

ELECTROMAGNETIC COMPATIBILITY

Class II Permissive Change

TEST REPORT



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Laboratory Accreditations (per ISO/IEC 17025:2017)



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Manufacturer: Cooper Electrical Canada
Address: 74-1833 Coast Meridian Rd.
Port Coquitlam BC, V3E 6G5 Canada

Equipment Tested: TS110A-2400 10 Button Remote Control 2400MHz Alkaline Battery
Model Number(s): TS110-24A

C2PC - Hardware changes for Alkaline battery; refer to other test reports for transmitter characteristics
This product contains a 2.45GHz Band Radio Module in the EUT.
FCC ID: IA9TD11024 IC: 1338B-TD11024



REVISION HISTORY

Date	Report Number	Details	Author's Initials
July 12, 2025	E10788-2502 Cooper TS110A-2400 FCC-ISED Rev0.0 :	Initial Draft release	DJ
July 22, 2025	E10788-2502 Cooper TS110A-2400 FCC-ISED Rev1.0 :	Initial Release	DJ
July 31, 2025	E10788-2502 Cooper TS110A-2400 FCC-ISED Rev2.0 :	Revised Release Fundamental and Dwell Time measurements	DJ
All previous versions of this report have been superseded by the latest dated revision as listed in the above table. Please dispose of all previous electronic and paper printed revisions accordingly.			

REPORT AUTHORIZATION

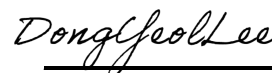
The data documented in this report is for the test equipment provided by the manufacturer. The tests were conducted on the sample equipment as requested by the manufacturer for the purpose of demonstrating compliance with the standards outlined in [Section II](#) of this report as agreed upon by the Manufacturer under the quote 25BM01293R2.

The Manufacturer is responsible for the tested product configurations, continued product compliance, and for the appropriate auditing of subsequent products as required. This report may comprise a partial list of tests that are required for FCC, ISED, and CE. Declaration of Conformity can only be produced by the manufacturer. This is to certify that the following report is true and correct to the best of our knowledge.

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QAI EMC ACCREDITATION

QAI EMC is your one-stop regulatory compliance partner for electromagnetic compatibility (EMC) and electromagnetic interference (EMI). Products are tested to the latest and applicable EMC/EMI requirements for domestic and international markets. QAI EMC goes above and beyond being a testing facility—we are your regulatory compliance partner. QAI EMC has the capability to perform RF Emissions and Immunity for all types of electronics manufacturing including Industrial, Scientific, Medical, Information Technology, Telecom, Wireless, Automotive, Marine and Avionics.

EMC Laboratory Location	FCC Designation (3m SAC)	IC Registration (3m SAC)	A2LA Certificate
Burnaby, BC, Canada	CA9543	9543A	3657.02

EMC Facility Burnaby BC, Canada



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TABLE OF CONTENTS

REVISION HISTORY	2
REPORT AUTHORIZATION	2
QAI FACILITIES	3
QAI EMC ACCREDITATION	3
TABLE OF CONTENTS	4
SECTION I: GENERAL INFORMATION	5
1.1 Product Description	5
1.2 Environmental Conditions	6
1.3 Measurement Uncertainty	6
1.4 Sample Calculations of Emissions Data	7
1.5 Test Equipment List.....	8
SECTION II: EXECUTIVE SUMMARY OF STANDARDS AND LIMITS	9
2.1 Applicable Emission Standards	9
2.2 Applicable Unintentional Radiated Emission Limits.....	10
2.3 Applicable Intentional Radiated Emission Limits	10
SECTION III: DATA & TEST RESULTS	13
3.1 Radiated Emissions.....	13
3.2 Dwell Time & Time of Occupancy.....	17
Appendix A: TEST SETUP PHOTOS	19
Appendix B: ABBREVIATIONS	21

SECTION I: GENERAL INFORMATION

1.1 Product Description

The information provided in this section is for the Equipment Under Test (EUT) and the corresponding Auxiliary Equipment needed to perform the tests as a complete system.

Equipment Under Test (EUT) Photos



EUT Information

EUT System	Description	Manufacturer	Model No.	Serial No.	Software Firmware Version
1	10 Button Remote Control 2400MHz Alkaline Battery	Cooper Electrical Canada	TS110-24A	ENG001	V1.4(49217)

Note: Highest frequency generated or tuned upon within the EUT is 2483 MHz.

EUT Test Mode/Configuration/Operation During Testing

Test Mode	EUT Test Configuration/Operation
1	Custom Firmware transmission once every second to simulate a button press; EUT Orientation - Horizontal flat on the table top was identified as representing the worst case orientation for all radiated emissions

Ancillary Equipment Information

System	Description	Manufacturer	Model No.	Serial No.
None required--	--	--	--	--

EUT Cabling Configuration

Port name	Connection Type / Connectors	Shielded	Ferrites	Length
None required--	--	--	--	--

1.2 Environmental Conditions

The equipment under test was operated and tested under the following environmental conditions:

Parameter	Conditions
Location	Indoors
Temperature	20.5°C
Relative Humidity	42 %
Atmospheric Pressure	110.2 kPa

1.3 Measurement Uncertainty

Parameter	Uncertainty
Radiated Emissions, 10kHz-1GHz	± 2.40 dB
Radiated Emissions, 1GHz-40GHz	± 2.48 dB
Conducted Emissions, 10kHz to 40GHz	± 2.82 dB
Radio Frequency	±1.5 x 10 ⁻⁵ MHz
Total RF Power Conducted	±1.36 dB
Spurious Emissions, Conducted	±1.36 dB
RF Power Density, Conducted	±1.36 dB
Temperature	±1°C
Humidity	±5 %
DC and low frequency voltages	±3 %

1.4 Sample Calculations of Emissions Data

Radiated and conducted emissions were performed using EMC32 software developed by Rohde & Schwarz. Transducer factors like Antenna factors, Cable Losses and Amplifier gains were stored in the test templates which are used to perform the emissions measurements. After test is finished, data is generated from the EMC32 consisting of product details, emission plots and final data tables as shown below.

Frequency (MHz)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.0064	25.67	40.00	14.33	1000	120	315.0	H	161	4.0

Quasi-Peak reading shown in the table above is already corrected by the software using correction factor shown in column “Corr.” The correction factor listed under “Corr.” table calculated as:

$$\text{Corr. (dB)} = \text{Antenna factor} + \text{Cable loss}$$

Or

$$\text{Corr. (dB)} = \text{Antenna factor} + \text{Cable Loss} - \text{Amp gain (if pre-amplifier was used)}$$

The final Quasi peak reading shown in the data is calculated by the software using following equation:

$$\text{Corrected Quasi-Peak (dBμV/m)} = \text{Raw Quasi-Peak Reading} + \text{Antenna factor} + \text{Cable loss}$$

To obtain the final Quasi-Peak or Average reading during power line conducted emissions, transducer factors are included in the final measurement as shown below.

Frequency (MHz)	Quasi Peak (dBμV)	Average (dBμV)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.2410	---	23.71	52.06	28.35	1000.0	9.0	L1	GND	10.0
0.2411	38.98	---	62.06	23.08	1000.0	9.0	L1	GND	10.0

Quasi Peak or Average reading shown in above table is already corrected by the software using the correction factor shown in column “Corr.” The correction factor listed under “Corr.” table calculated as:

$$\text{Corr. (dB)} = \text{Antenna factor} + \text{Cable loss}$$

The final Quasi-peak or Average reading shown in the data is calculated by the software using following equation:

$$\text{Corr. Quasi-Peak/Average Reading (dBμV)} = \text{Raw Quasi-Peak/Average Reading} + \text{Antenna factor} + \text{Cable loss}$$

The allowable margin from the limits, as per the standards, were calculated for both radiated and conducted emissions:

$$\text{Margin (dB)} = \text{Limit} - \text{Quasi-Peak or Average reading}$$

1.5 Test Equipment List

The tables below contain all the equipment used by 'QAI Laboratories' in conducting all tests on the Equipment Under Test (EUT) as per Section I.

Emissions Test Equipment

	Manufacturer	Model	Description	Serial No.	S/W Version	Calibration Due Date
1	Com-Power Corporation	LI-220C	Line Impedance Stabilization Network (9kHz-30MHz)	20070025	N/A	2026-Jan-23
2	Sunol Sciences	SC 104V	Turntable Controller	042506-1	N/A	Indication Only
3	Sunol Sciences	SM46C	Turntable	071705-2	N/A	Indication Only
4	Maturo GmbH	BAM 4.0-P	Boresight Antenna Mast	365	3382.01	Indication Only
5	ETS Lindgren	S201	7-meter Semi-Anechoic Chamber	1030	N/A	Indication Only
6	Hewlett Packard	8447F	Amplifier (0.1-1300MHz)	1726A00566	N/A	Indication Only
7	Hewlett Packard	8449B	Preamplifier (1-26.5 GHz)	3008A00982	N/A	Indication Only
8	Microwave Lab	USMC10180	Low Noise Amplifier (0.1-18GHz)	001303JR0802 A2729	N/A	Indication Only
9	Keysight Technologies	N9038B	MXE EMI Receiver, Multi-touch	MY60180014	N/A	2026-Aug-22
10	ETS-Lindgren	3117	Horn, Double-Ridge Guide Ant, 1.0 - 18 GHz	75944	N/A	2026-Jan-25
11	Sunol Sciences	JB3	Biconilog Antenna (30MHz – 3GHz)	A120106	N/A	2026-Mar-28

Note: Equipment listed above have 3 years calibration interval.

Measurement Software List

	Manufacturer	Model	Version	Description
1	Rohde & Schwarz	EMC 32	10.35.10	Emissions Test Software

SECTION II: EXECUTIVE SUMMARY OF STANDARDS AND LIMITS

2.1 Applicable Emission Standards

ISED, FCC - Emissions

Test or Measurement	Applicable Standards and References	Description	Result
Un-intentional Radiated Emissions	ICES-003 Issue 7 ICES-Gen Issue 2 CFR Title 47 FCC Part 15	The radiated emissions are measured in the 30-1000MHz range.	Comply
Transmitter Radiated Emissions Verification of Transmitter power and spurious emissions	RSS-247 Issue 3 RSS-Gen Issue 5 CFR Title 47 FCC Part 15/C 15.247 ANSI c63.10-2020 KDB 996369 D01 Module Certification Guide v04r02	The radiated emissions are measured in the 30-25000MHz range.	Comply

Method of Measurement:

For the radiated emissions, the Equipment under test (EUT) is positioned in the center of the turntable in the SAC. The Equipment under test (EUT) is then measured for all the radiated emissions using the spectrum analyzer and receiver using the appropriate antennas, amplifiers, attenuators, and filters.

The required Quasi-Peak CISPR bandwidth shall be 120 kHz for the range 30 – 1000 MHz and 1 MHz for the frequency above 1GHz. The ANSI C63.4 requirement for the placement of RF Absorber on the turntable Ground Plane shall be satisfied.

Emissions in both horizontal and vertical polarizations were measured while rotating the Equipment Under Test (EUT) on the turntable to maximize signal strength and the limit is adjusted as per the equation below. The result is added or subtracted to the required emission level to ensure compliance at the new distance.

$$20 \log \left(\frac{D1}{D2} \right); \quad \text{Where } D1 = \text{Current Distance} \\ D2 = \text{Required Distance}$$

2.2 Applicable Unintentional Radiated Emission Limits

CFR Title 47 FCC Part 15- Class A

Frequency (MHz)	Field Strength – Class A			Result
	uV/m @ 10-m	(dBµV/m @ 3m SAC)	(dBµV/m @ 10m OATS)	
30 – 88	90	49.6	39.1	Comply (Upper frequency: 25GHz)
88 – 216	150	54.0	43.5	
216 – 960	210	56.9	46.4	
Above 960	300	60.0	49.5	
Note 1: The lower limit shall apply at the transition frequency.				
Note 2: Additional provisions may be required for cases where interference occurs.				

ICES-003 Issue 7 – Class A

Frequency (MHz)	Field Strength – Class A		Result
	(dBµV/m @ 3m SAC)	(dBµV/m @ 10m OATS)	
30 – 88	50.0	40.0	Comply
88 – 216	54.0	43.5	
216 – 230	56.9	46.4	
230 – 960	57.0	47.0	
960 – 1000	60.0	49.5	
Frequency (GHz)	Maximum Field Strength (dBµV/m)		Result
	Peak	Average	
1-40	60.0	80.0	Comply (Upper frequency: 40GHz)
Note 1: The lower limit shall apply at the transition frequency.			
Note 2: Additional provisions may be required for cases where interference occurs.			

2.3 Applicable Intentional Radiated Emission Limits

CFR Title 47 FCC Part 15.247 and RSS-247 Transmitter limits

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Measurements were performed using Radiated method at 3 meter distance and the result converted to Watts using the formula:

Unwanted emissions falling into restricted bands of shall comply with the limits specified below

Frequency (MHz)	Field Strength	
	uV/m @ 3-m	Calculated dBµV/m at 3m
30 – 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

FCC PART 15.205-RESTRICTED BANDS OF OPERATION

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.

RESTRICTED FREQUENCY BANDS (RSS-GEN ISSUE 4)

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	Certain frequency bands listed in table 2 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

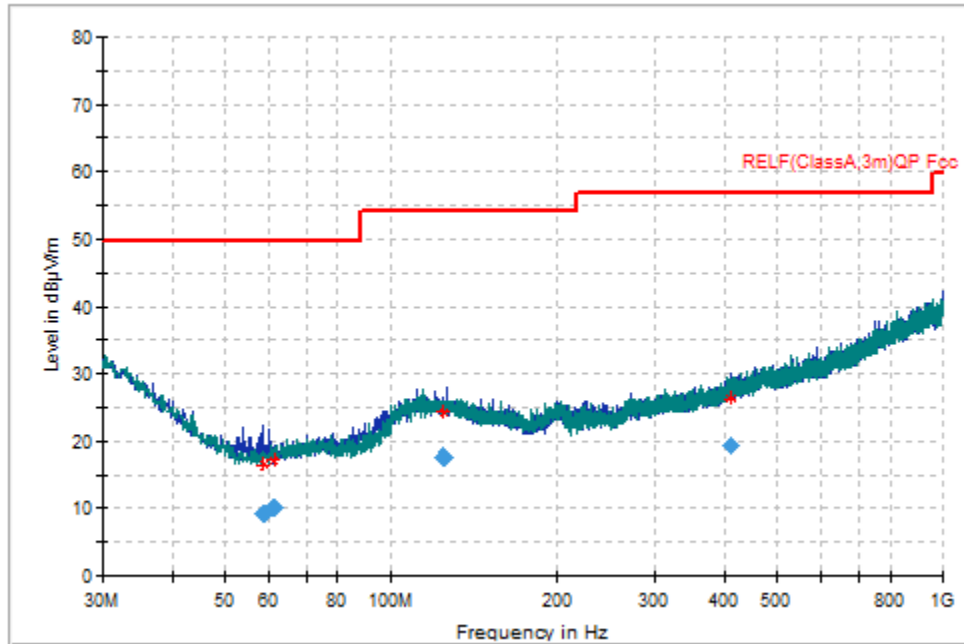
SECTION III: DATA & TEST RESULTS

3.1 Radiated Emissions

- **Date Performed:**
June 12, 2025
- **Test Standard:**
As per [Section 2.1](#) of this report
- **Required Limit:**
As per [Section 2.2](#) of this report
- **Test Method:**
As per [Section 2.1](#) of this report
- **Modifications:**
No modification was required.
- **Result:**
The EUT **complies** with the standard.

Measurement Data and Plots:

- Test Standard: FCC 15.109, 15.247, ICES-003, RSS-247, RSS-Gen
- Class: A
- EUT input voltage: 3 Vdc user replaceable alkaline batteries
- Frequency Range: 30MHz to 18GHz
- Test mode: 1 - transmission mode

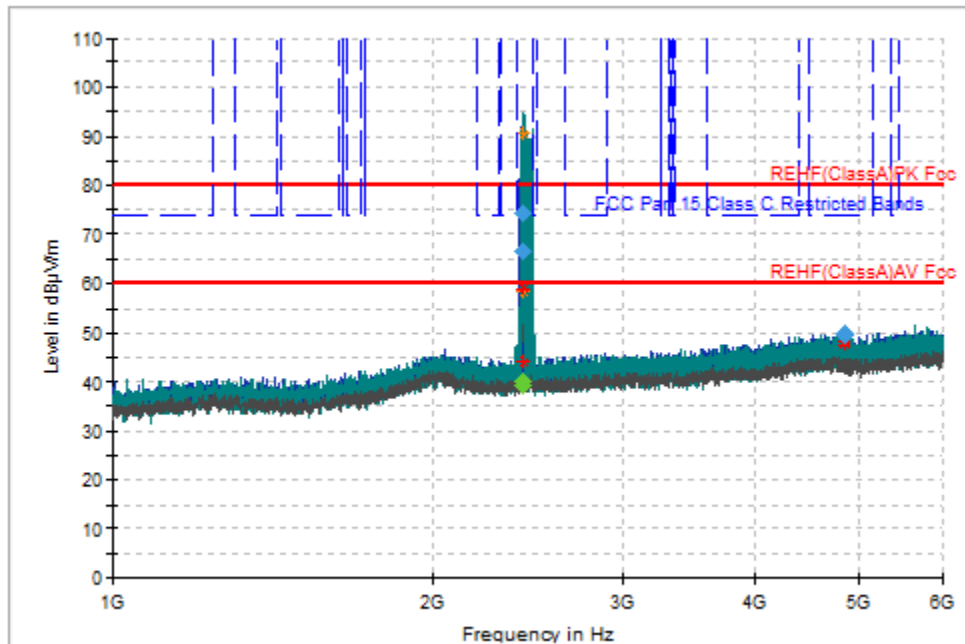


Plot 1: Radiated Emissions at 3m SAC – FCC Part 15/B 15.109; ICES-003, mode #1
(FCC Part 15 Class A limit line and plot is reference only. All final measurements were performed manually.)

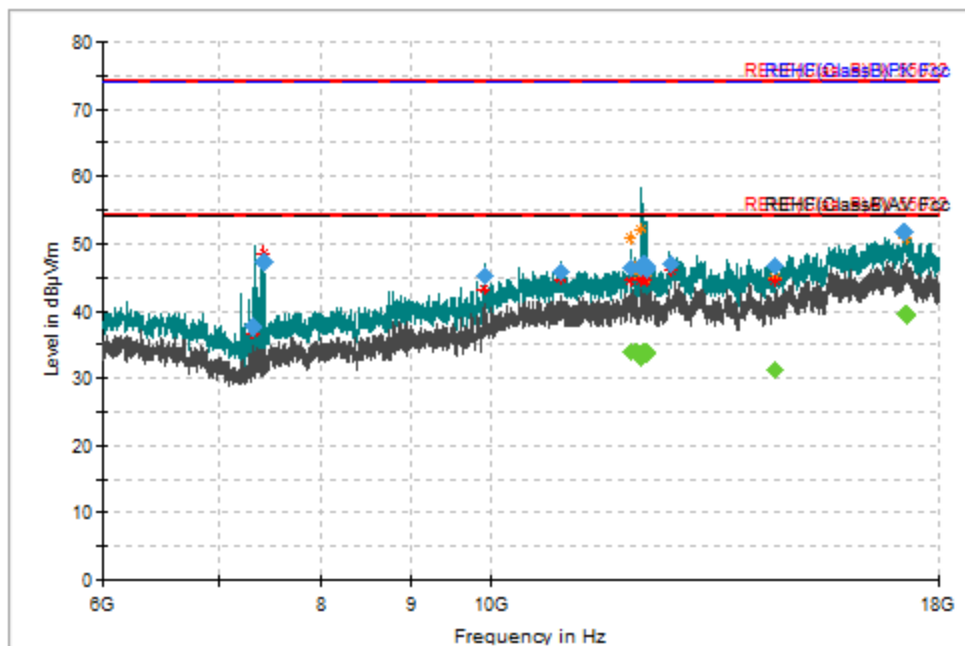
Table 1: Quasi Peak Data of Radiated Emissions at 3m SAC - FCC Part 15/B 15.109; ICES-003, mode #1

Frequency (MHz)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
58.9091	9.38	49.50	40.12	1000.0	120.0	306.0	V	110	-9.9
61.4476	10.20	49.50	39.30	1000.0	120.0	306.0	V	276	-9.6
124.3502	17.56	53.90	36.34	1000.0	120.0	100.0	H	184	-2.8
411.9444	19.41	56.90	37.49	1000.0	120.0	252.0	H	245	-0.9

All other emissions were greater than 20dB below the limit line.



Plot 2: Radiated Emissions at 3m SAC – FCC Part 15/B 15.109; ICES-003, mode #1
(FCC Part 15 Class A limit line and plot is reference only. All final measurements were performed manually.)



Plot 3: Radiated Emissions at 3m SAC – FCC Part 15/B 15.109; ICES-003, mode #1
(FCC Part 15 Class A limit line and plot is reference only. All final measurements were performed manually.)

Table 2: Peak Power Radiated Emissions – at 3meters, 2.45GHz Band

Frequency (MHz)	Corrected Max. Peak (dBµV/m)	Conversion at 3m (dBm EIRP)	Limit 1Watt conversion (dBm EIRP)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2404.11	103.84	8.54	30.00	21.46	103.0	H	28	37.6
2449.71	103.80	8.50	30.00	21.50	103.0	H	28	37.6
2478.52	104.30	9.00	30.00	21.00	103.0	H	28	37.7

- Prescans in 3 orthogonal orientations identified that the EUT in Horizontal Orientation and measurement done with Antenna in Horizontal Orientation was the worst case for all frequencies.
- Conversion of Radiated Emission measured at 3meters to dBm at antenna is:
 - Linear units: ANSI 63.10 Formula G.2 ($EIRP_{(w)} = (E_{(V/m)} \times d_{(m)})^2 / 30$)
 - Logarithmic units ANSI 63.10 (11.12.2.2 (e)) $EIRP_{(dBm)} = -104.8 + E0_{(dBmV/m)} + 20 \log D0_{(m)}$,

Table 3: Radiated Spurious Emissions, 1GHz – 18GHz

Frequency (MHz)	Max. Peak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4808.2280	49.58	---	80.00	30.42	103.0	H	28	-7.6
4808.2280	---	33.84	60.00	26.16	103.0	H	28	-7.6
4899.4200	55.16	---	80.00	24.84	103.0	H	28	-8.0
4899.4200	---	37.02	60.00	22.98	103.0	H	28	-8.0
4957.0400	50.65	---	80.00	29.35	103.0	H	28	-8.2
4957.0400	---	34.18	60.00	25.82	103.0	H	28	-8.2
7212.3300	50.23	---	80.00	29.77	103.0	H	28	-4.9
7212.3300	---	32.18	60.00	27.82	103.0	H	28	-4.9
7349.1300	49.37	---	80.00	30.63	103.0	H	28	-4.5
7349.1300	---	31.35	60.00	28.65	103.0	H	28	-4.5
7435.5600	45.85	---	80.00	34.15	103.0	H	28	-4.3
7435.5600	---	29.17	60.00	30.83	103.0	H	28	-4.3

- Prescans in 3 orthogonal orientations identified that the EUT in Horizontal Orientation was the worst case for all frequencies.
- All other emissions were greater than 20dB below the limit line.

3.2 Dwell Time & Time of Occupancy

Date Performed: June 12, 2025

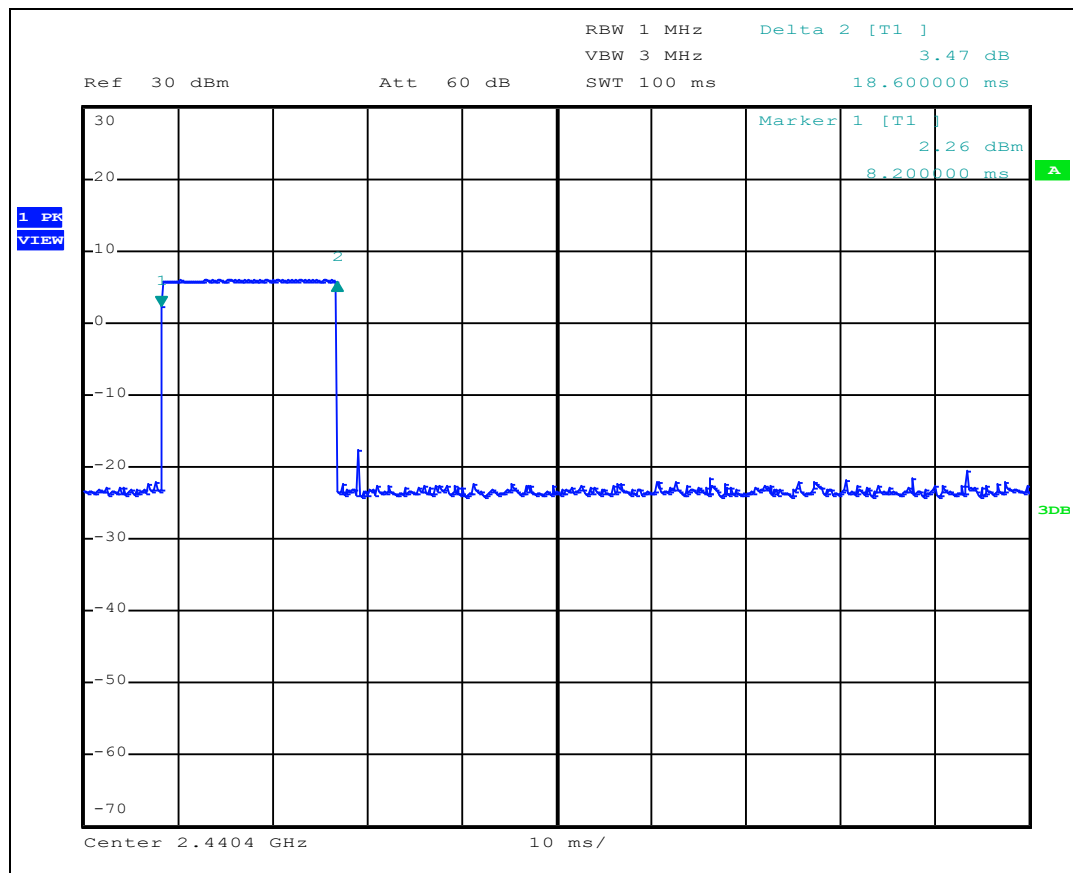
Test Requirement: Frequency hopping systems in the 2400–2483.5 MHz band use 15 channels, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels (15) employed (<6ms).

Test Method: ANSI C63.10:2013

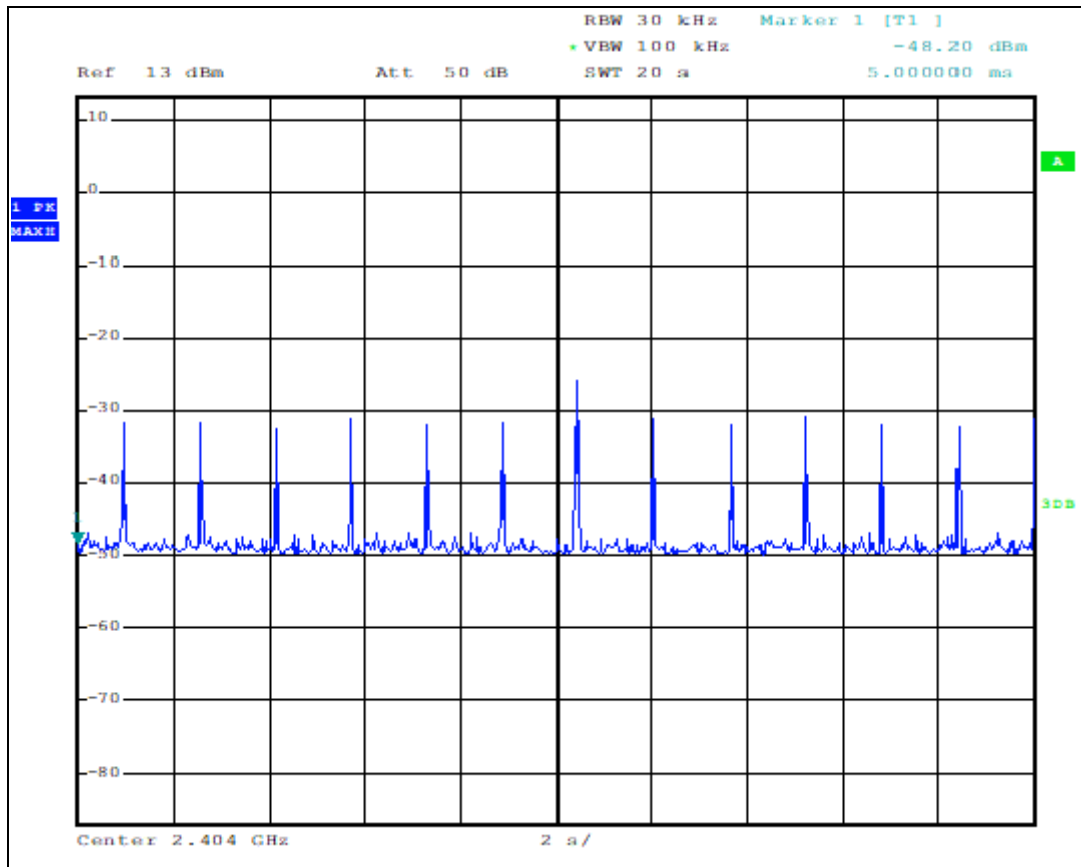
Modifications: No modification was required to comply for this test

Result: The EUT **Comply** with the applicable standard.

Measurement Data and Plot:



Plot 4: Bursts in 100ms- Dwelling time 18.60 ms



Plot 5: 12 Burst in 20 s

Table 4: Data of Bursts in 20 seconds and duty cycle of each burst

Modulation	Number Of Burst in 20 s	Burst Duty Cycle ms	Burst Duty Cycle %	Time of Occupancy ms	Max Limit ms	Results
FSK	12	18.60	18.60	223.2	400	Complies

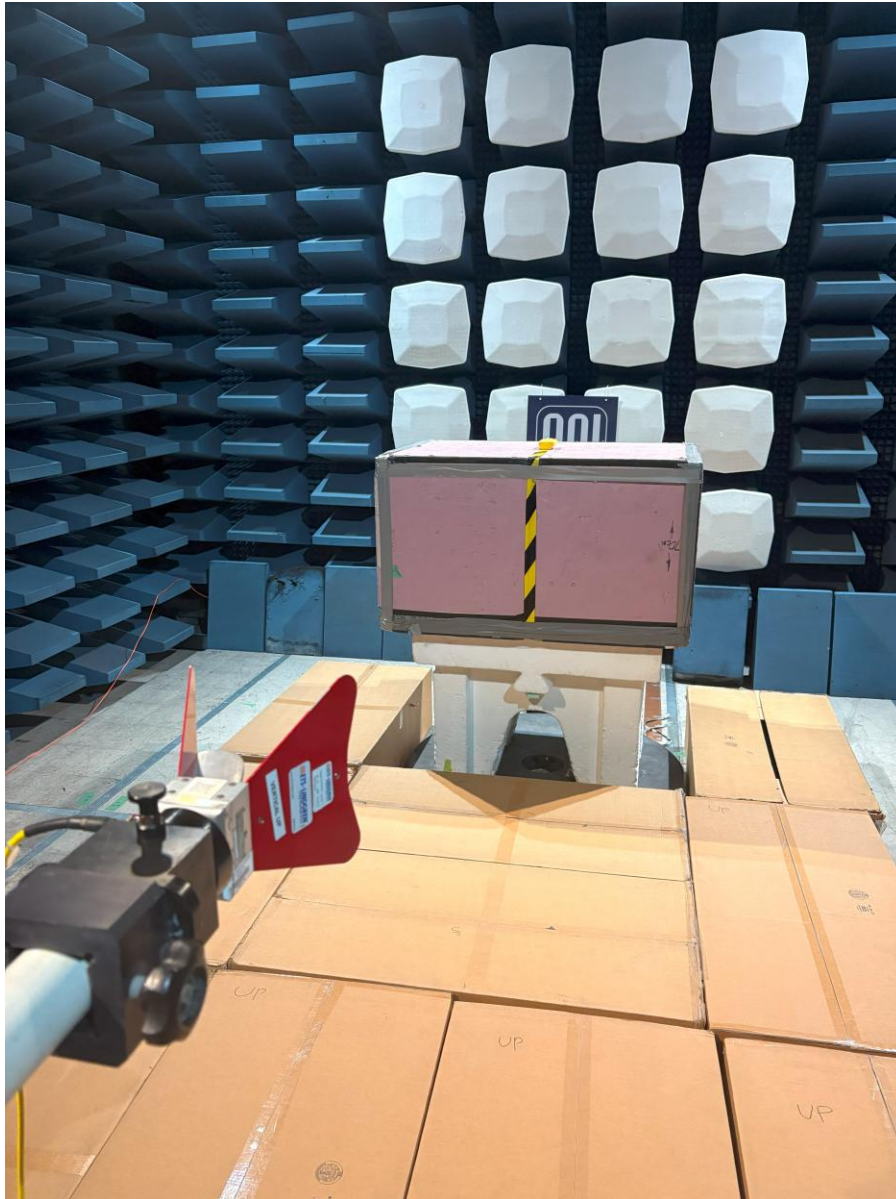
Duty Cycle Corr.: 18.6ms ON; 81.4ms OFF (20log (On/Off)) = - 12.82dB
Peak Output Corr'd: 9.00dBm – 12.82dB= -3.82dBm = 0.053mw

Appendix A: TEST SETUP PHOTOS



Radiated Emissions – 30MHz to 1GHz – Horizontal Orientation

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Radiated Emissions – 1GHz to 18GHz – Horizontal Orientation

Appendix B: ABBREVIATIONS

Abbreviation	Definition
AC	Alternating Current
AM	Amplitude Modulation
ASW	Anti-Submarine Warfare
BIT	Built-in-Test
CE	European Conformity
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)
DC	Direct Current
EFT	Electrical Fast Transient
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ERP	Effective Radiated Power
ESD	Electrostatic Discharge
EUT	Equipment Under Test
FCC	Federal Communications Commission
FVIN	Firmware Version Identification Number FVIN
GFE	Government Furnished Equipment
IC	Industry Canada
ICES	Interference Causing Equipment Standard
IEC	International Electrotechnical Commission
LISN	Line Impedance Stabilizing Network
OATS	Open Area Test Site
RF	Radio Frequency
RMS	Root-Mean-Square
SAC	Semi-Anechoic Chamber
TEM	Transverse Electromagnetic
TPD	Terminal Protection Device

END OF REPORT

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