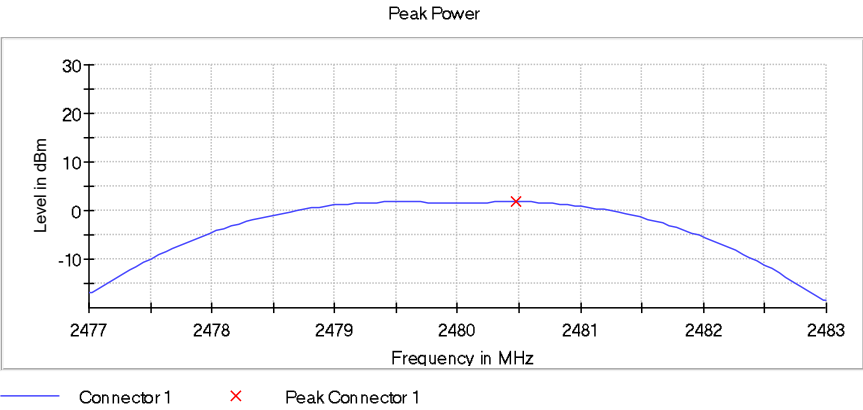


Figure 2.3.7-6: Output Power - HCH - 2 Mbps

Table 2.3.7-2: Sample Measurement Settings – 1 Mbps

Setting	Instrument Value	Target Value
Start Frequency	2.40050 GHz	2.40050 GHz
Stop Frequency	2.40350 GHz	2.40350 GHz
Span	3.000 MHz	3.000 MHz
RBW	1.000 MHz	>= 732.675 kHz
VBW	3.000 MHz	>= 3.000 MHz
Sweep Points	101	~ 101
Sweep time	1.907 μ s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.08 dB	0.50 dB

**Table 2.3.7-3: Sample Measurement Settings – 2 Mbps**

Setting	Instrument Value	Target Value
Start Frequency	2.39900 GHz	2.39900 GHz
Stop Frequency	2.40500 GHz	2.40500 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	≥ 1.188 MHz
VBW	10.000 MHz	≥ 6.000 MHz
Sweep Points	101	~ 101
Sweep time	953.450 ns	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.04 dB	0.50 dB



2.4 6dB / 99% Bandwidth

2.4.1 Specification Reference

FCC Sections: 15.247(a)(2)
ISED Canada: RSS-247 5.2(a), RSS-GEN 6.7

2.4.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.4.3 Date of Test

3/3/2025

2.4.4 Test Method

The 6dB bandwidth was measured in accordance with the ANSI C63.10 Section 11.8. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The trace was set to max hold with a peak detector active. The marker-delta function of the spectrum analyzer was utilized to determine the 6 dB bandwidth of the emission.

The occupied bandwidth measurement function of the spectrum analyzer was used to measure the 99% bandwidth. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The resolution bandwidth was set to 1% to 5% of the occupied bandwidth. The video bandwidth was set to 3 times the resolution bandwidth. A peak detector was used.

2.4.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21.5 °C
Relative Humidity	48.6 %
Atmospheric Pressure	977.4 mbar

2.4.6 Test Results – Radio 1 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.



Table 2.4.6-1: 6dB / 99% Bandwidth

Frequency [MHz]	6dB Bandwidth (kHz)	99% Bandwidth (MHz)	Data Rate
2402	752.476	1.055	1 Mbps
2440	732.674	1.060	1 Mbps
2480	732.674	1.060	1 Mbps
2402	1188.00	2.030	2 Mbps
2440	1188.00	2.030	2 Mbps
2480	1188.00	2.030	2 Mbps

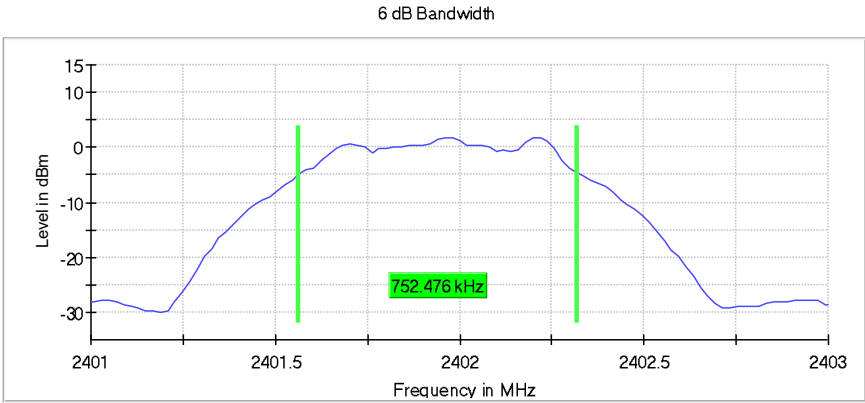


Figure 2.4.6-1: 6 dB BW - LCH – 1 Mbps

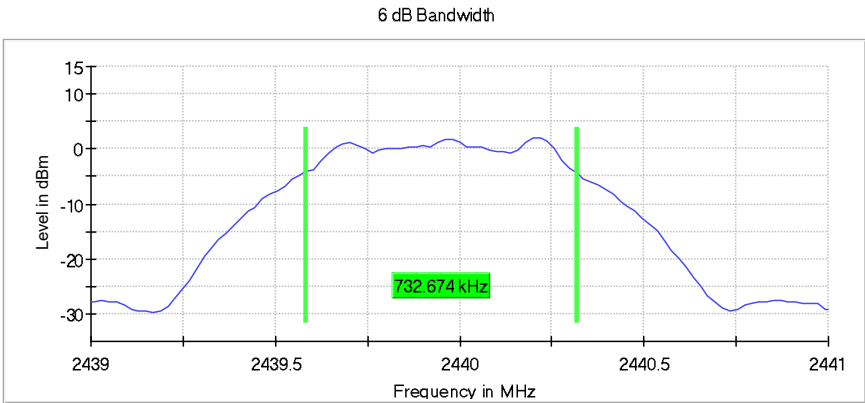


Figure 2.4.6-2: 6 dB BW - MCH – 1 Mbps

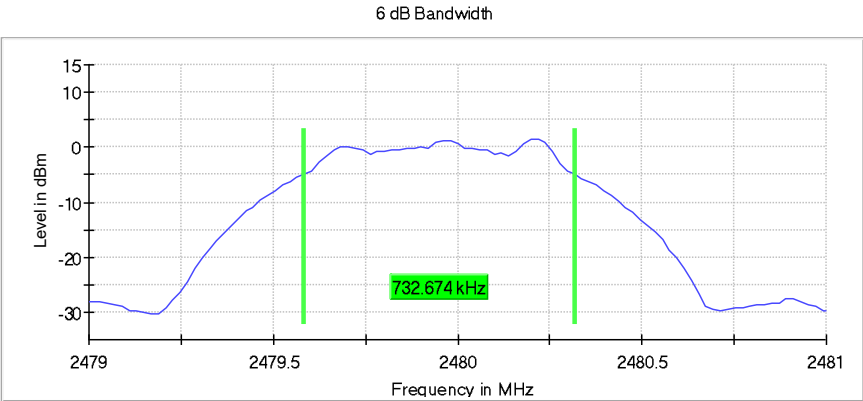


Figure 2.4.6-3: 6 dB BW - HCH – 1 Mbps

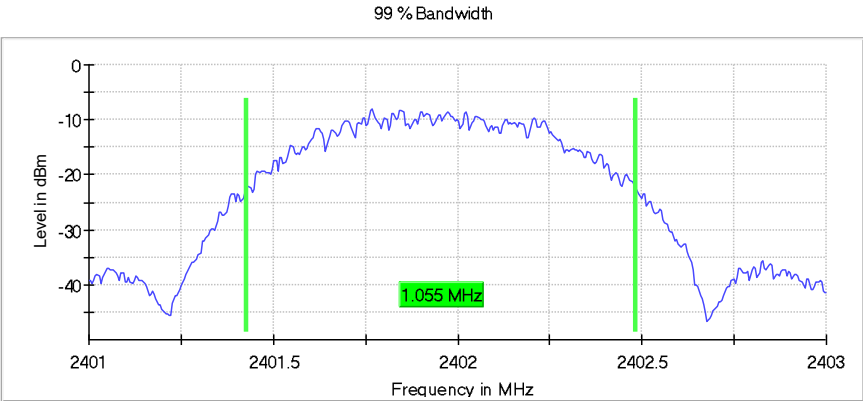


Figure 2.4.6-4: 99% BW - LCH - 1 Mbps

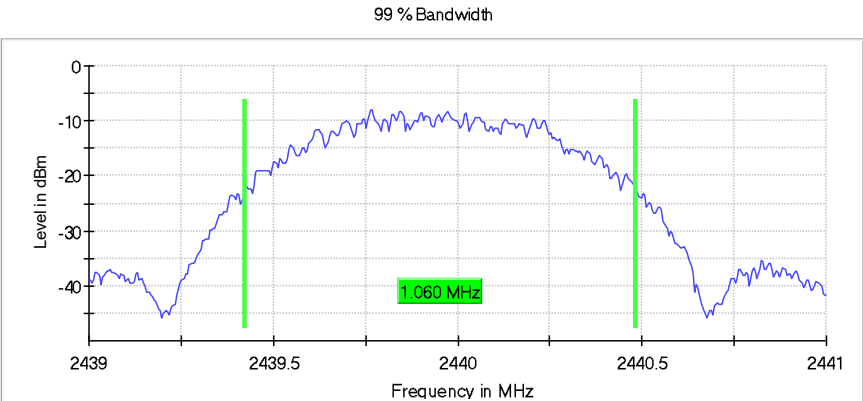


Figure 2.4.6-5: 99% BW - MCH – 1 Mbps

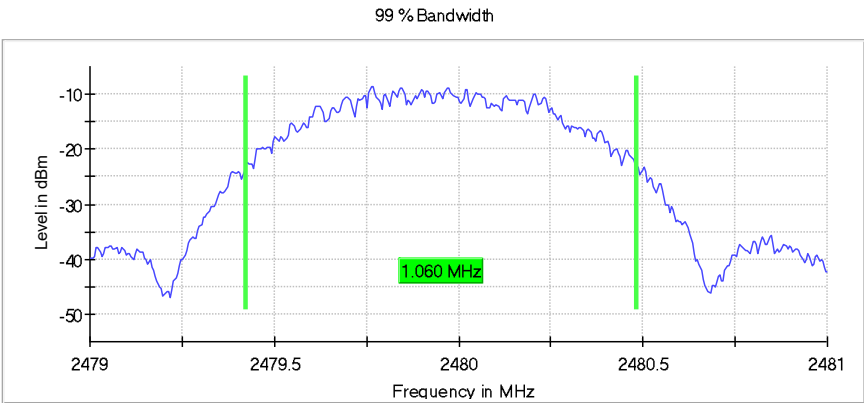


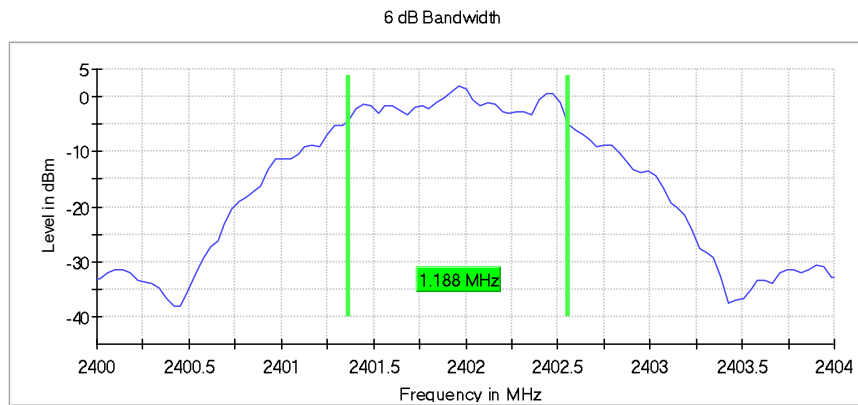
Figure 2.4.6-6: 99% BW - HCH – 1 Mbps

Table 2.4.6-2: Sample Measurement Setting (6dB BW)

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
Sweep Points	101	~ 40
Sweep time	18.938 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	9 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.17 dB	0.50 dB

Table 2.4.6-3: Sample Measurement Setting (99% BW)

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	≥ 10.000 kHz
VBW	30.000 kHz	≥ 30.000 kHz
Sweep Points	400	~ 400
Sweep time	189.648 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.30 dB	0.30 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.13 dB	0.30 dB

**Figure 2.4.6-7: 6 dB BW - LCH – 2 Mbps**

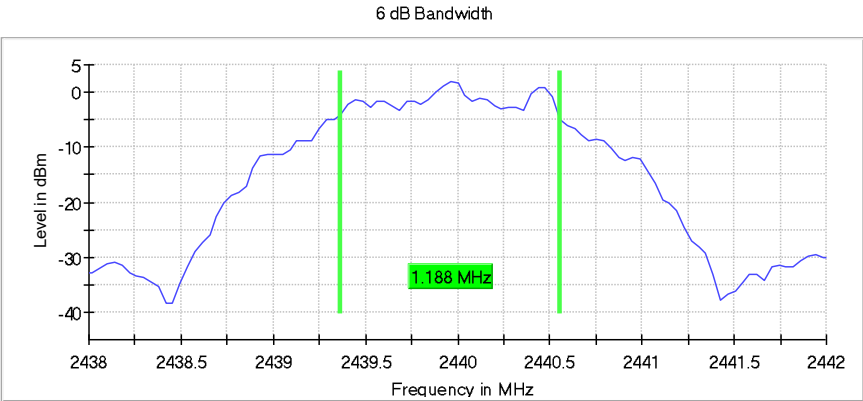


Figure 2.4.6-8: 6 dB BW - MCH – 2 Mbps

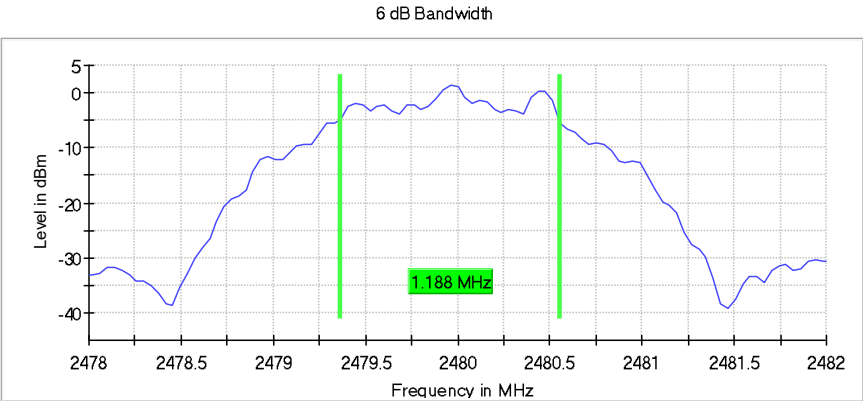


Figure 2.4.6-9: 6 dB BW - HCH – 2 Mbps

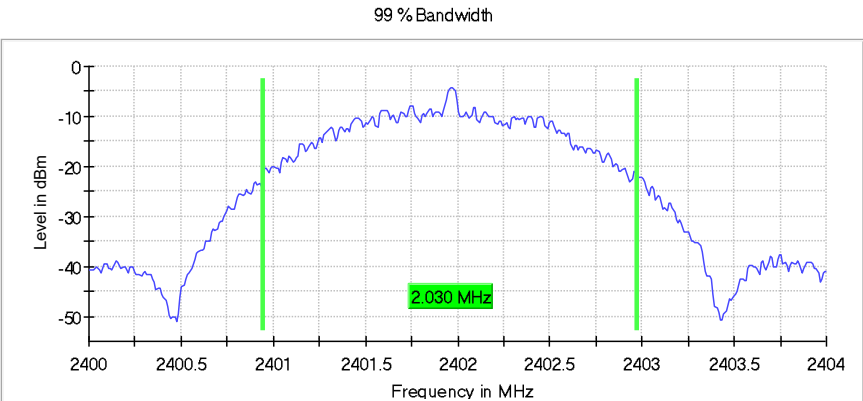


Figure 2.4.6-10: 99% BW - LCH - 2 Mbps

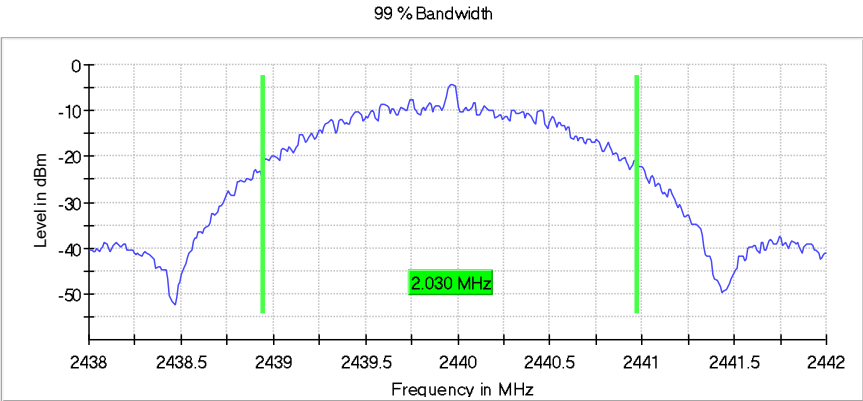


Figure 2.4.6-11: 99% BW - MCH – 2 Mbps

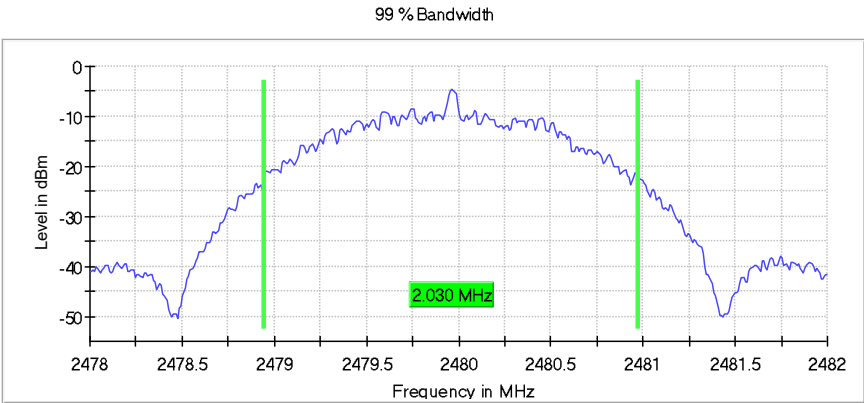


Figure 2.4.6-12: 99% BW - HCH – 2 Mbps

**Table 2.4.6-4: Sample Measurement Setting (6dB BW)**

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.40400 GHz	2.40400 GHz
Span	4.000 MHz	4.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
Sweep Points	101	~ 80
Sweep time	18.938 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.08 dB	0.50 dB

Table 2.4.6-5: Sample Measurement Setting (99% BW)

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.40400 GHz	2.40400 GHz
Span	4.000 MHz	4.000 MHz
RBW	20.000 kHz	$\geq$ 20.000 kHz
VBW	100.000 kHz	$\geq$ 60.000 kHz
Sweep Points	400	~ 400
Sweep time	94.824 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.30 dB	0.30 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.19 dB	0.30 dB



2.4.7 Test Results – Radio 2 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

Table 2.4.7-1: 6dB / 99% Bandwidth

Frequency [MHz]	6dB Bandwidth (kHz)	99% Bandwidth (MHz)	Data Rate
2402	732.674	1.055	1 Mbps
2440	732.674	1.055	1 Mbps
2480	732.674	1.055	1 Mbps
2402	1188.00	2.030	2 Mbps
2440	1188.00	2.030	2 Mbps
2480	1188.00	2.030	2 Mbps

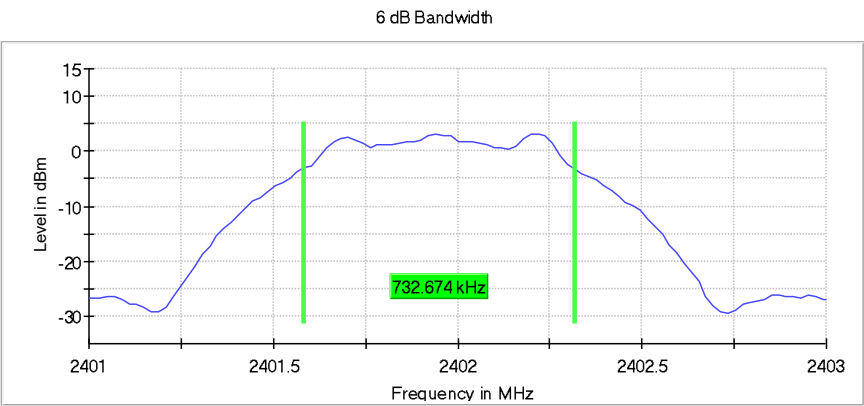


Figure 2.4.7-1: 6 dB BW - LCH – 1 Mbps

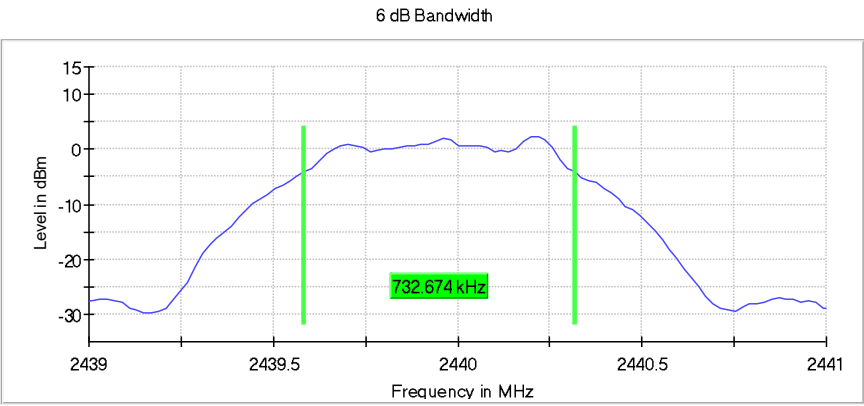


Figure 2.4.7-2: 6 dB BW - MCH – 1 Mbps

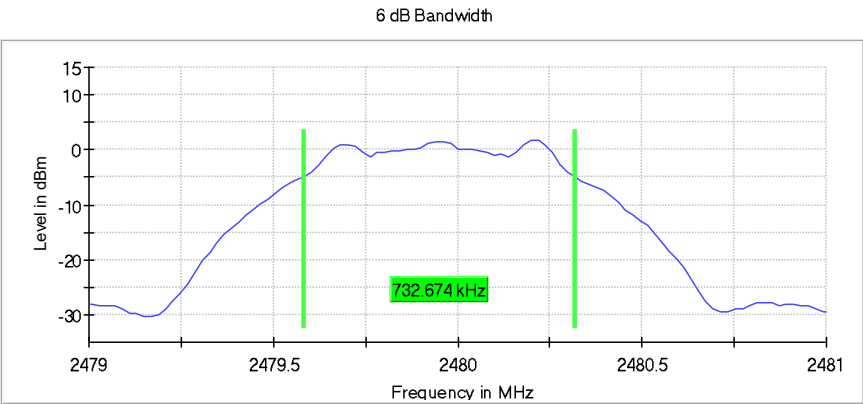


Figure 2.4.7-3: 6 dB BW - HCH – 1 Mbps

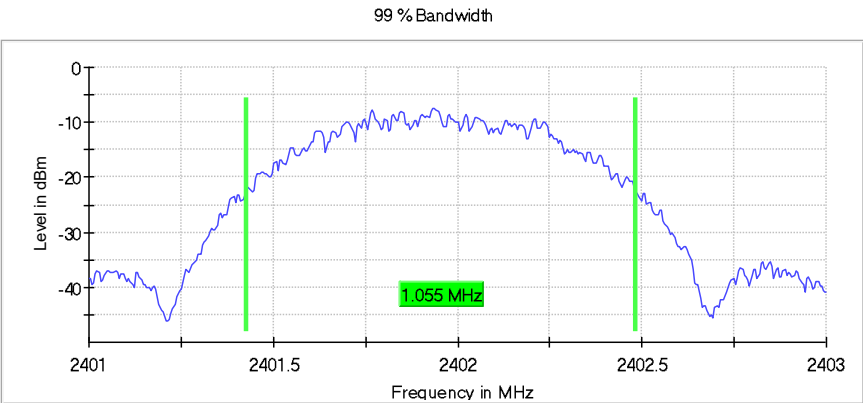


Figure 2.4.7-4: 99% BW - LCH - 1 Mbps

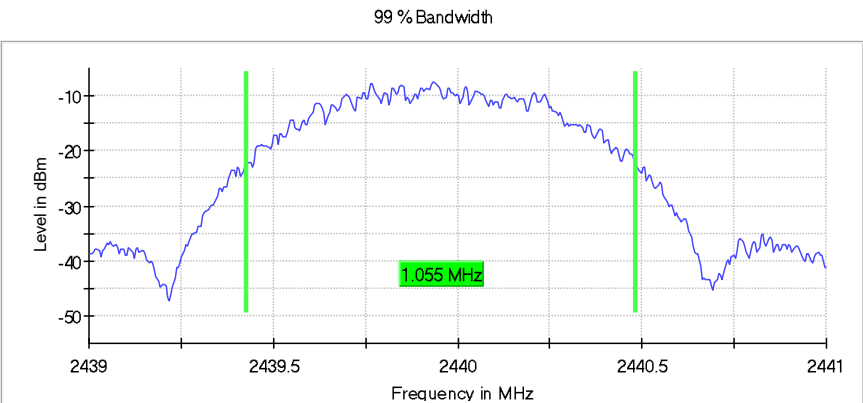


Figure 2.4.7-5: 99% BW - MCH – 1 Mbps

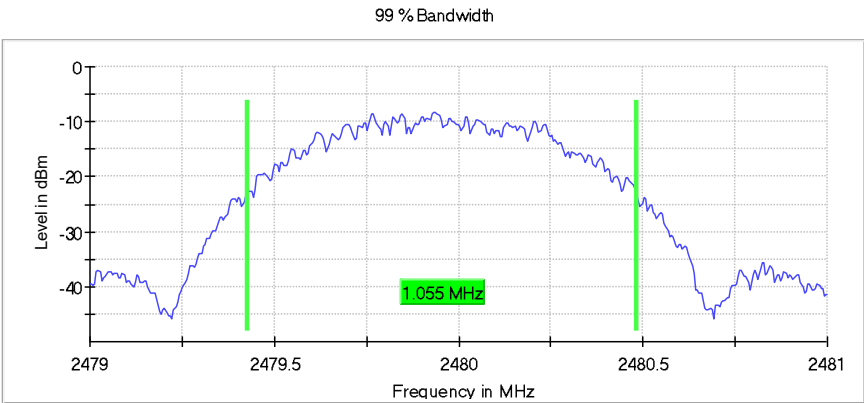


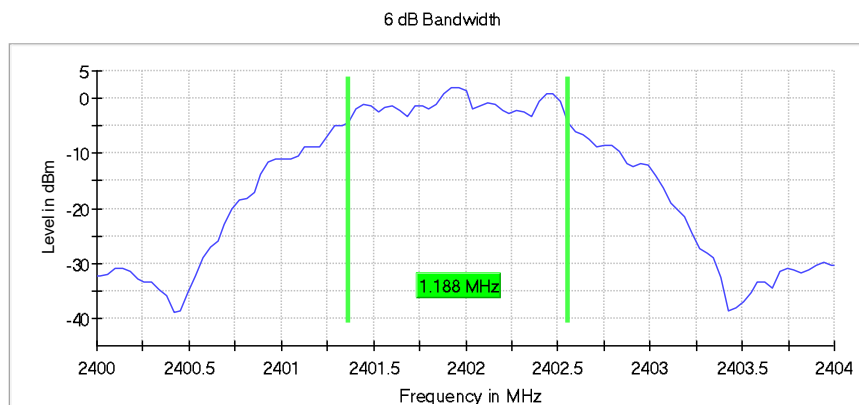
Figure 2.4.7-6: 99% BW - HCH – 1 Mbps

Table 2.4.7-2: Sample Measurement Setting (6dB BW)

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
Sweep Points	101	~ 40
Sweep time	18.938 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	15.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	15 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB

Table 2.4.7-3: Sample Measurement Setting (99% BW)

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	10.000 kHz	≥ 10.000 kHz
VBW	30.000 kHz	≥ 30.000 kHz
Sweep Points	400	~ 400
Sweep time	189.648 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.30 dB	0.30 dB
Run	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.16 dB	0.30 dB

**Figure 2.4.7-7: 6 dB BW - LCH – 2 Mbps**

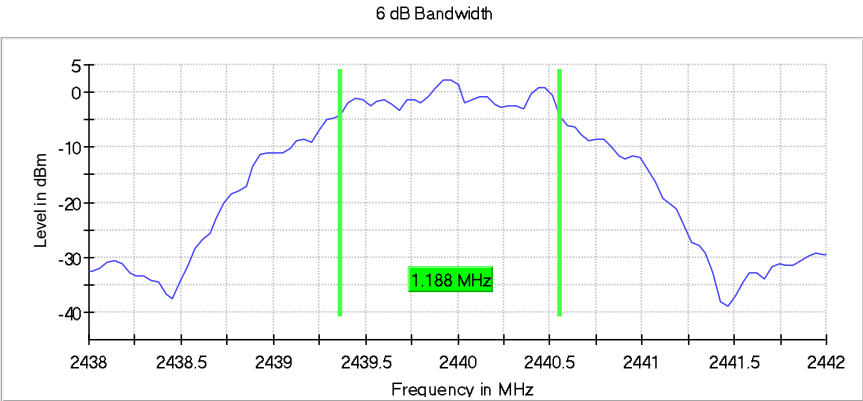


Figure 2.4.7-8: 6 dB BW - MCH – 2 Mbps

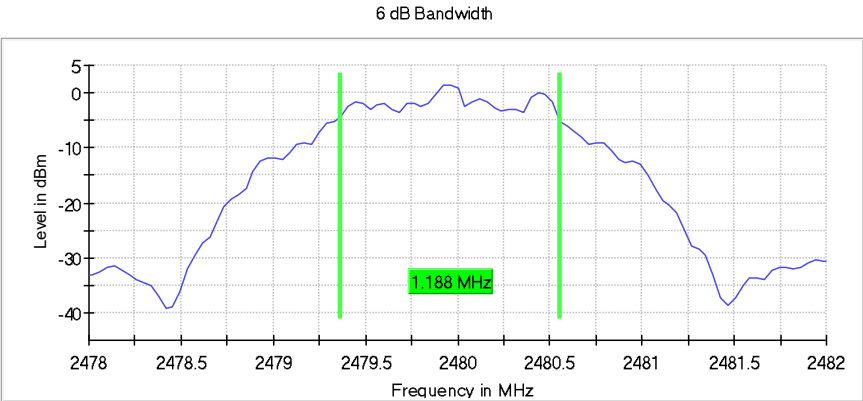


Figure 2.4.7-9: 6 dB BW - HCH – 2 Mbps

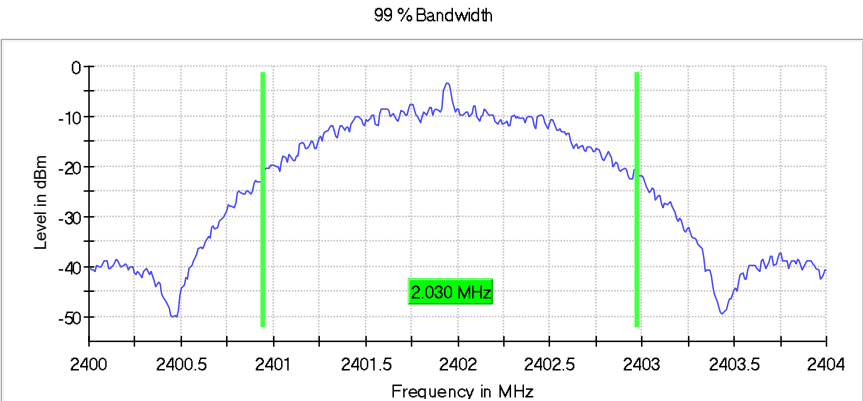


Figure 2.4.7-10: 99% BW - LCH - 2 Mbps

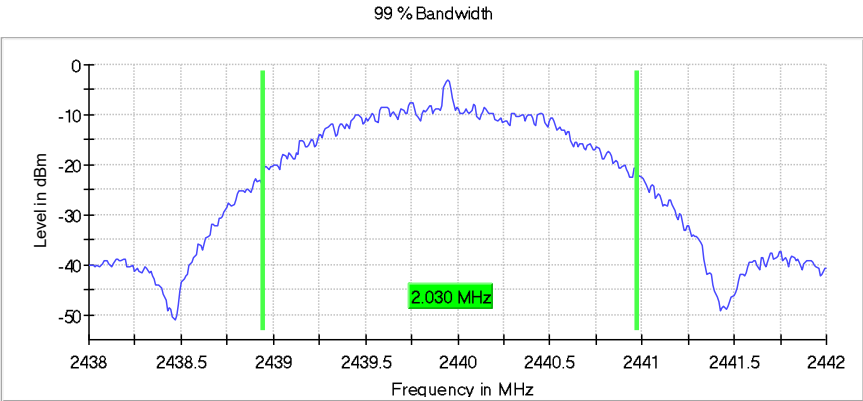


Figure 2.4.7-11: 99% BW - MCH – 2 Mbps

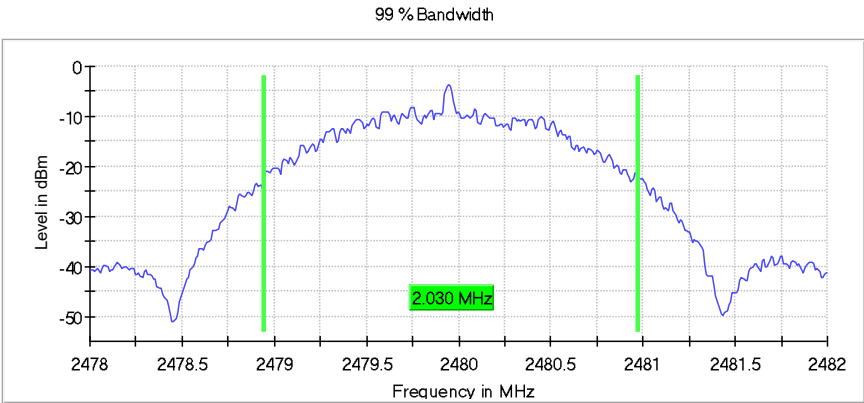


Figure 2.4.7-12: 99% BW - HCH – 2 Mbps

**Table 2.4.7-4: Sample Measurement Setting (6dB BW)**

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.40400 GHz	2.40400 GHz
Span	4.000 MHz	4.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
Sweep Points	101	~ 80
Sweep time	18.938 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.17 dB	0.50 dB

Table 2.4.7-5: Sample Measurement Setting (99% BW)

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.40400 GHz	2.40400 GHz
Span	4.000 MHz	4.000 MHz
RBW	20.000 kHz	>= 20.000 kHz
VBW	100.000 kHz	>= 60.000 kHz
Sweep Points	400	~ 400
Sweep time	94.824 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	FFT	AUTO
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.30 dB	0.30 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.30 dB	0.30 dB



2.5 Maximum Power Spectral Density in the Fundamental Emission

2.5.1 Specification Reference

FCC Sections: 15.247(e)
ISED Canada: RSS-247 5.2(b)

2.5.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.5.3 Date of Test

3/3/2025

2.5.4 Test Method

The power spectral density was measured in accordance with the ANSI C63.10 Section 11.10.2. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 10 kHz. The Video Bandwidth (VBW) was set to 30 kHz. Span was set to 1.5 times the channel bandwidth. The trace was set to max hold with the peak detector active.

2.5.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21.5 °C
Relative Humidity	48.6 %
Atmospheric Pressure	977.4 mbar

2.5.6 Test Results – Radio 1 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.



Table 2.5.6-1: RF Power Spectral Density

Frequency [MHz]	PSD (dBm)	Data Rate
2402	-7.853	1 Mbps
2440	-7.782	1 Mbps
2480	-8.480	1 Mbps
2402	-9.455	2 Mbps
2440	-9.378	2 Mbps
2480	-9.995	2 Mbps

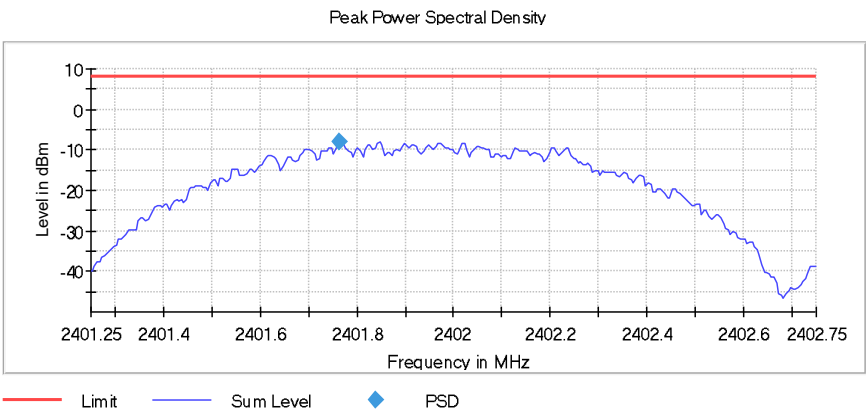


Figure 2.5.6-1: PSD – LCH – 1 Mbps

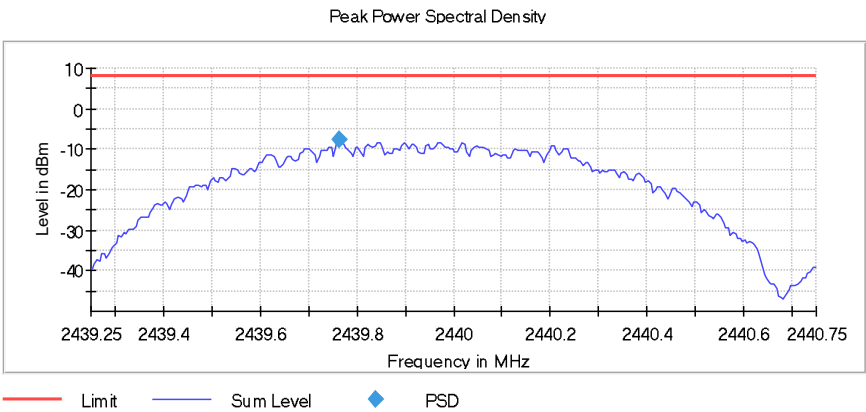


Figure 2.5.6-2: PSD – MCH – 1 Mbps

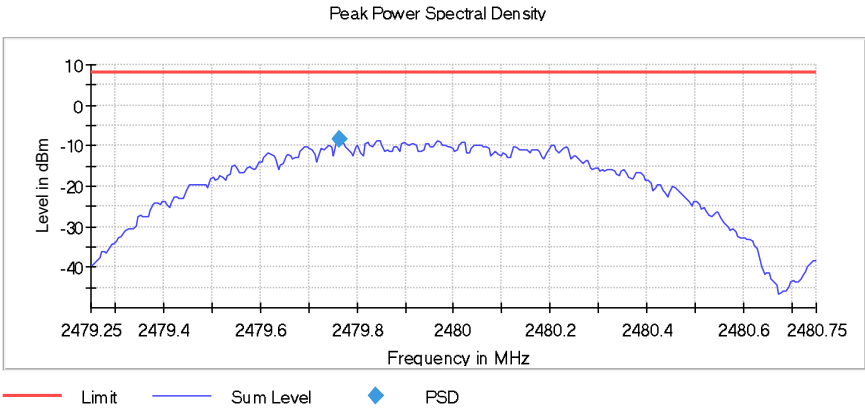


Figure 2.5.6-3: PSD – HCH – 1 Mbps

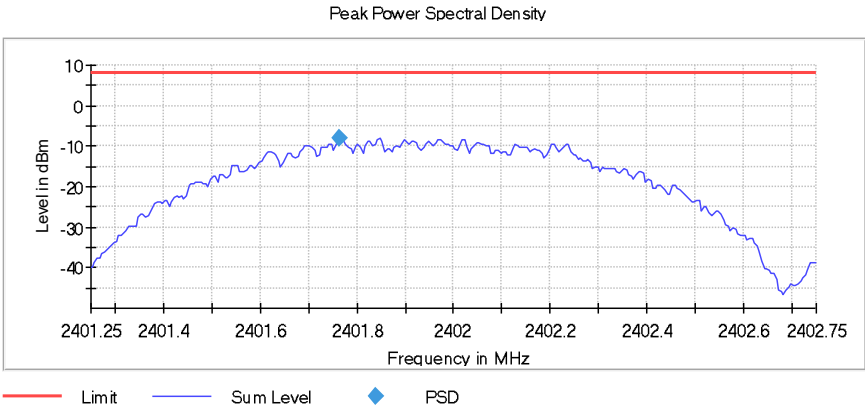


Figure 2.5.6-4: PSD – LCH – 2 Mbps

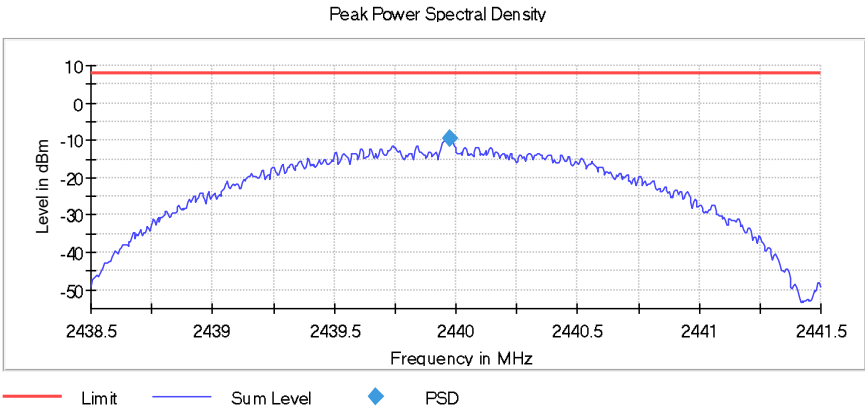


Figure 2.5.6-5: PSD – MCH – 2 Mbps

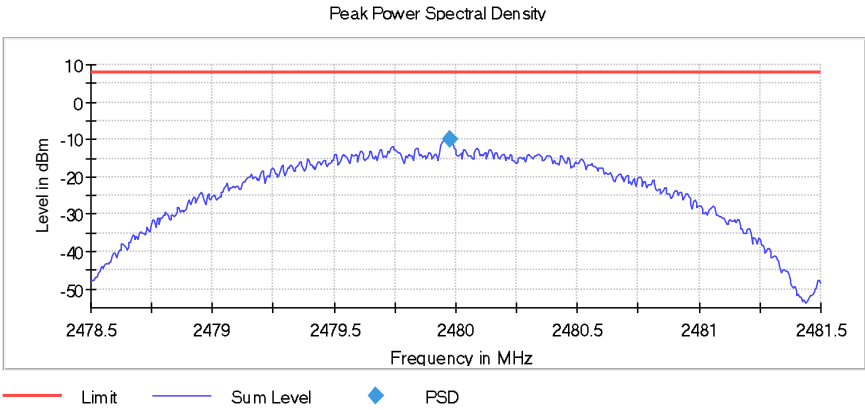


Figure 2.5.6-6: PSD – HCH – 2 Mbps

Table 2.5.6-2: Sample Measurement Settings (PSD) – 1 Mbps

Setting	Instrument Value	Target Value
Start Frequency	2.40125 GHz	2.40125 GHz
Stop Frequency	2.40275 GHz	2.40275 GHz
Span	1.500 MHz	1.500 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
Sweep Points	300	~ 300
Sweep time	1.500 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	Sweep	Sweep
Preamplifier	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.14 dB	0.50 dB

**Table 2.5.6-3: Sample Measurement Settings (PSD) – 2 Mbps**

Setting	Instrument Value	Target Value
Start Frequency	2.40125 GHz	2.40125 GHz
Stop Frequency	2.40275 GHz	2.40275 GHz
Span	1.500 MHz	1.500 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
Sweep Points	300	~ 300
Sweep time	1.500 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	Sweep	Sweep
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.14 dB	0.50 dB

2.5.7 Test Results – Radio 2 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

Table 2.5.7-1: RF Power Spectral Density

Frequency [MHz]	PSD (dBm)	Data Rate
2402	-7.227	1 Mbps
2440	-7.593	1 Mbps
2480	-7.892	1 Mbps
2402	-8.086	2 Mbps
2440	-7.938	2 Mbps
2480	-8.489	2 Mbps

Peak Power Spectral Density

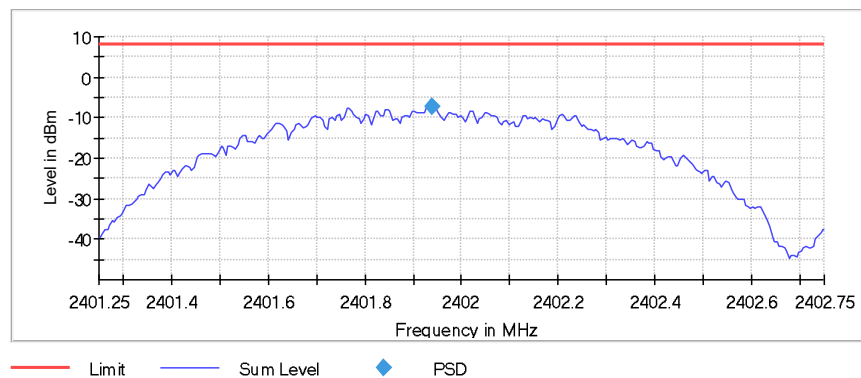


Figure 2.5.7-1: PSD – LCH – 1 Mbps

Peak Power Spectral Density

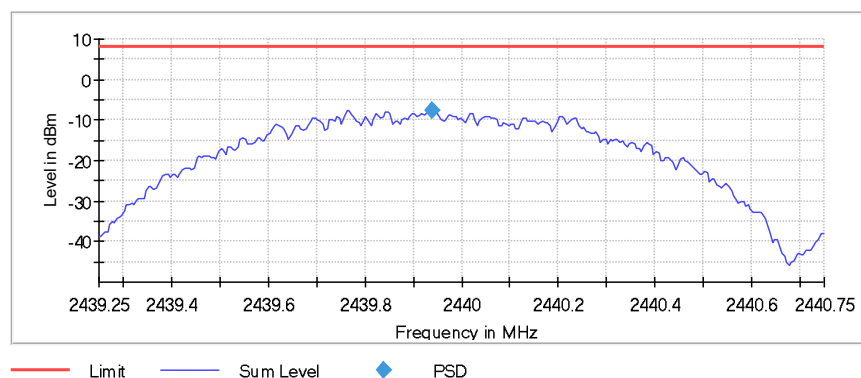


Figure 2.5.7-2: PSD – MCH – 1 Mbps

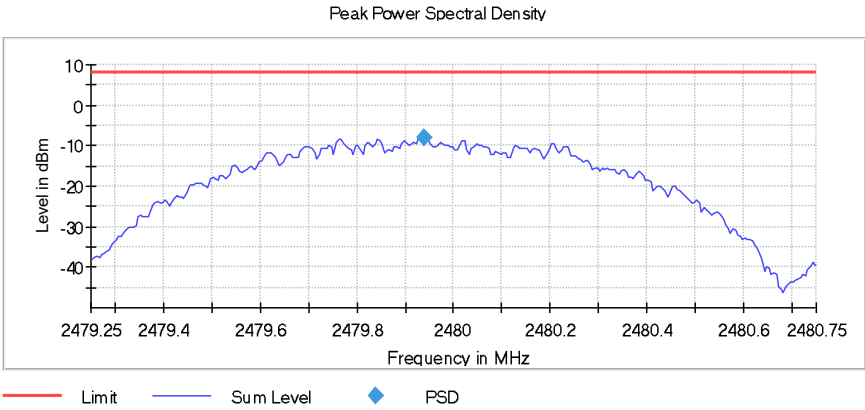


Figure 2.5.7-3: PSD – HCH – 1 Mbps

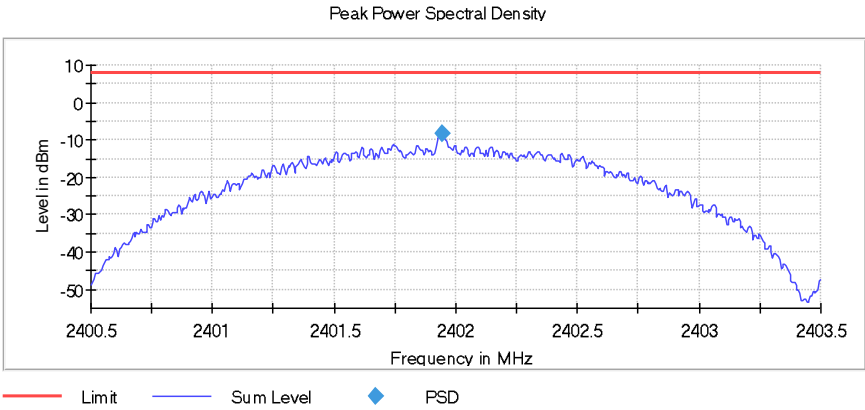


Figure 2.5.7-4: PSD – LCH – 2 Mbps

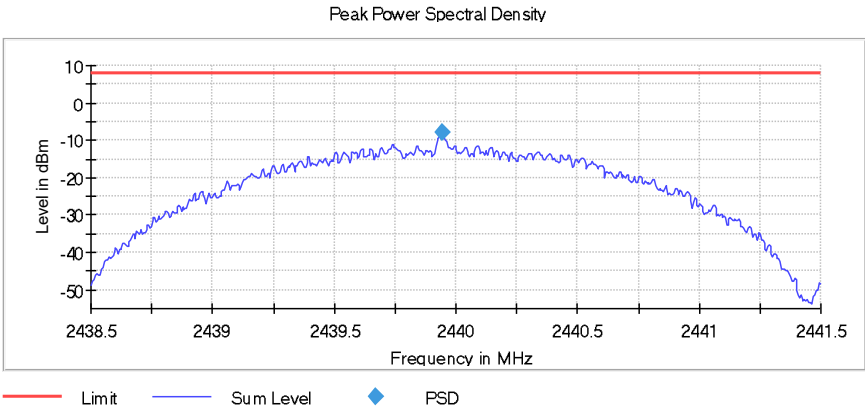


Figure 2.5.7-5: PSD – MCH – 2 Mbps

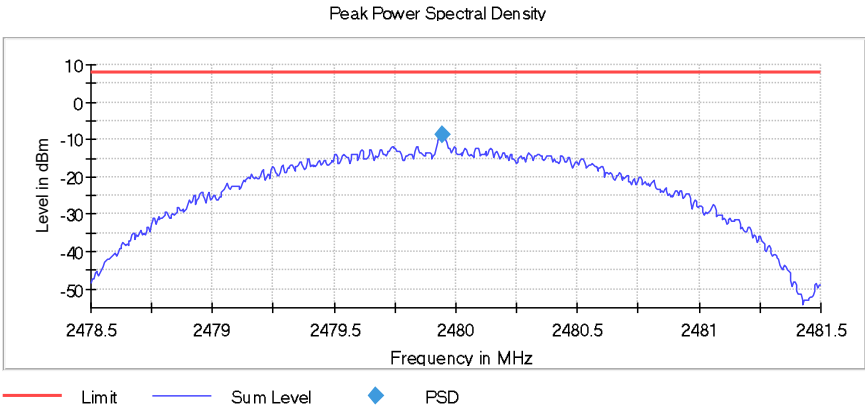


Figure 2.5.7-6: PSD – HCH – 2 Mbps

Table 2.5.7-2: Sample Measurement Settings (PSD) – 1 Mbps

Setting	Instrument Value	Target Value
Start Frequency	2.40125 GHz	2.40125 GHz
Stop Frequency	2.40275 GHz	2.40275 GHz
Span	1.500 MHz	1.500 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
Sweep Points	300	~ 300
Sweep time	1.500 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	Sweep	Sweep
Preamplifier	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	6 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.18 dB	0.50 dB

**Table 2.5.7-3: Sample Measurement Settings (PSD) – 2 Mbps**

Setting	Instrument Value	Target Value
Start Frequency	2.40050 GHz	2.40050 GHz
Stop Frequency	2.40350 GHz	2.40350 GHz
Span	3.000 MHz	3.000 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
Sweep Points	600	~ 600
Sweep time	3.000 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
Sweep Count	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweep type	Sweep	Sweep
Preamp	off	off
Stable mode	Trace	Trace
Stable value	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	2 / 2	2
Max Stable Difference	0.39 dB	0.50 dB



2.6 Band-Edge Compliance of RF Conducted Emissions

2.6.1 Specification Reference

FCC Sections: 15.247(d)
ISED Canada: RSS-247 5.5

2.6.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.6.3 Date of Test

3/3/2025

2.6.4 Test Method

The unwanted emissions into non-restricted bands were measured conducted in accordance with ANSI C63.10 Section 11.11. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 300 kHz. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 20 dBc limit at the band edges.

2.6.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21.5 °C
Relative Humidity	48.6 %
Atmospheric Pressure	977.4 mbar

2.6.6 Test Results – Radio 1 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

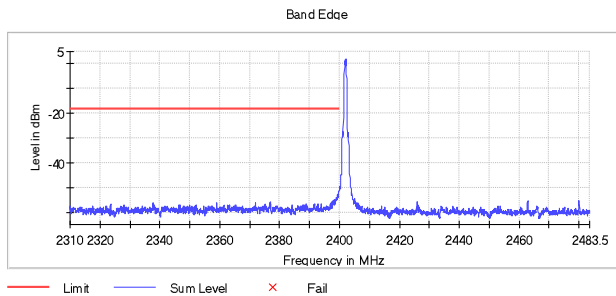


Figure 2.6.6-1: Lower Band-edge – 1Mbps

Table 2.6.6-1: Lower Band-edge- Low Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-49.5	31.5	-18.0	PASS
2399.925000	-49.7	31.7	-18.0	PASS
2399.825000	-51.5	33.4	-18.0	PASS
2399.875000	-51.5	33.5	-18.0	PASS
2399.775000	-51.5	33.5	-18.0	PASS
2399.725000	-51.6	33.6	-18.0	PASS
2399.675000	-51.8	33.8	-18.0	PASS
2399.425000	-52.6	34.6	-18.0	PASS
2399.475000	-52.7	34.7	-18.0	PASS
2399.575000	-53.3	35.3	-18.0	PASS
2399.275000	-53.3	35.3	-18.0	PASS
2399.375000	-53.4	35.4	-18.0	PASS
2399.225000	-53.5	35.5	-18.0	PASS
2399.325000	-53.7	35.7	-18.0	PASS
2399.625000	-53.9	35.9	-18.0	PASS

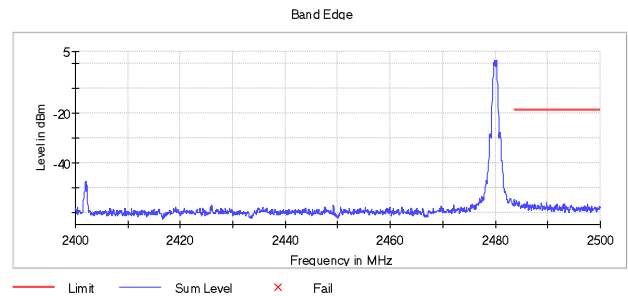


Figure 2.6.6-2: Upper Band-edge – 1Mbps

Table 2.6.6-2: Upper Band-edge – High Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.625000	-55.0	36.5	-18.5	PASS
2483.575000	-55.3	36.8	-18.5	PASS
2484.025000	-55.5	37.0	-18.5	PASS
2484.475000	-55.7	37.2	-18.5	PASS
2483.975000	-55.7	37.2	-18.5	PASS
2483.675000	-55.7	37.2	-18.5	PASS
2484.525000	-55.7	37.2	-18.5	PASS
2486.075000	-55.9	37.4	-18.5	PASS
2488.775000	-56.1	37.6	-18.5	PASS
2483.875000	-56.1	37.6	-18.5	PASS
2483.925000	-56.2	37.7	-18.5	PASS
2488.725000	-56.3	37.8	-18.5	PASS
2484.125000	-56.3	37.8	-18.5	PASS
2489.775000	-56.3	37.8	-18.5	PASS
2484.075000	-56.3	37.8	-18.5	PASS

Table 2.6.6-3: Sample Measurement Settings – Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	113.672 μs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Table 2.6.6-4: Sample Measurement Settings – Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	94.727 μs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.05 dB	0.50 dB

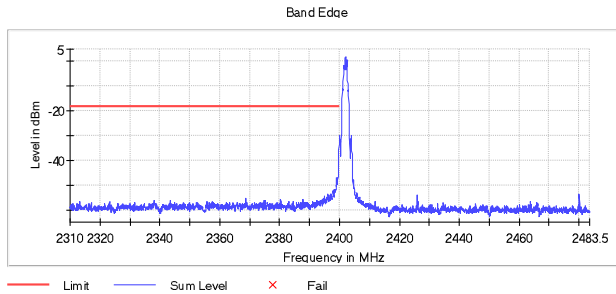


Figure 2.6.6-3: Lower Band-edge – 2 Mbps

Table 2.6.6-5: Lower Band-edge- Low Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-29.9	11.8	-18.1	PASS
2399.925000	-30.0	11.8	-18.1	PASS
2399.875000	-32.1	13.9	-18.1	PASS
2399.825000	-33.5	15.4	-18.1	PASS
2399.775000	-35.6	17.4	-18.1	PASS
2399.725000	-36.6	18.5	-18.1	PASS
2399.675000	-38.9	20.8	-18.1	PASS
2399.625000	-42.5	24.3	-18.1	PASS
2399.575000	-43.2	25.1	-18.1	PASS
2399.525000	-45.5	27.4	-18.1	PASS
2399.475000	-46.8	28.7	-18.1	PASS
2399.125000	-47.0	28.8	-18.1	PASS
2399.075000	-47.0	28.9	-18.1	PASS
2399.425000	-47.9	29.8	-18.1	PASS
2399.175000	-48.3	30.2	-18.1	PASS

Table 2.6.6-7: Sample Measurement Settings – Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	113.672 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

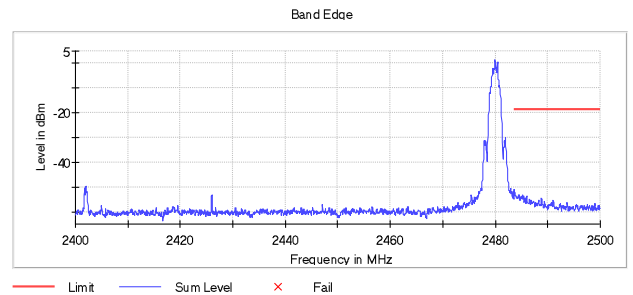


Figure 2.6.6-4: Upper Band-edge – 2 Mbps

Table 2.6.6-6: Upper Band-edge – High Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-51.2	32.6	-18.6	PASS
2483.675000	-52.0	33.4	-18.6	PASS
2483.725000	-52.5	33.8	-18.6	PASS
2483.575000	-52.8	34.2	-18.6	PASS
2484.525000	-53.0	34.3	-18.6	PASS
2484.475000	-53.0	34.4	-18.6	PASS
2484.425000	-53.0	34.4	-18.6	PASS
2483.625000	-53.1	34.4	-18.6	PASS
2484.375000	-53.1	34.5	-18.6	PASS
2483.775000	-53.2	34.6	-18.6	PASS
2485.125000	-53.3	34.7	-18.6	PASS
2483.825000	-53.5	34.8	-18.6	PASS
2485.975000	-53.7	35.0	-18.6	PASS
2484.575000	-53.7	35.0	-18.6	PASS
2485.325000	-53.8	35.1	-18.6	PASS

Table 2.6.6-8: Sample Measurement Settings – Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	94.727 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.23 dB	0.50 dB

2.6.7 Test Results – Radio 2 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

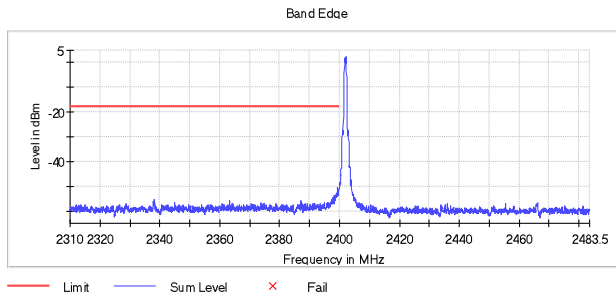


Figure 2.6.7-1: Lower Band-edge – 1Mbps

Table 2.6.7-1: Lower Band-edge- Low Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-48.4	30.6	-17.8	PASS
2399.925000	-48.4	30.6	-17.8	PASS
2399.875000	-49.5	31.7	-17.8	PASS
2399.425000	-50.6	32.9	-17.8	PASS
2399.825000	-51.0	33.2	-17.8	PASS
2399.375000	-51.1	33.3	-17.8	PASS
2399.775000	-51.4	33.6	-17.8	PASS
2399.475000	-51.5	33.7	-17.8	PASS
2399.675000	-51.5	33.8	-17.8	PASS
2399.625000	-51.6	33.9	-17.8	PASS
2399.575000	-52.0	34.2	-17.8	PASS
2399.725000	-52.5	34.7	-17.8	PASS
2399.075000	-52.8	35.0	-17.8	PASS
2399.275000	-53.0	35.3	-17.8	PASS
2398.975000	-53.1	35.3	-17.8	PASS

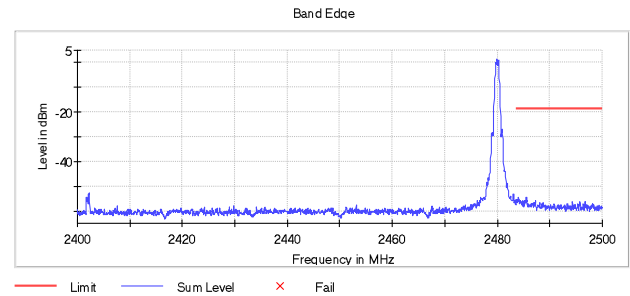


Figure 2.6.7-2: Upper Band-edge – 1Mbps

Table 2.6.7-2: Upper Band-edge – High Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.025000	-54.5	35.8	-18.7	PASS
2485.525000	-54.6	35.9	-18.7	PASS
2485.475000	-54.7	36.0	-18.7	PASS
2484.075000	-55.1	36.4	-18.7	PASS
2483.625000	-55.3	36.6	-18.7	PASS
2483.975000	-55.3	36.6	-18.7	PASS
2484.125000	-55.5	36.8	-18.7	PASS
2483.875000	-55.5	36.8	-18.7	PASS
2484.175000	-55.6	36.9	-18.7	PASS
2483.675000	-55.7	37.0	-18.7	PASS
2484.375000	-55.7	37.0	-18.7	PASS
2484.425000	-55.8	37.1	-18.7	PASS
2483.525000	-55.8	37.1	-18.7	PASS
2485.225000	-55.9	37.2	-18.7	PASS
2483.825000	-55.9	37.2	-18.7	PASS



Table 2.6.7-3: Sample Measurement Settings – Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	113.672 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Table 2.6.7-4: Sample Measurement Settings – Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	12 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

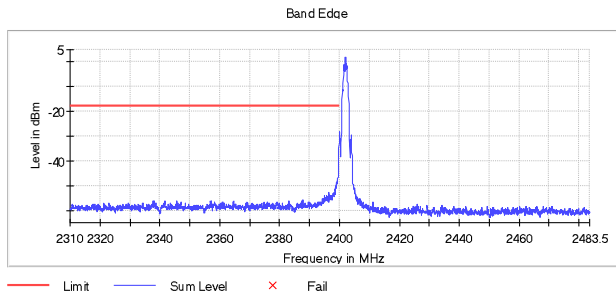


Figure 2.6.7-3: Lower Band-edge – 2 Mbps

Table 2.6.7-5: Lower Band-edge- Low Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.925000	-28.2	10.2	-17.9	PASS
2399.975000	-28.3	10.3	-17.9	PASS
2399.875000	-30.3	12.4	-17.9	PASS
2399.825000	-32.7	14.8	-17.9	PASS
2399.775000	-34.8	16.9	-17.9	PASS
2399.725000	-35.3	17.4	-17.9	PASS
2399.675000	-38.2	20.3	-17.9	PASS
2399.625000	-41.4	23.5	-17.9	PASS
2399.575000	-42.0	24.0	-17.9	PASS
2399.525000	-44.2	26.2	-17.9	PASS
2399.475000	-46.5	28.6	-17.9	PASS
2399.425000	-47.3	29.3	-17.9	PASS
2399.325000	-47.7	29.8	-17.9	PASS
2399.275000	-47.8	29.9	-17.9	PASS
2399.175000	-48.2	30.3	-17.9	PASS

Table 2.6.7-7: Sample Measurement Settings – Measurement 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	113.672 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

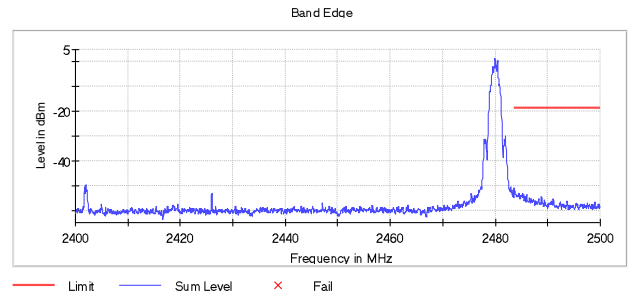


Figure 2.6.7-4: Upper Band-edge – 2 Mbps

Table 2.6.7-6: Upper Band-edge – High Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-51.2	32.6	-18.6	PASS
2483.675000	-52.0	33.4	-18.6	PASS
2483.725000	-52.5	33.8	-18.6	PASS
2483.575000	-52.8	34.2	-18.6	PASS
2484.525000	-53.0	34.3	-18.6	PASS
2484.475000	-53.0	34.4	-18.6	PASS
2484.425000	-53.0	34.4	-18.6	PASS
2483.625000	-53.1	34.4	-18.6	PASS
2484.375000	-53.1	34.5	-18.6	PASS
2483.775000	-53.2	34.6	-18.6	PASS
2485.125000	-53.3	34.7	-18.6	PASS
2483.825000	-53.5	34.8	-18.6	PASS
2485.975000	-53.7	35.0	-18.6	PASS
2484.575000	-53.7	35.0	-18.6	PASS
2485.325000	-53.8	35.1	-18.6	PASS

Table 2.6.7-8: Sample Measurement Settings – Measurement 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
Sweeptime	94.727 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.09 dB	0.50 dB



2.7 RF Conducted Spurious Emissions

2.7.1 Specification Reference

FCC Sections: 15.247(d)
ISED Canada: RSS-247 5.5

2.7.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.7.3 Date of Test

3/3/2025

2.7.4 Test Method

The unwanted emissions into non-restricted bands were measured conducted in accordance with ANSI C63.10 Section 11.11. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 300 kHz. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 20 dBc limit at the band edges. The spectrum span was then adjusted for the measurement of spurious emissions from 30MHz to 26GHz, 10 times the highest fundamental frequency.

2.7.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21.5 °C
Relative Humidity	48.6 %
Atmospheric Pressure	977.4 mbar

2.7.6 Test Results – Radio 1 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

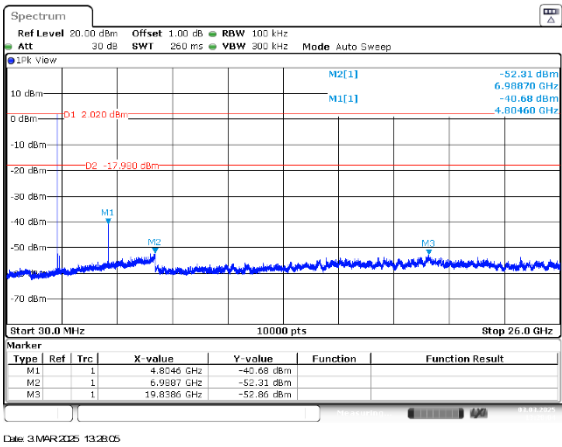


Figure 2.7.6-1: 30MHz – 26GHz – LCH – 1 Mbps

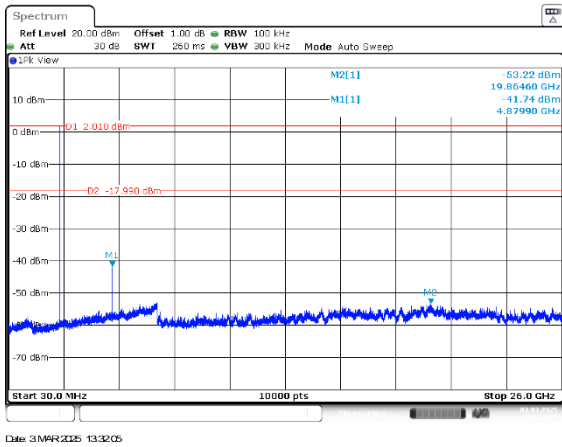


Figure 2.7.6-2: 30MHz – 26GHz – MCH – 1 Mbps

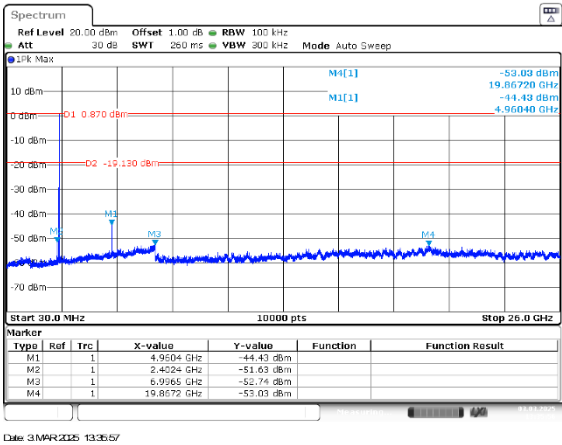


Figure 2.7.6-3: 30MHz – 26GHz – HCH – 1 Mbps

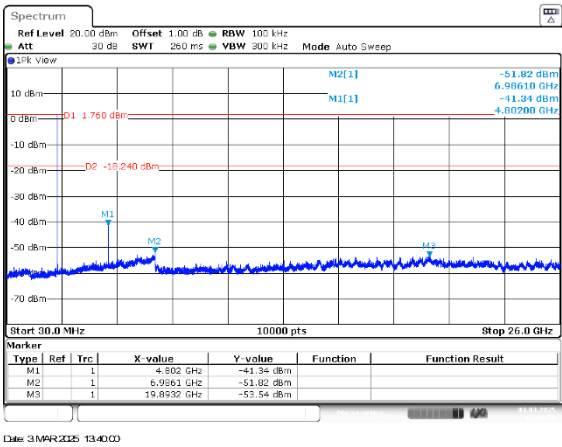


Figure 2.7.6-4: 30MHz – 26GHz – LCH – 2 Mbps

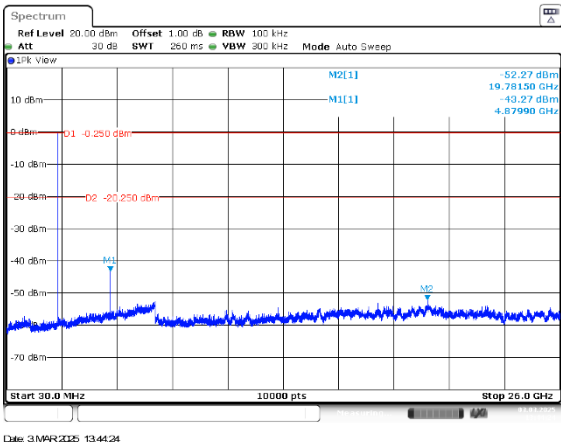


Figure 2.7.6-5: 30MHz – 26GHz – MCH – 2 Mbps

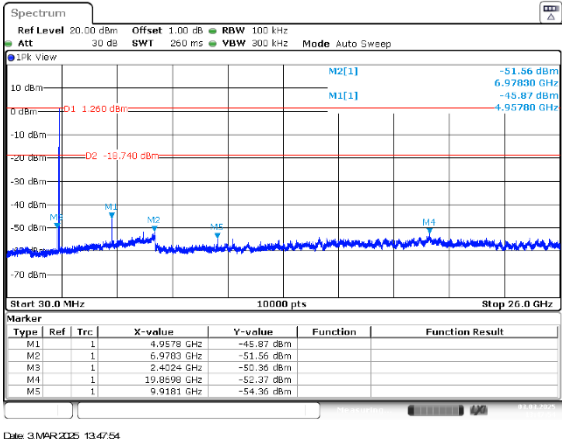


Figure 2.7.6-6: 30MHz – 26GHz – HCH – 2 Mbps



2.7.7 Test Results – Radio 2 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

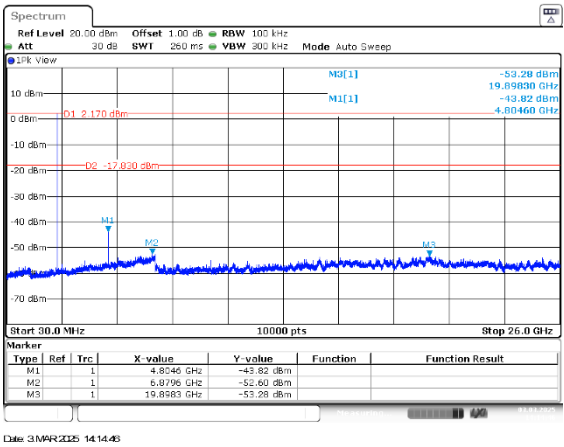


Figure 2.7.7-1: 30MHz – 26GHz – LCH – 1 Mbps

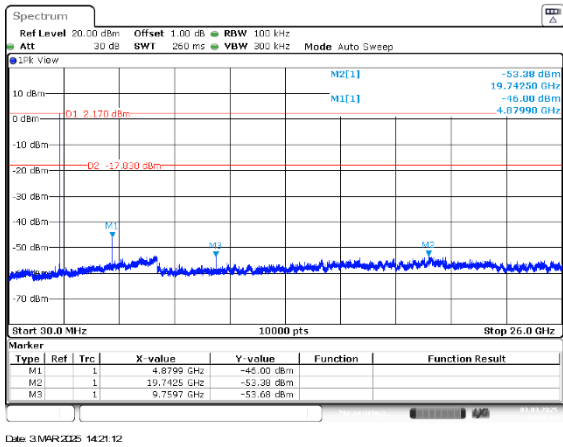


Figure 2.7.7-2: 30MHz – 26GHz – MCH – 1 Mbps

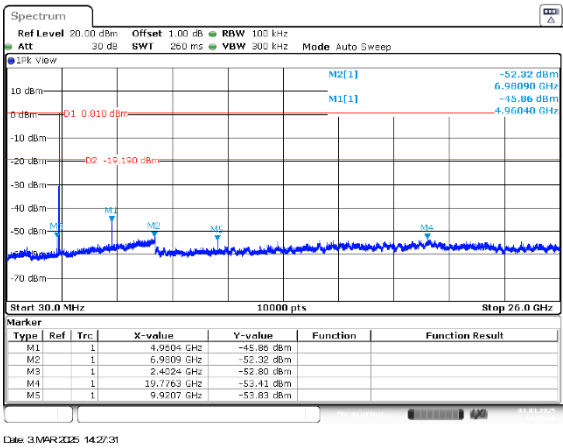
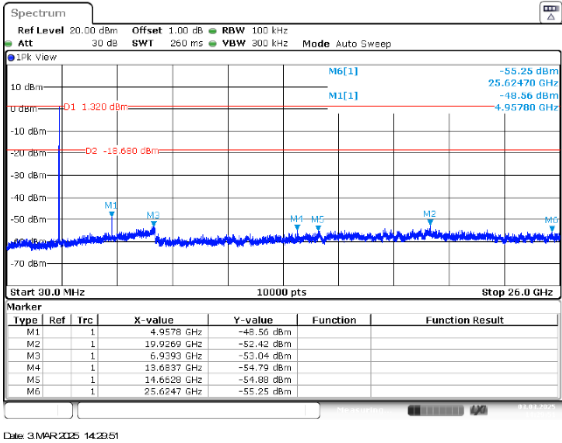
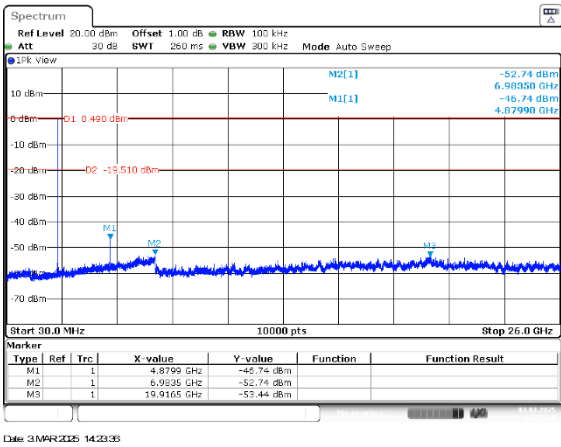
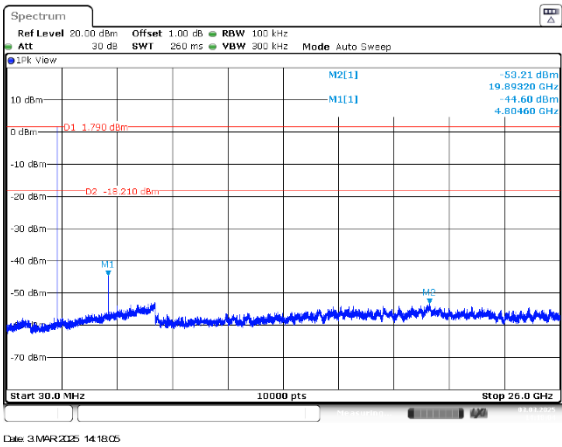


Figure 2.7.7-3: 30MHz – 26GHz – HCH – 1 Mbps





2.8 Radiated Spurious Emissions into Restricted Frequency Bands

2.8.1 Specification Reference

FCC Sections: 15.205, 15.209.
ISED Canada RSS – Gen 8.9/8.10

2.8.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.8.3 Date of Test

2/25/2025 to 3/17/2025

2.8.4 Test Method

Radiated emissions tests were made over the frequency range of 9 kHz to 26.5 GHz, 10 times the highest fundamental frequency of 2.4 GHz. Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in Section 15.209.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 150 kHz, quasi-peak measurements were made using a resolution bandwidth RBW of 200 Hz and a video bandwidth VBW of 1 kHz and frequencies between 150 kHz and 30MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 9 kHz and a video bandwidth VBW of 30 kHz. For frequencies between 30 MHz and 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak and average measurements were made with RBW of 1 MHz and VBW of 3 MHz.

2.8.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21.5 °C
Relative Humidity	48.6 %
Atmospheric Pressure	977.4 mbar

2.8.6 Test Results – Radio 1 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

**Table 2.8.6-1: Radiated Spurious Emissions Tabulated Data < 1 GHz - 1 Mbps**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg		pk	Qpk/Avg	pk	Qpk/Avg
364.868	----	32.299	H	----	46	----	13.7
499.988	----	33.166	H	----	46	----	12.83
599.995	----	21.28	H	----	46	----	24.72
624.998	----	40.539	H	----	46	----	5.46
749.982	----	30.501	H	----	46	----	15.5
874.99	----	35.567	H	----	46	----	10.43
363.386	----	33.15	V	----	46	----	12.85
499.988	----	31.437	V	----	46	----	14.56
599.995	----	17.979	V	----	46	----	28.02
624.998	----	38.567	V	----	46	----	7.43
874.99	----	35.112	V	----	46	----	10.89

Note: Emission present in 30 MHz – 1 GHz frequency range is not associated with radio frequency, and it belongs to unintentional emissions and it is same for all channels.

Table 2.8.6-2: Radiated Spurious Emissions Tabulated Data > 1 GHz – 1 Mbps

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBuV/m	dBuV/m	dBuV/m	Limit_Avg	dB	dBuV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 1 Mbps											
4803.38	62.90	54.40	74.00	54.00	-1.39	53.01	11.10	0.99	H	Pass	Pass
4803.40	59.17	49.74	74.00	54.00	-1.39	48.35	14.83	5.65	V	Pass	Pass
2440 MHz - 1 Mbps											
4880.35	62.86	54.71	74.00	54.00	-1.39	53.32	11.14	0.68	H	Pass	Pass
4880.40	57.68	47.93	74.00	54.00	-1.39	46.54	16.32	7.46	V	Pass	Pass
2480 MHz - 1 Mbps											
4959.30	61.37	52.33	74.00	54.00	-1.39	50.94	12.63	3.06	H	Pass	Pass
4959.30	56.35	45.88	74.00	54.00	-1.39	44.50	17.65	9.50	V	Pass	Pass

**Table 2.8.6-3: Radiated Band-Edge Tabulated Data – 1 Mbps**

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBμV/m	dBμV/m	dBμV/m	Limit_Avg	dB	dBμV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 1 Mbps											
2390.23	45.44	30.32	74.00	54.00	-1.39	28.93	28.56	25.07	H	Pass	Pass
2389.95	44.87	29.18	74.00	54.00	-1.39	27.79	29.13	26.21	V	Pass	Pass
2480 MHz - 1 Mbps											
2483.5	54.45	37.74	74.00	54.00	-1.39	36.35	19.55	17.65	H	Pass	Pass
2483.58	45.65	30.60	74.00	54.00	-1.39	29.21	28.35	24.79	V	Pass	Pass



Table 2.8.6-4: Radiated Spurious Emissions Tabulated Data < 1 GHz - 2 Mbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg		pk	Qpk/Avg	pk	Qpk/Avg
362.392	----	32.807	H	----	46	----	13.19
499.988	----	34.171	H	----	46	----	11.83
600.02	----	20.587	H	----	46	----	25.41
624.998	----	39.049	H	----	46	----	6.95
749.981	----	30.928	H	----	46	----	15.07
874.99	----	36.388	H	----	46	----	9.61
360.505	----	35.493	V	----	46	----	10.51
499.988	----	33.662	V	----	46	----	12.34
624.998	----	36.355	V	----	46	----	9.64
786.112	----	15.607	V	----	46	----	30.39
874.99	----	34.609	V	----	46	----	11.39

Note: Emission present in 30 MHz – 1 GHz frequency range is not associated with radio frequency, and it belongs to unintentional emissions and it is same for all channels.

Table 2.8.6-5: Radiated Spurious Emissions Tabulated Data > 1 GHz – 2 Mbps

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBuV/m	dBuV/m	dBuV/m	Limit_Avg	dB	dBuV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 2 Mbps											
4802.95	61.35	48.61	74.00	54.00	-1.39	47.22	12.65	6.78	H	Pass	Pass
4805.00	58.74	45.02	74.00	54.00	-1.39	43.63	15.26	10.37	V	Pass	Pass
2440 MHz - 2 Mbps											
4878.75	61.86	48.76	74.00	54.00	-1.39	47.37	12.14	6.63	H	Pass	Pass
4881.05	57.18	43.33	74.00	54.00	-1.39	41.94	16.82	12.06	V	Pass	Pass
2480 MHz - 2 Mbps											
4958.90	61.24	48.44	74.00	54.00	-1.39	47.05	12.76	6.95	H	Pass	Pass
4959.10	54.49	40.58	74.00	54.00	-1.39	39.19	19.52	14.81	V	Pass	Pass



Table 2.8.6-6: Radiated Band-Edge Tabulated Data – 2 Mbps

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBµV/m	dBµV/m	dBµV/m	Limit_Avg	dB	dBµV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 2 Mbps											
2389.98	48.29	31.69	74.00	54.00	-1.39	30.30	25.71	23.71	H	Pass	Pass
2390.08	44.52	29.36	74.00	54.00	-1.39	27.97	29.48	26.03	V	Pass	Pass
2480 MHz - 2 Mbps											
2483.58	57.18	38.86	74.00	54.00	-1.39	37.47	16.82	16.53	H	Pass	Pass
2483.50	47.95	31.57	74.00	54.00	-1.39	30.18	26.05	23.82	V	Pass	Pass

Measured Duty Cycle: 85.2%

Duty Cycle Correction Factor (DC): $20 \cdot \log(0.852) = -1.39$

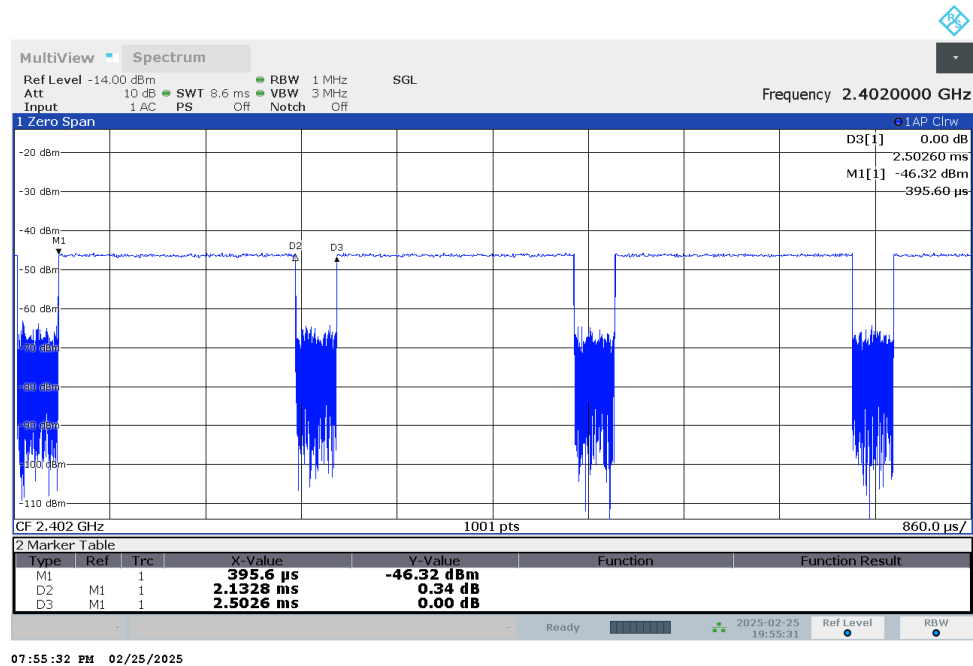


Figure 2.8.6-1: Duty Cycle

**Sample Calculation:**

$$R_C = R_U + CF_T$$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak (LCH - Band edge)

Corrected Level: $50.24 + 1.952 = 48.29\text{dB}\mu\text{V/m}$

Margin: $74\text{dB}\mu\text{V/m} - 48.29\text{dB}\mu\text{V/m} = 25.71\text{dB}$

Example Calculation: Average

Corrected Level: $29.738 + 1.952 - 1.39 = 30.30\text{dB}\mu\text{V}$

Margin: $54\text{dB}\mu\text{V} - 30.30\text{dB}\mu\text{V} = 23.7\text{dB}$

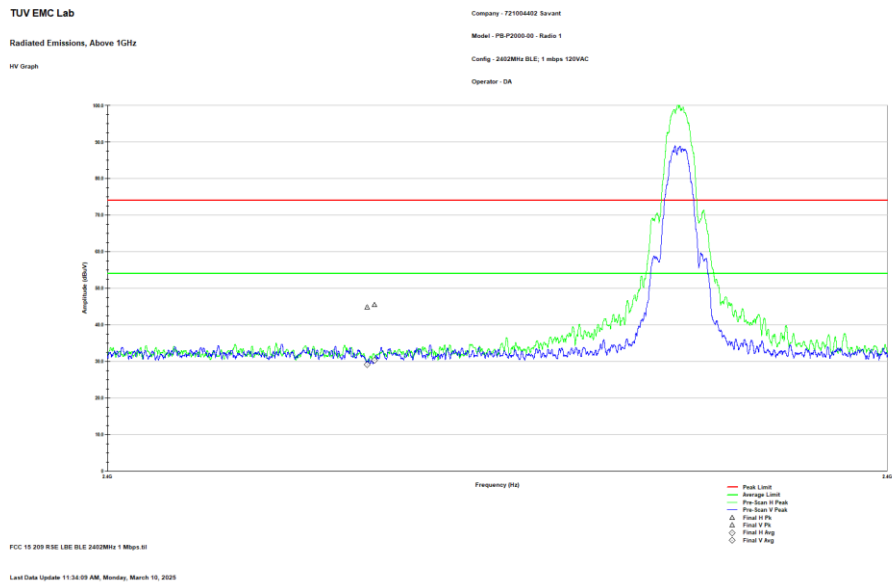


Figure 2.8.6-2: Reference Plot for Radiated Lower Band-edge – LCH – 1 Mbps – Radio 1

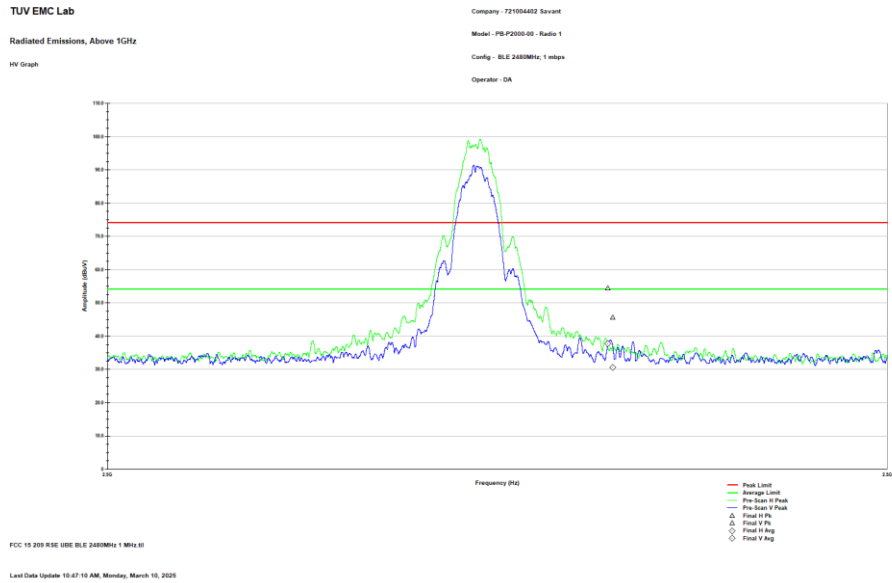


Figure 2.8.6-3: Reference Plot for Radiated Upper Band-edge – HCH – 1 Mbps – Radio 1

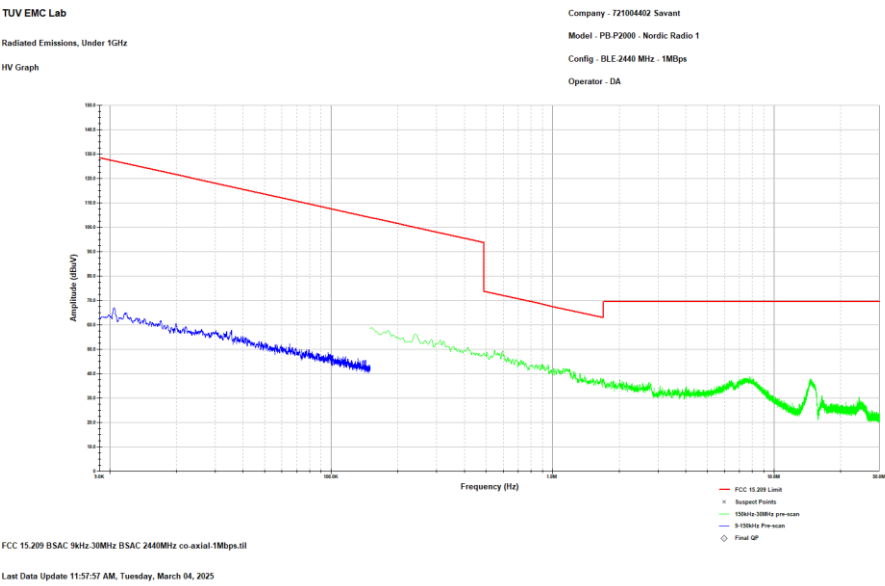


Figure 2.8.6-4: Reference plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Co-Axial - MCH - 1 Mbps – Radio 1

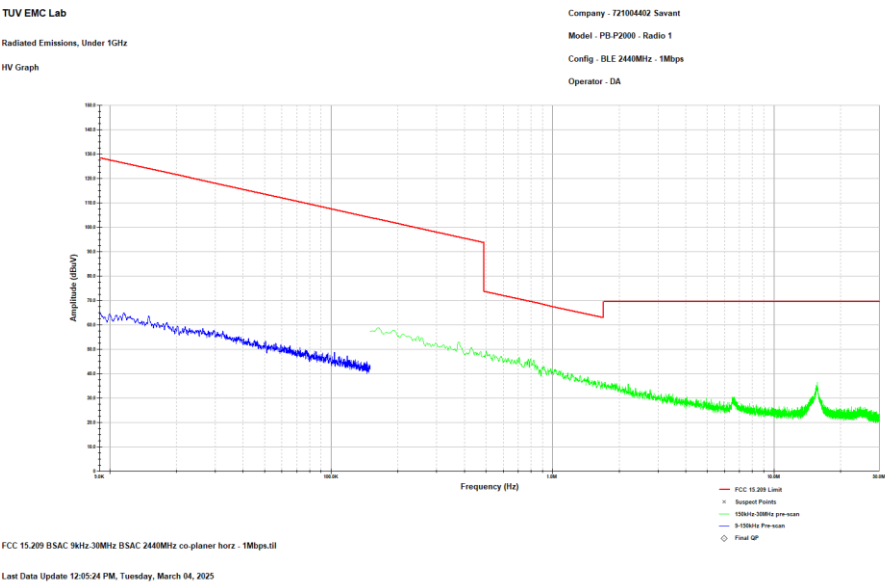


Figure 2.8.6-5: Reference plot for Radiated Spurious Emissions– 9 kHz – 30 MHz – Co-Planar Horz. - MCH - 1 Mbps – Radio 1

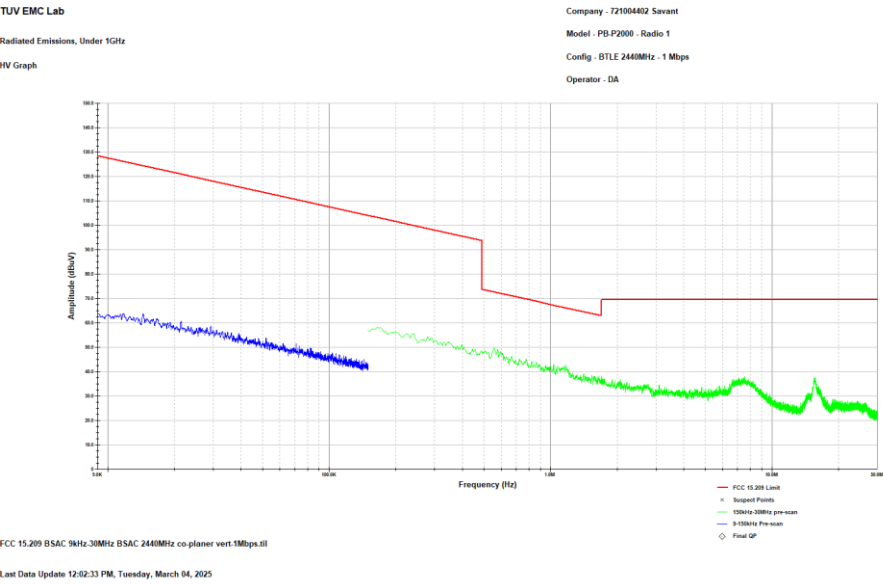


Figure 2.8.6-6: Reference plot for Radiated Spurious Emissions– 9 kHz – 30 MHz – Co-Planar Vert. - MCH - 1 Mbps – Radio 1

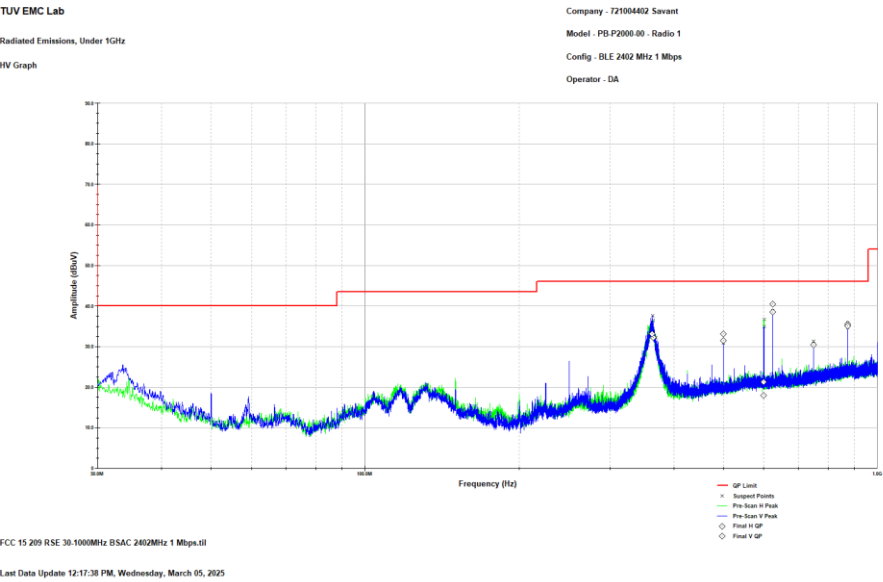


Figure 2.8.6-7: Reference plot for Radiated Spurious Emissions – 30 MHz – 1 GHz – LCH – 1 Mbps – Radio 1

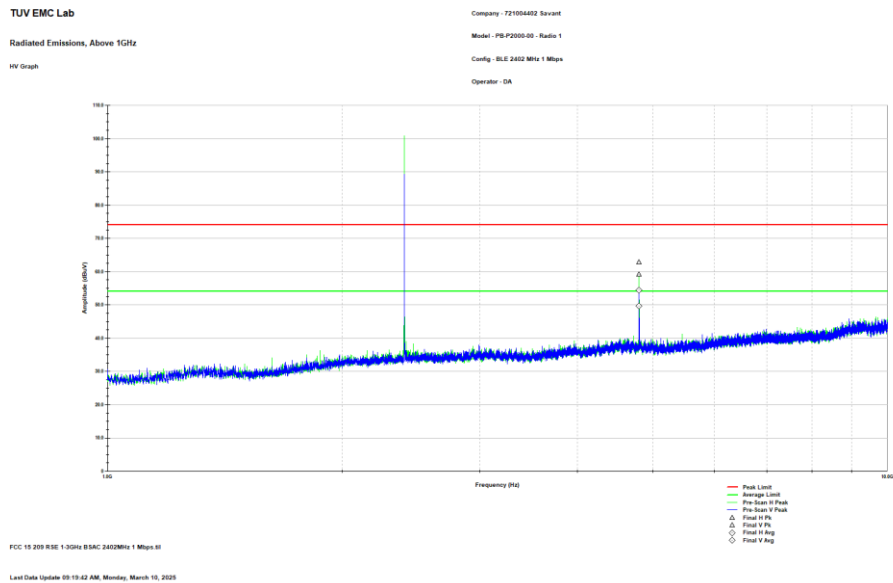


Figure 2.8.6-8: Reference plot for Radiated Spurious Emissions – 1 GHz – 10 GHz – LCH – 1 Mbps – Radio 1

Note: The emission above the limit line is the Fundamental Frequency.

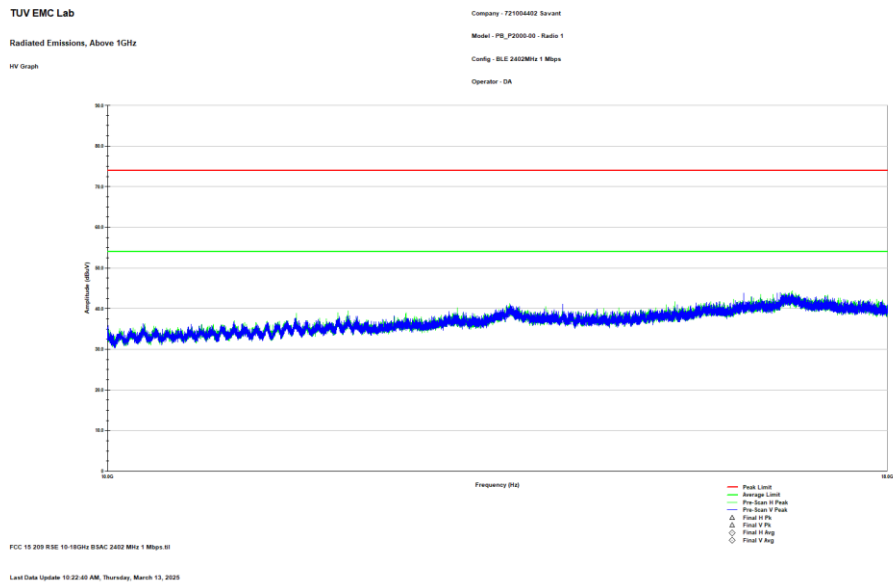


Figure 2.8.6-9: Reference plot for Radiated Spurious Emissions – 10 GHz – 18 GHz – LCH – 1 Mbps – Radio 1

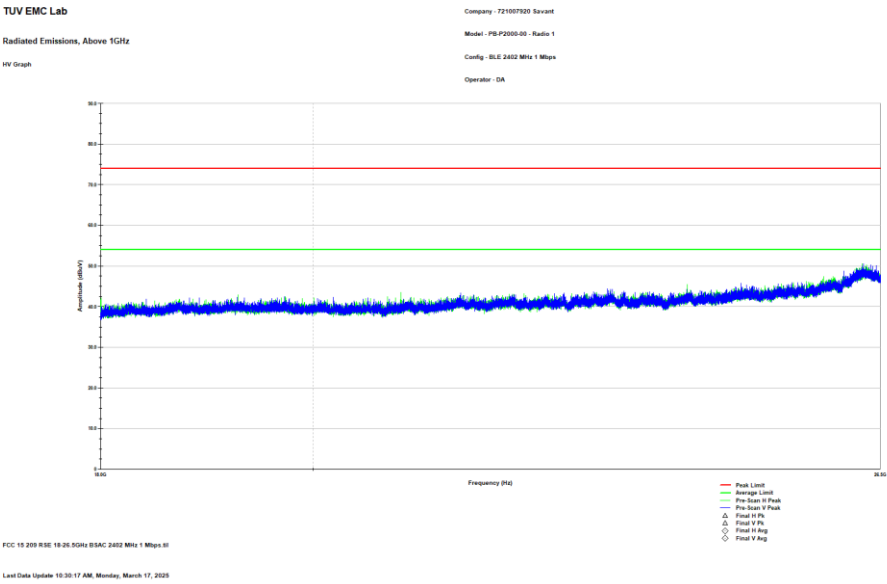


Figure 2.8.6-10: Reference plot for Radiated Spurious Emissions – 18 GHz – 26.5 GHz – LCH – 1 Mbps – Radio 1



2.8.7 Test Results – Radio 2 (BLE)

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

Table 2.8.7-1: Radiated Spurious Emissions Tabulated Data < 1 GHz - 1 Mbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg		pk	Qpk/Avg	pk	Qpk/Avg
345.906	----	18.547	H	----	46	----	27.45
363.78	----	26.464	H	----	46	----	19.54
499.988	----	27.161	H	----	46	----	18.84
600.071	----	14.481	H	----	46	----	31.52
624.998	----	35.995	H	----	46	----	10
874.99	----	37.095	H	----	46	----	8.9
364.745	----	34.651	V	----	46	----	11.35
499.988	----	30.801	V	----	46	----	15.2
599.995	----	19.082	V	----	46	----	26.92
624.998	----	39.08	V	----	46	----	6.92
874.99	----	33.372	V	----	46	----	12.63

Note: Emission present in 30 MHz – 1 GHz frequency range is not associated with radio frequency, and it belongs to unintentional emissions and it is same for all channels.

Table 2.8.7-2: Radiated Spurious Emissions Tabulated Data > 1 GHz – 1 Mbps

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBuV/m	dBuV/m	dBuV/m	Limit_Avg	dB	dBuV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 1 Mbps											
4804.30	60.15	52.11	74.00	54.00	-1.39	50.72	13.85	3.28	H	Pass	Pass
4804.55	55.35	44.23	74.00	54.00	-1.39	42.84	18.65	11.16	V	Pass	Pass
2440 MHz - 1 Mbps											
4879.45	58.65	49.55	74.00	54.00	-1.39	48.16	15.35	5.84	H	Pass	Pass
4883.95	50.19	34.18	74.00	54.00	-1.39	32.79	23.81	21.21	V	Pass	Pass
2480 MHz - 1 Mbps											
4959.30	56.96	46.03	74.00	54.00	-1.39	44.64	17.04	9.36	H	Pass	Pass
4959.30	54.14	43.11	74.00	54.00	-1.39	41.72	19.86	12.28	V	Pass	Pass



Table 2.8.7-3: Radiated Band-Edge Tabulated Data – 1 Mbps

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBμV/m	dBμV/m	dBμV/m	Limit_Avg	dB	dBμV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 1 Mbps											
2390.25	44.69	29.71	74.00	54.00	-1.39	28.32	29.31	25.68	H	Pass	Pass
2389.95	45.19	29.48	74.00	54.00	-1.39	28.10	28.81	25.90	V	Pass	Pass
2480 MHz - 1 Mbps											
2483.50	53.93	34.90	74.00	54.00	-1.39	33.51	20.07	20.49	H	Pass	Pass
2483.50	47.23	31.26	74.00	54.00	-1.39	29.87	26.77	24.13	V	Pass	Pass

**Table 2.8.7-4: Radiated Spurious Emissions Tabulated Data < 1 GHz - 2 Mbps**

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg		pk	Qpk/Avg	pk	Qpk/Avg
356.964	----	25.018	H	----	46	----	20.98
600.071	----	15.902	H	----	46	----	30.1
624.998	----	36.191	H	----	46	----	9.81
750.006	----	28.845	H	----	46	----	17.15
874.99	----	35.769	H	----	46	----	10.23
358.829	----	31.379	V	----	46	----	14.62
599.995	----	33.443	V	----	46	----	12.56
624.998	----	37.158	V	----	46	----	8.84
874.99	----	33.653	V	----	46	----	12.35

Note: Emission present in 30 MHz – 1 GHz frequency range is not associated with radio frequency and it belongs to unintentional emissions and it is same for all channels.

Table 2.8.7-5: Radiated Spurious Emissions Tabulated Data > 1 GHz – 2 Mbps

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBuV/m	dBuV/m	dBuV/m	Limit_Avg	dB	dBuV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 2 Mbps											
4804.75	59.58	46.86	74.00	54.00	-1.39	45.47	14.42	8.53	H	Pass	Pass
4802.95	54.85	41.45	74.00	54.00	-1.39	40.06	19.15	13.94	V	Pass	Pass
2440 MHz - 2 Mbps											
4880.80	56.93	43.40	74.00	54.00	-1.39	42.01	17.07	11.99	H	Pass	Pass
4834.25	49.00	34.12	74.00	54.00	-1.39	32.74	25.00	21.26	V	Pass	Pass
2480 MHz - 2 Mbps											
4960.90	55.81	42.25	74.00	54.00	-1.39	40.86	18.19	13.14	H	Pass	Pass
4959.10	54.84	41.38	74.00	54.00	-1.39	40.00	19.16	14.00	V	Pass	Pass

**Table 2.8.7-6: Radiated Band-Edge Tabulated Data – 2 Mbps**

Frequency	Peak Value	Avg Value	Peak Limit	Avg Limit	DCCF	Corrected Avg Value	Peak Margin	Avg Margin	Antenna polarity	Peak Limit Results	Avg Limit Results
MHz	dBμV/m	dBμV/m	dBμV/m	Limit_Avg	dB	dBμV/m	dB	dB	H/V	Pass/Fail	Pass/Fail
2402 MHz - 2 Mbps											
2390.00	48.06	31.92	74.00	54.00	-1.39	30.53	25.94	23.47	H	Pass	Pass
2390.05	44.98	29.46	74.00	54.00	-1.39	28.07	29.02	25.93	V	Pass	Pass
2480 MHz - 2 Mbps											
2483.50	58.52	39.47	74.00	54.00	-1.39	38.08	15.48	15.92	H	Pass	Pass
2483.50	49.16	32.41	74.00	54.00	-1.39	31.03	24.84	22.97	V	Pass	Pass

Measured Duty Cycle: 85%

Duty Cycle Correction Factor (DC): $20 \cdot \log(0.85) = -1.39$

Sample Calculation:

$$R_C = R_U + CF_T$$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak (LCH - Band edge)

Corrected Level: $46.108 + 1.952 = 48.06 \text{ dB}\mu\text{V/m}$

Margin: $74 \text{ dB}\mu\text{V/m} - 48.06 \text{ dB}\mu\text{V/m} = 25.94 \text{ dB}$

Example Calculation: Average

Corrected Level: $29.968 + 1.952 - 1.39 = 30.53 \text{ dB}\mu\text{V}$

Margin: $54 \text{ dB}\mu\text{V} - 30.53 \text{ dB}\mu\text{V} = 23.47 \text{ dB}$

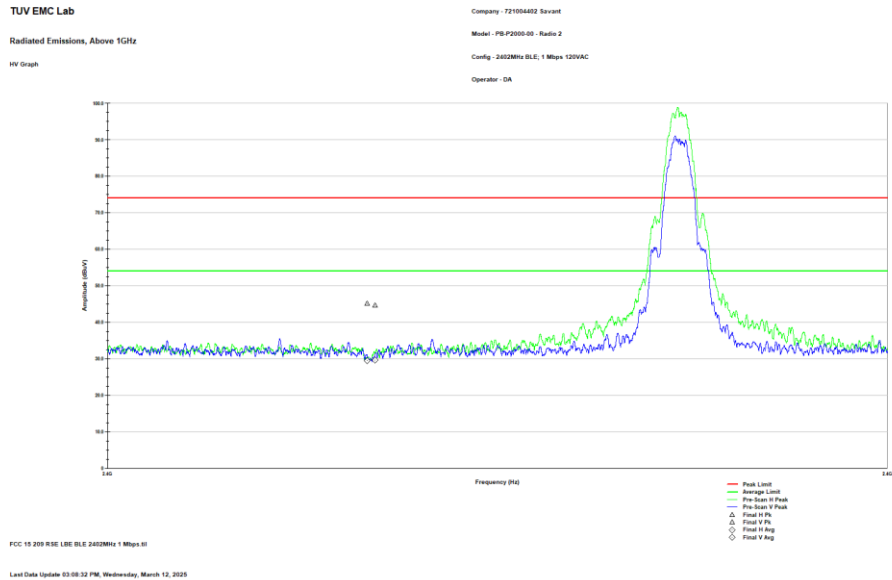


Figure 2.8.7-11: Reference Plot for Radiated Lower Band-edge – LCH – 1 Mbps – Radio 2

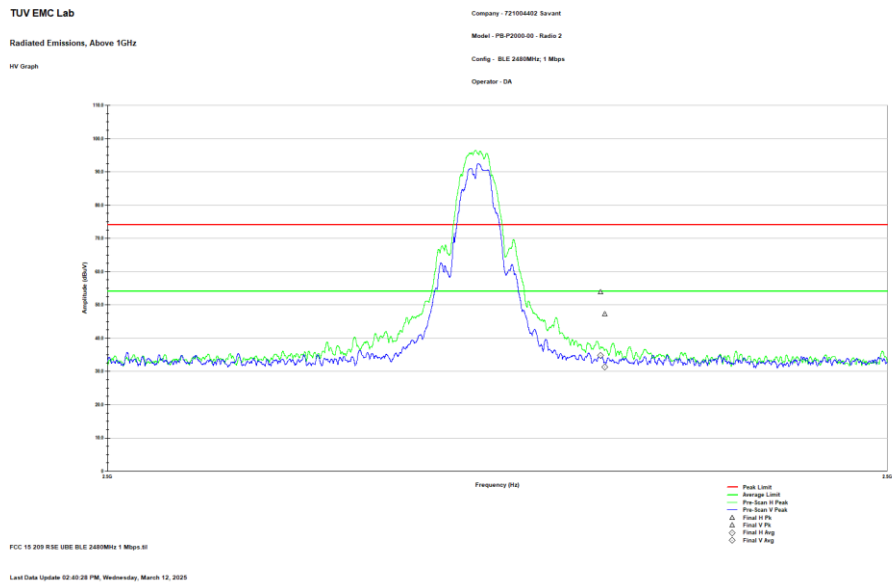


Figure 2.8.7-12: Reference Plot for Radiated Upper Band-edge – HCH – 1 Mbps – Radio 2

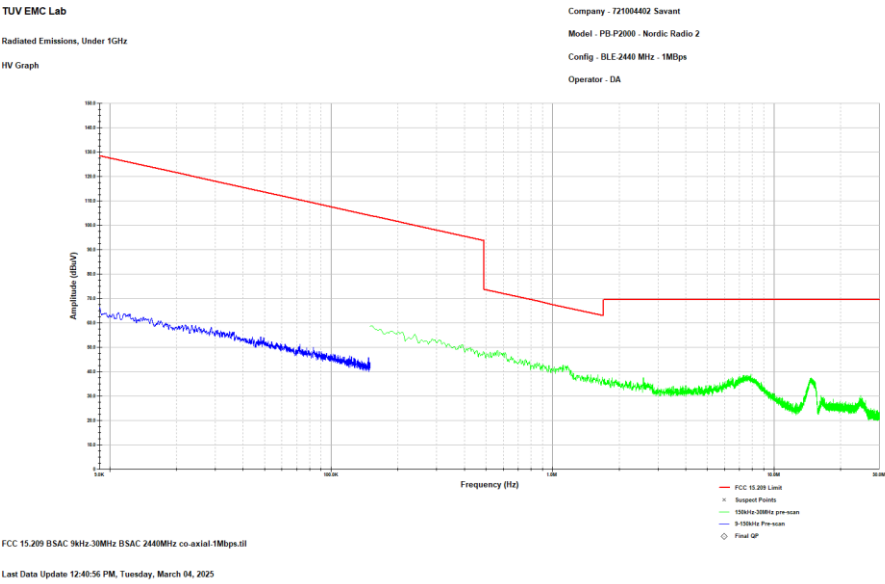


Figure 2.8.7-13: Reference plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Co-Axial - MCH - 1 Mbps – Radio 2

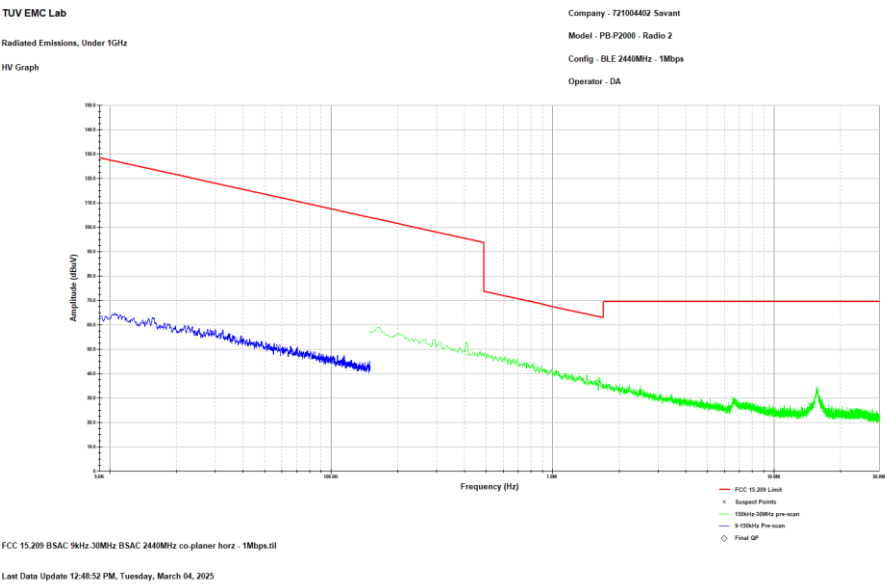


Figure 2.8.7-14: Reference plot for Radiated Spurious Emissions– 9 kHz – 30 MHz – Co-Planar Horz. - MCH - 1 Mbps – Radio 2

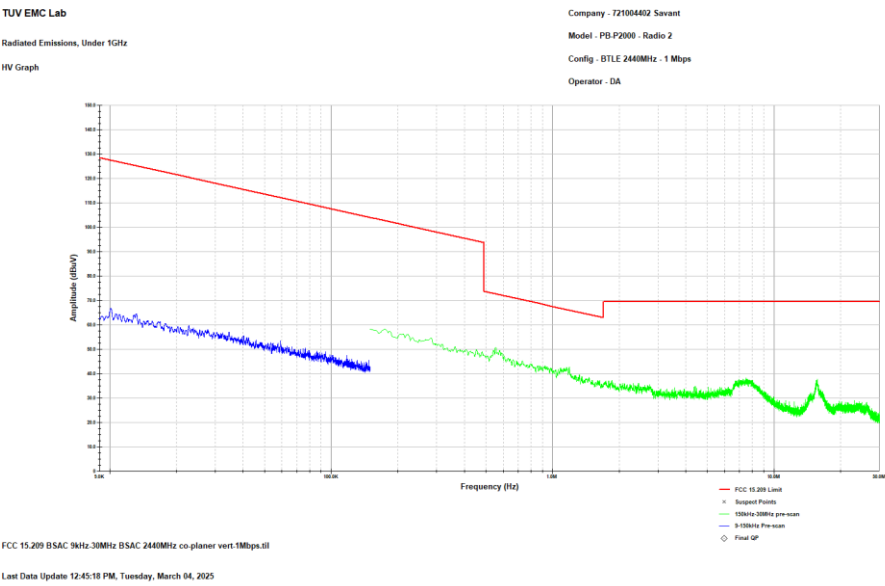


Figure 2.8.7-15: Reference plot for Radiated Spurious Emissions– 9 kHz – 30 MHz – Co-Planar Vert. - MCH - 1 Mbps – Radio 2

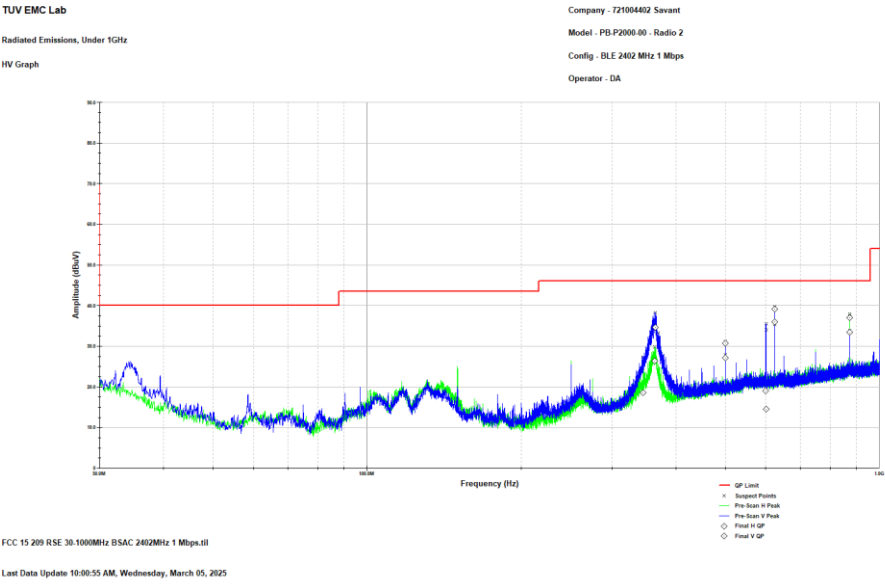


Figure 2.8.7-16: Reference plot for Radiated Spurious Emissions – 30 MHz – 1 GHz – LCH – 1 Mbps – Radio 2

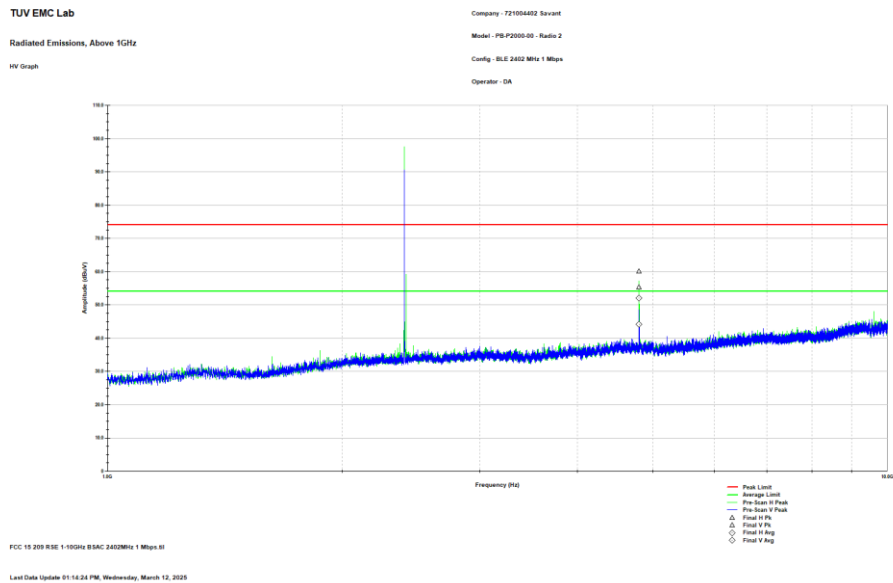


Figure 2.8.7-17: Reference plot for Radiated Spurious Emissions – 1 GHz – 10 GHz – LCH – 1 Mbps – Radio 2
Note: The emission above the limit line is the Fundamental Frequency.

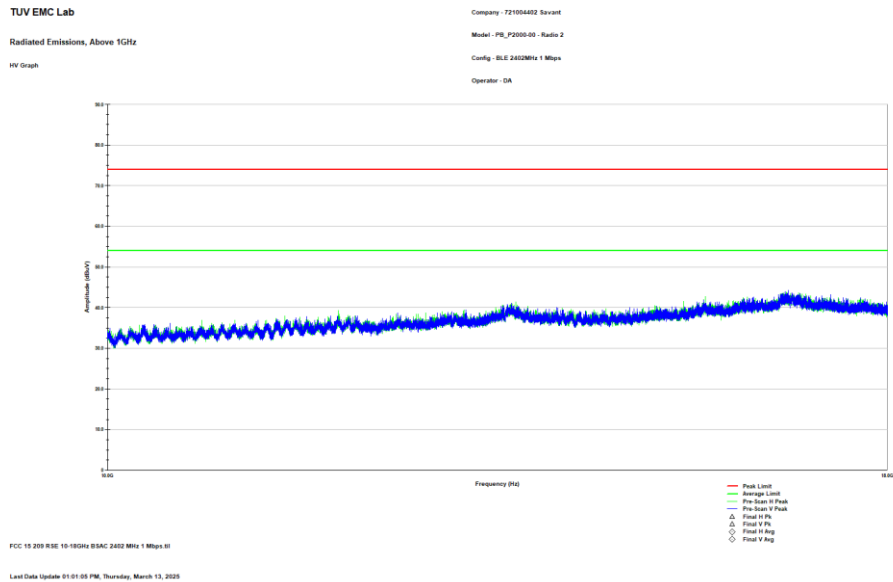


Figure 2.8.7-18: Reference plot for Radiated Spurious Emissions – 10 GHz – 18 GHz – LCH – 1 Mbps – Radio 2

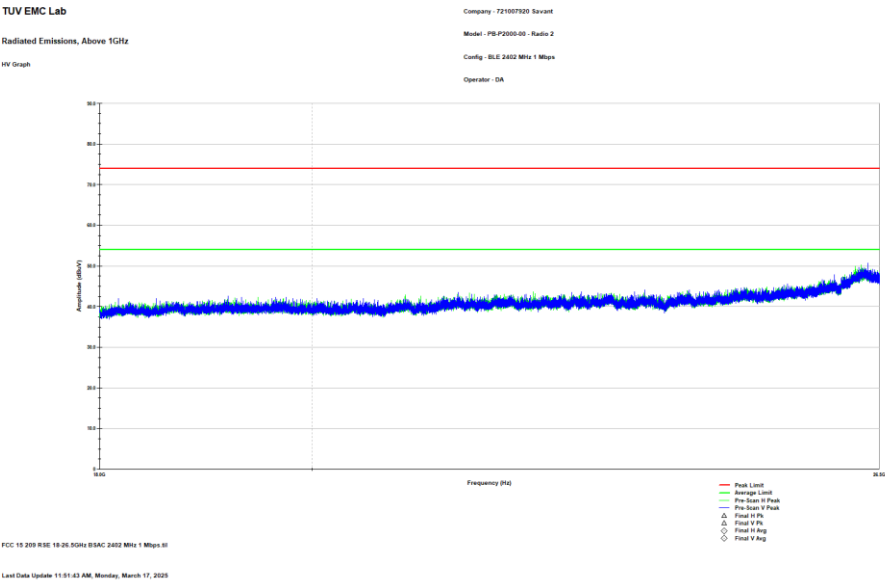


Figure 2.8.7-19: Reference plot for Radiated Spurious Emissions – 18 GHz – 26.5 GHz – LCH – 1 Mbps – Radio 2



2.9 Test Equipment Used

Table 2.9-1 –Equipment List

Asset ID	Manufacturer	Model	Equipment Type	Serial Number	Last Calibration Date	Calibration Due Date
628	EMCO	6502	Active Loop Antenna 10kHz-30MHz	9407-2877	06/20/2023	06/20/2025
853	Teseq	CBL6112D	BiLog Antenna	51616	7/26/2023	7/26/2025
884	ETS Lindgren (EMCO)	3117	DOUBLE-RIDGED GUIDE ANTENNA	240106	5/16/2023	5/16/2025
AEMC0889	Com Power	PAM 103	Pre-amplifier	18020215	09/30/2024	09/30/2025
338	Hewlett Packard	8449B	High Frequency Pre-Amp	3008A01111	06/18/2024	06/18/2026
882	Rohde & Schwarz	ESW44	ESW44 EMI TEST RECEIVER	101961	6/18/2024	6/18/2025
22	Teledyne Storm Microwave	90-195-456	BSAC Cable	N/A	07/15/2024	07/15/2025
20	Teledyne Storm Microwave	R-90-195-036	BSAC Cable	N/A	07/15/2024	07/15/2025
21	Teledyne Storm Microwave	R-90-195-072	BSAC Cable	N/A	07/15/2024	07/15/2025
3010	Rohde & Schwarz	ENV216	Two-Line V-Network	3010	06/18/2024	06/18/2025
871	ACS	n/a	Conducted EMI Cable	871	3/22/2025	3/22/2026
872	HP	E7402A	EMI Receiver	US40240258	6/20/2024	6/20/2025
334	Rohde & Schwarz	3160-09	HF 18 -26.5 GHz antenna	49404	06/23/2024	06/23/2026
335	Suhner	SF-102A	Cable (40GHZ)	882/2A	06/18/2024	06/18/2025
345	Suhner Sucoflex	102A	Cable 42(GHZ)	1077/2A	06/18/2024	06/18/2025
827	Rohde & Schwarz	RF Cable set	TS8997 Rack cable set	N/A	01/13/2025	01/13/2026
622	Rohde & Schwarz	FSV40 (v3.40)	FSV Signal Analyzer 10Hz to 40GHz	101338	04/02/2025	04/02/2026
144	Omega	RH411	Temp / Humidity Meter	H0103373	02/06/2025	02/06/2027
N/A	Rohde & Schwarz	WMS32	Test Software Version 11.30.00	N/A	N/A	N/A
AEMC3144	ETS Lindgren	TILE!	Test Software Version 7.7.2.4	00232063	N/A	N/A

N/A – Not Applicable



3 **Diagram of Test Set-ups**

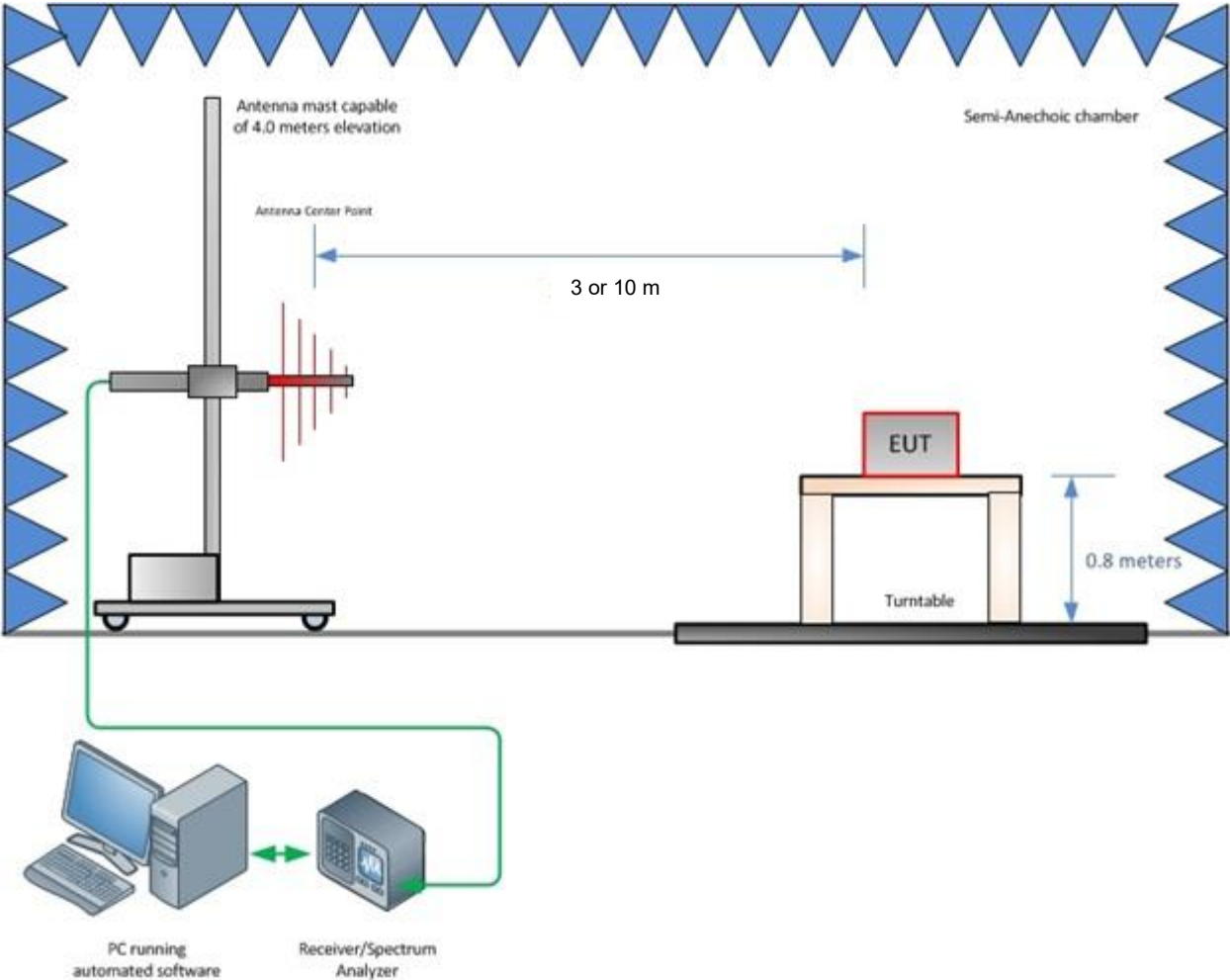


Figure 3-1 – Radiated Emissions Test Setup up to 1 GHz

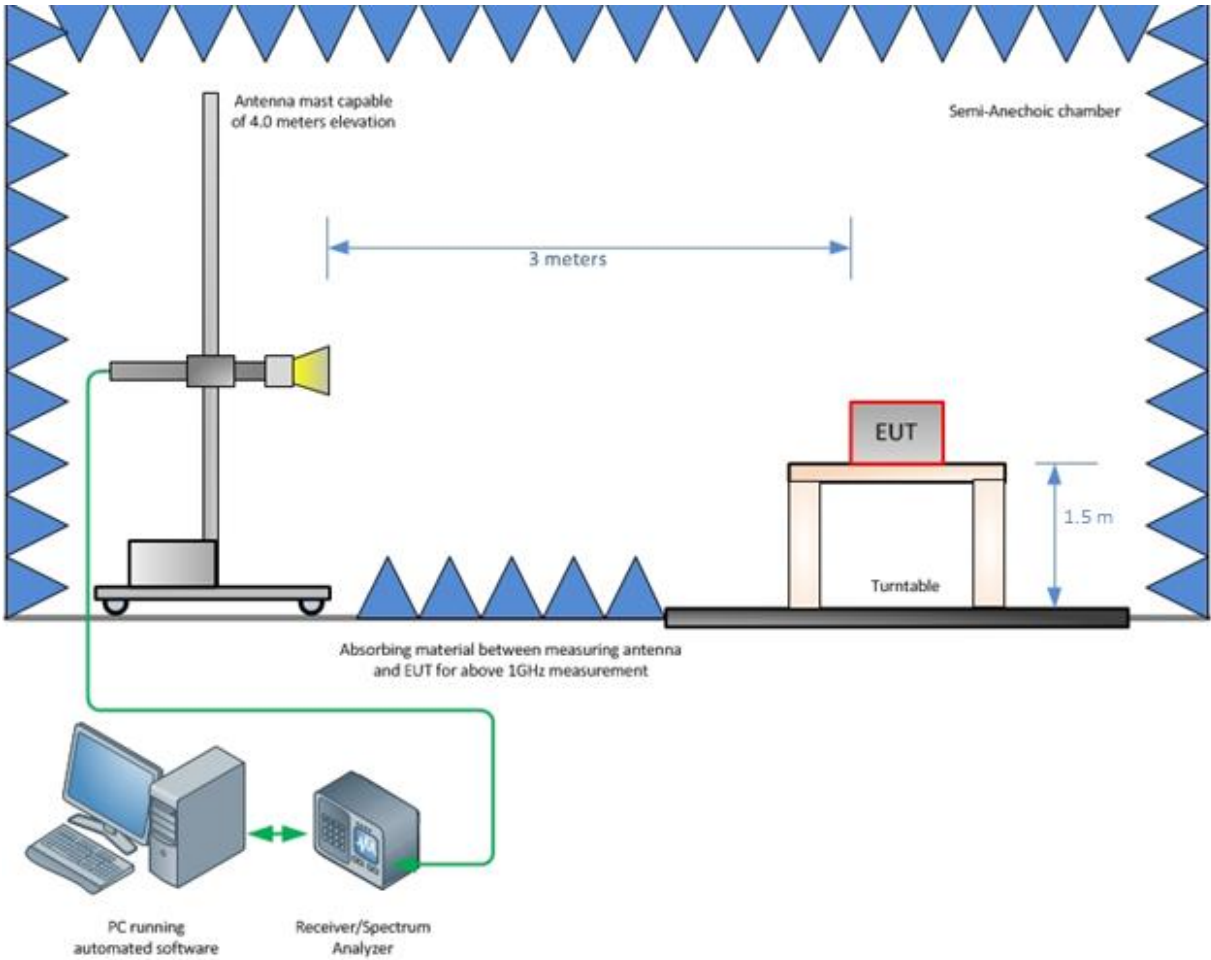


Figure 3-2 – Radiated Emissions Test Setup above 1 GHz

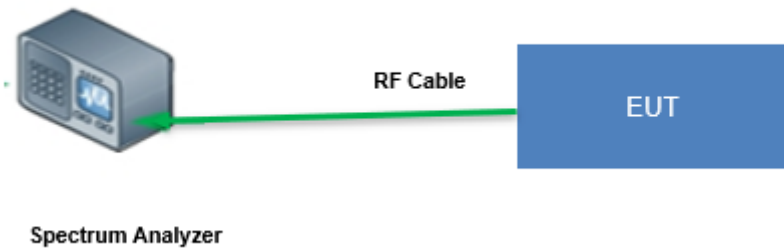


Figure 3-3 – Conducted Test Setup: Antenna Port measurement

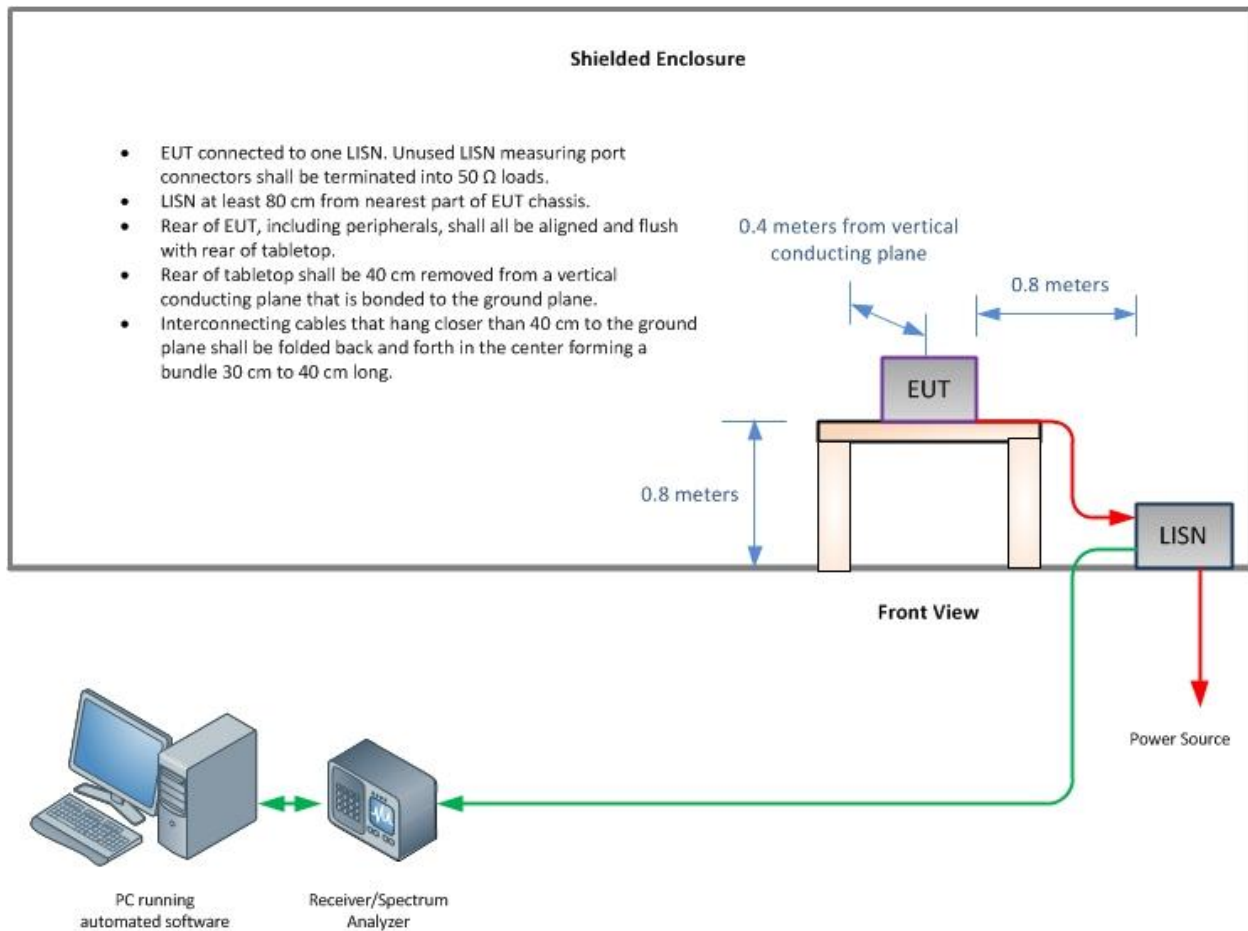


Figure 3-4 – Conducted Emissions Test Setup



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STATEMENT OF MEASUREMENT UNCERTAINTY – Emissions

The expanded laboratory measurement uncertainty figures (U_{Lab}) provided below correspond to an expansion factor (coverage factor) $k = 1.96$ which provide confidence levels of 95%.

Table 4-1: Estimation of Measurement Uncertainty

Parameter	U_{lab}
Occupied Channel Bandwidth	$\pm 0.009 \%$
RF Conducted Output Power	$\pm 0.349 \text{ dB}$
Power Spectral Density	$\pm 0.372 \text{ dB}$
Antenna Port Conducted Emissions	$\pm 1.264 \text{ dB}$
Radiated Emissions $\leq 1 \text{ GHz}$	$\pm 5.72 \text{ dB}$
Radiated Emissions $> 1 \text{ GHz}$	$\pm 5.02 \text{ dB}$
Temperature	$\pm 0.860 \text{ }^{\circ}\text{C}$
Radio Frequency	$\pm 2.832 \times 10^{-8}$
AC Power Line Conducted Emissions 9 – 150 kHz	$\pm 3.69 \text{ dB}$
AC Power Line Conducted Emissions 150 kHz – 30 MHz	$\pm 3.28 \text{ dB}$

TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated to meet test method standard requirements and/or manufacturer's specifications