

The Procter & Gamble Co. TEST REPORT

SCOPE OF WORK

EMC TESTING – IGROWTH BATH DEVICE

REPORT NUMBER

105935250LEX-002

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EMC TEST REPORT (FULL COMPLIANCE)

Report Number: 105935250LEX-002

Project Number: G105935250

Report Issue Date: 11/20/2024

Model(s) Tested: iGrowth Bath Device

Standards: FCC Title 47 CFR Part 15.225
RSS-210 Issue 10
RSS-GEN Issue 5

Tested by:
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Lexington, KY 40510
USA

Client:
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St Bernard, OH 45217
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Report prepared by



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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
6	Occupied Bandwidth (ANSI C63.10 (2020) §6.9.2, 6.9.3)	Pass
7	Radiated Spurious Emissions (ANSI C63.10 (2020) §6.3, §6.4, and §6.5)	Pass
8	Frequency Stability (ANSI C63.10 (2020) § 6.8)	Pass
9	Antenna Requirement (FCC Part 15.203, RSS-Gen Issue 5 § 6.8)	Pass



3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	The Procter & Gamble Co.
Address:	5299 Spring Grove Ave. St Bernard, OH 45217 USA
Contact:	Spencer Miller
Telephone:	+1 (513) 627-2572
Email:	miller.s.19@pg.com
Manufacturer Information	
Manufacturer Name:	Stress Engineering Services, Inc.
Manufacturer Address:	7030 Stress Engineering Way Mason, OH 45040 USA
Contact:	Joe Bullard
Telephone:	+1 (513) 336-6701
Email:	joseph.bullard@stress.com



4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	iGrowth Bath Device
Model Number	3284
Serial Number	BT2.0-000443
Hardware Version	2.0
Software Version	21
Receive Date	8/20/2024
Test Start Date	11/5/2024
Test End Date	11/8/2024
Device Received Condition	Good
Test Sample Type	Production
Transmit Frequency	13.56MHz
Antenna Type	Integral Antenna
Rated Voltage	7.5V
Description of Equipment Under Test (provided by client)	
Research device used to measure toilet paper consumption	

4.1 Variant Models:

There were no variant models covered under this evaluation.

**5 System Setup and Method****5.1 Method:**

Configuration as required by ANSI C63.10 (2020)

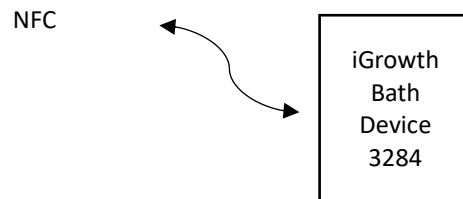
No.	Descriptions of EUT Exercising
1	The EUT was powered by AA batteries and configured to transmit 13.56MHz continuously.

Cables					
QTY	Description	Length (m)	Shielding	Ferrites	Termination
-	None	-	-	-	-

Support Equipment (Accessories)		
Description	Manufacturer	Model Number
None	-	-



5.2 EUT Block Diagram:



**6 Occupied Bandwidth****6.1 Test Method:**

Tests are performed in accordance with ANSI C63.10 (2020) §6.9.2 and 6.9.3.

6.2 Test Limits:

Title 47 CFR 15.215(c):

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

RSS-GEN §6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

**6.3 Test Equipment Used:**

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	8258	Rohde & Schwarz	ESW44	10/10/2024	10/10/2025

6.4 Test Software Used:

Description	Manufacturer	Version
RSCommander	Rohde & Schwarz	2.4.2 64 bit (2023)

6.5 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Automatic Bandwidth Measurement	2.89%

No measurement correction based on measurement uncertainty is performed.

6.6 Test Conditions

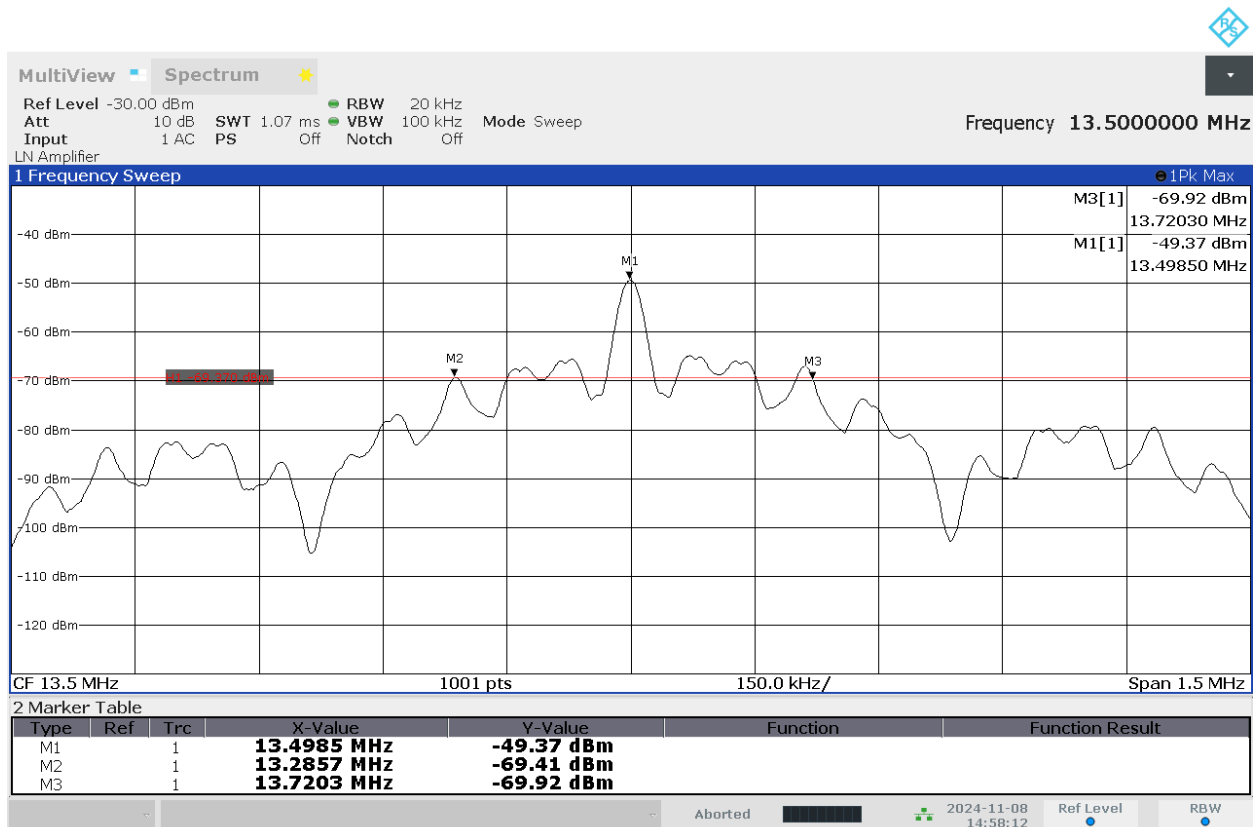
Test Personnel	Supervising / Reviewing Engineer	Test Date	Ambient Temperature	Relative Humidity	Pressure
Brian Lackey	NA	11/8/2024	20.9°C	56.6%	985.4mbar

6.7 Test Results:

The sample tested was found to Comply. The 20dB and 99% bandwidths were contained completely within the authorized band.

6.8 Test Data:

Bandwidth	F _{low} (MHz)	F _{high} (MHz)	Bandwidth (kHz)
20dB	13.2857	13.7203	434.6
99%	13.25467	13.833367	579.0

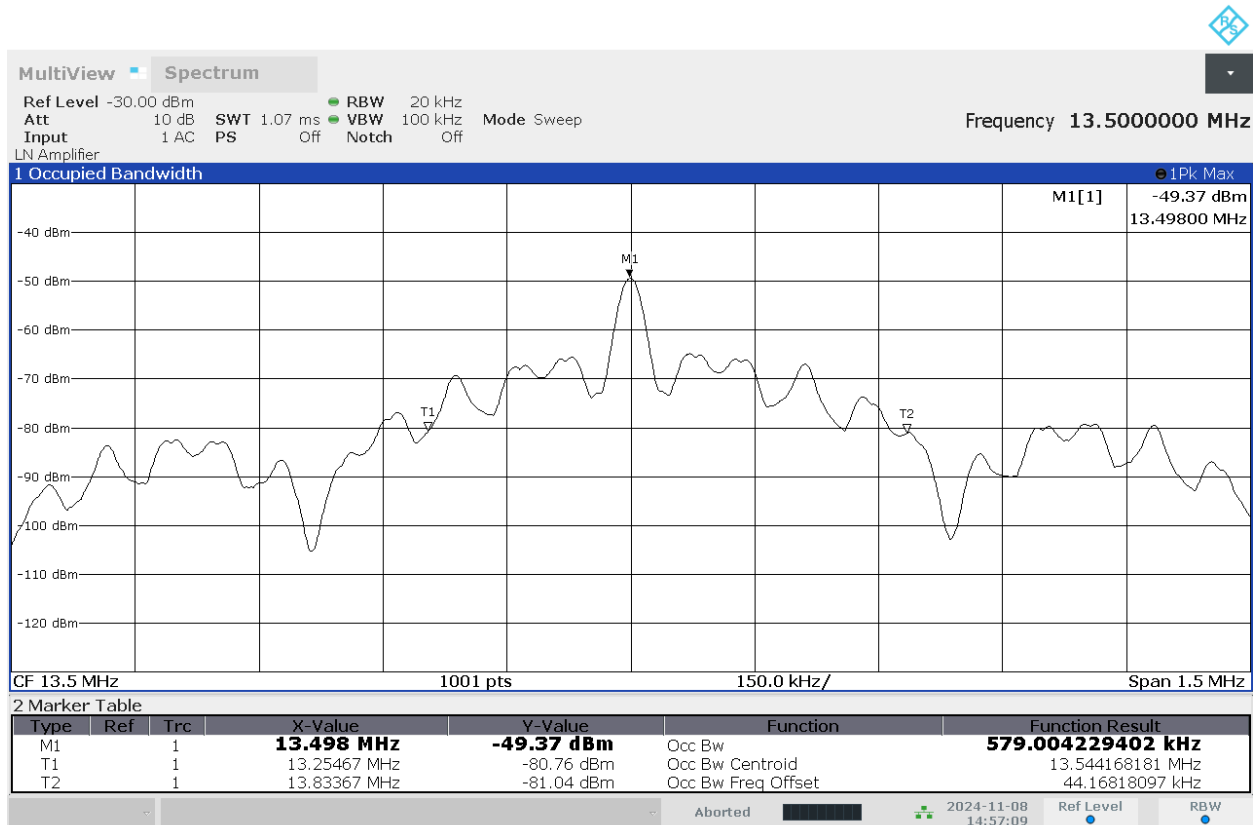
**6.9 Test Plots: Occupied Bandwidth****6.9.1 20dB**

02:58:13 PM 11/08/2024

Figure 1 – 20dB Bandwidth



6.9.2 99% Occupied Power Bandwidth



02:57:10 PM 11/08/2024

Figure 2 – 99% Occupied Power Bandwidth

**7 Radiated Spurious Emissions****7.1 Test Method:**

Tests are performed in accordance with ANSI C63.10 (2020) §6.3, §6.4, and §6.5.

7.2 Test Limits:

47 CFR 15.225(a)-(d):

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

RSS-210 Issue 10 § B.6(a)(i)-(iv):

(a) the field strength of any emission shall not exceed the following limits:

(i) 15.848 mV/m (84 dBμV/m) at 30 m, within the band 13.553-13.567 MHz

(ii) 334 μV/m (50.5 dBμV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz

(iii) 106 μV/m (40.5 dBμV/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz

(iv) RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz

**7.3 Test Equipment Used:**

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	8258	Rohde & Schwarz	ESW44	10/10/2024	10/10/2025
Bilog Antenna	7085	SunAR	JB6	3/18/2024	3/18/2025
Magnetic Loop Antenna	2366	ETS	6502	9/16/2024	9/16/2025
System Controller	3957	Sunol Sciences	SC99V	Verify at Time of Use	Verify at Time of Use
30M-1G 3m Signal Path without Preamplifier	3339, 2592, 8188, 8185			1/12/2024	1/12/2025

7.4 Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	UcISPR
Radiated Emissions, 10m	30-1000 MHz	3.9dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.0dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.7dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7dB	5.5 dB

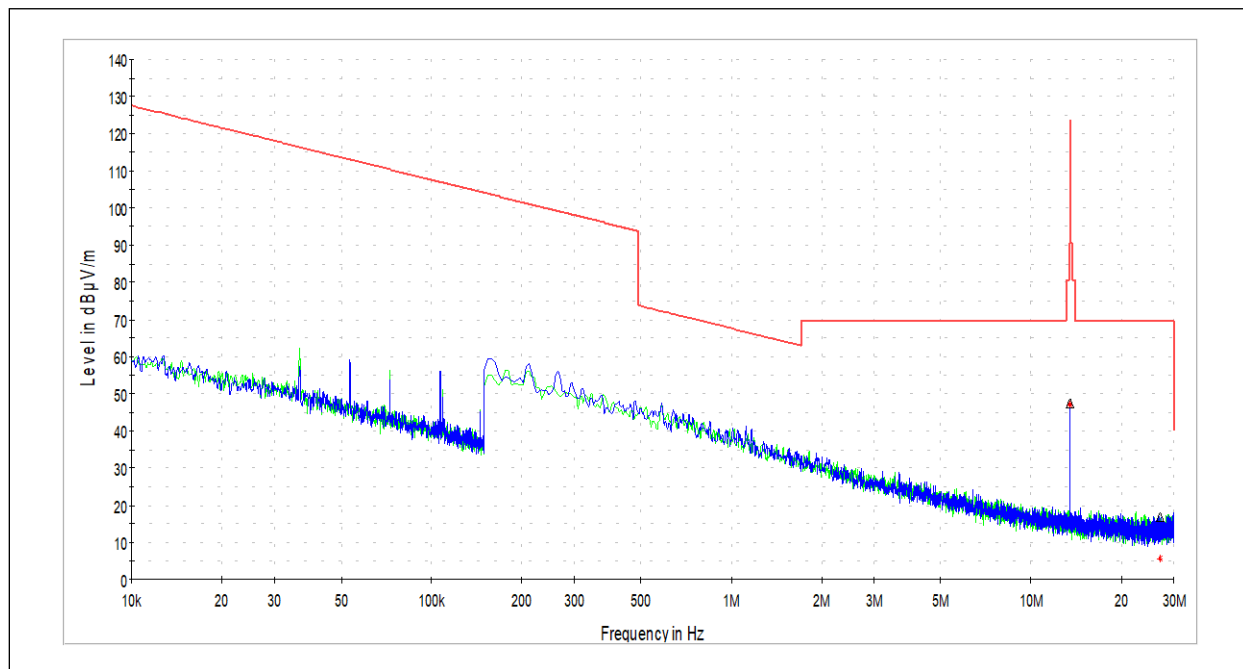
As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required.

7.5 Test Software Used:

Description	Manufacturer	Version
EMC32	Rohde & Schwarz	10.60.20

7.6 Test Results:

The sample tested was found to Comply. The device was investigated in three orthogonal axes.

**7.7 Test Data: Radiated Spurious Emissions, General****7.7.1 Frequency Range 9kHz – 30MHz**

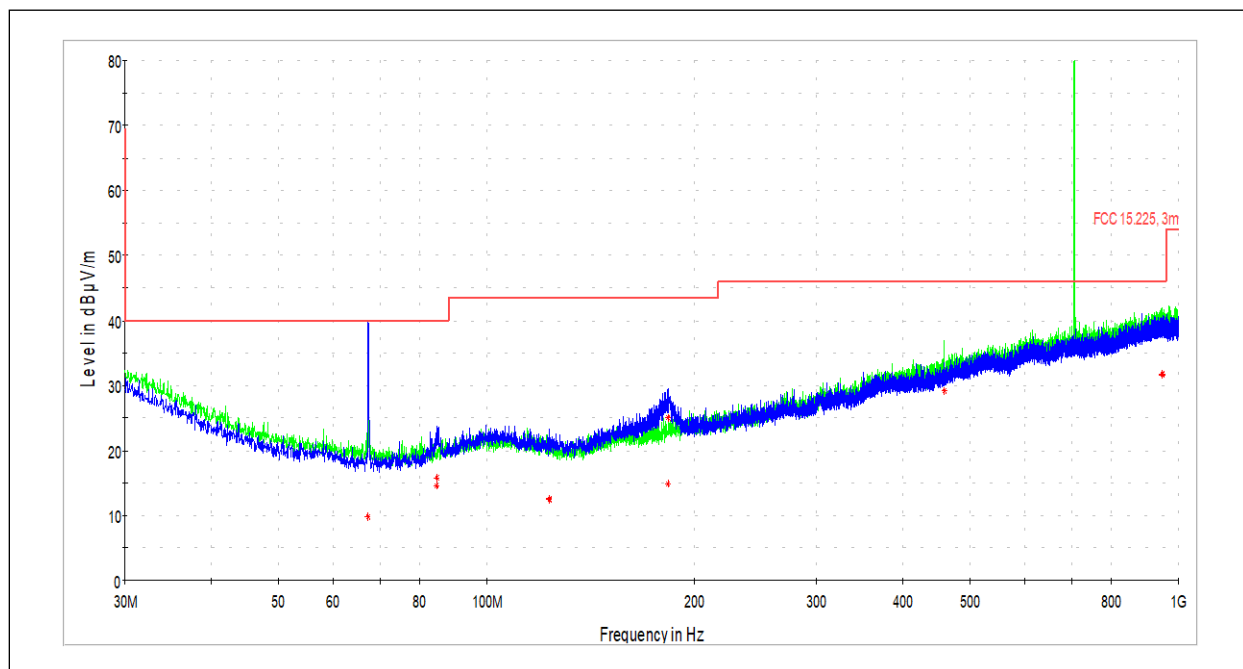
Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
13.499096	47.46	---	---	100.0	V	16.0	11.1
27.001831	16.92	---	---	100.0	V	247.0	9.4

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
13.499096	47.14	90.50	43.36	100.0	V	16.0	11.1
27.001831	5.56	69.50	63.94	100.0	V	247.0	9.4

Test Personnel: Brian Lackey
Supervising/Reviewing Engineer: NA
(Where Applicable) FCC 15.225
Product Standard: RSS-210
Input Voltage: Battery

Test Date: 11/8/2024
Limit Applied: See Section 7.2
Ambient Temperature: 19.7°C
Relative Humidity: 53.1%
Atmospheric Pressure: 985.4mbar

Deviations, Additions, or Exclusions: Peak emissions were below the quasi-peak limit and the device is deemed to comply.

**7.7.2 Frequency Range 30MHz – 1GHz**

Note: the large peak near 700MHz was a transient not observed during final measurement.

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
67.452778	9.90	40.00	30.10	100.0	V	72.0	12.6
84.589444	14.59	40.00	25.41	101.0	V	108.0	13.6
123.066111	12.52	43.50	30.98	155.0	V	255.0	15.3
182.613333	14.82	43.50	28.68	166.0	V	192.0	17.5
458.955556	29.18	46.00	16.82	115.0	H	218.0	26.1
947.081111	31.73	46.00	14.27	250.0	H	19.0	33.1

Test Personnel: Brian Lackey
Supervising/Reviewing Engineer: _____
(Where Applicable) NA
FCC 15.225
Product Standard: RSS-210
Input Voltage: Battery

Test Date: 11/8/2024
Limit Applied: See Section 7.2
Ambient Temperature: 19.7°C
Relative Humidity: 53.1%
Atmospheric Pressure: 985.4mbar

Deviations, Additions, or Exclusions: None

**8 Frequency Stability****8.1 Test Method:**

Tests are performed in accordance with ANSI C63.10 (2020) § 6.8.1. Testing was performed with fresh batteries.

8.2 Test Limits:

Title 47 CFR Part 15.225(e):

(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

RSS-210 Issue 10 § B.6(b):

(b) the carrier frequency stability shall not exceed ± 100 ppm

8.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Spectrum Analyzer	8305	Rohde & Schwarz	FSW26	9/20/2024	9/20/2025

8.4 Test Software Used:

Description	Manufacturer	Version
RSCommander	Rohde & Schwarz	2.4.2 64 bit (2023)

8.5 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Reference Frequency Uncertainty	0.0120 Hz

No measurement correction based on measurement uncertainty is performed.

8.6 Test Conditions

Test Personnel	Supervising / Reviewing Engineer	Test Date	Ambient Temperature	Relative Humidity	Pressure
Brian Lackey	NA	11/5/2024	21.5°C	54.6%	982.0mbar

8.7 Test Results:

The sample tested was found to Comply. The frequency was maintained to within $\pm 0.01\%$ and ± 100 ppm.

**8.8 Test Data:**

Temperature (C)	Frequency (MHz)	Frequency (Hz)	Deviation (Hz)	Deviation (%)	Deviation (ppm)
-30	13.499865335	13499865.335	-107.096	-0.0008%	-7.93
-20	13.499949250	13499949.250	-23.181	-0.0002%	-1.72
-10	13.499997199	13499997.199	24.768	0.0002%	1.83
0	13.500012988	13500012.988	40.557	0.0003%	3.00
10	13.500003797	13500003.797	31.366	0.0002%	2.32
20	13.499972431	13499972.431	-	-	-
30	13.499933274	13499933.274	-39.157	-0.0003%	-2.90
40	13.499906499	13499906.499	-65.932	-0.0005%	-4.88
50	13.499890113	13499890.113	-82.318	-0.0006%	-6.10



9 Antenna Requirement

9.1 Test Limits

FCC Part 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

RSS-Gen Issue 5 § 6.8:

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the license-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

License-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the license-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of license-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

9.2 Test Results

The device was found to be **compliant**. The device has an internal, permanently affixed antenna.



10 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	11/20/2024	105935250LEX-002	BZ	MC	Original Issue