RF Test Report

Project Number:	**5169396**	**Quotation Number:**	**SUW-202311005606**
Report Number:	**5169396EMC02**	**Revision Level:**	**0**

Client: **Seaira Global**

Equipment Under Test: **Lora Transmitter for Watchdog 550**

Model Name: **Watchdog SmartSync**

Model Number: **Watchdog SmartSync**

FCC ID: **2BF8M-WD-DRYFI**

Applicable Standards: **FCC Part 15 Subpart C, § 15.249**
ANSI C63.10: 2013
RSS-210 Issue 10:2019: RSS GEN Issue 5:2018

Report issued on: **02 May 2024**

Test Result: **Compliant**

FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER: 3212.01
This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

Prepared by: _____
Daniel Alvarez, RF/EMC Sr. Staff Engineer

Reviewed by: _____
Martin Taylor, EMC/RF Sr. Project Engineer

Remarks: This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com//en/Terms-and-Conditions.aspx. And for electronic format documents, subject to Terms and Conditions for Electronic Documents at http://www.sgs.com/en/Terms-and-Conditions/terms-e-document.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for a maximum of 30 days only.

TABLE OF CONTENTS

1 SUMMARY OF TEST RESULTS 3
1.1 MODIFICATIONS REQUIRED FOR COMPLIANCE 3
2 GENERAL INFORMATION 3
2.1 CLIENT INFORMATION 3
2.2 TEST LABORATORY 3
2.3 GENERAL INFORMATION OF EUT 3
2.4 OPERATING MODES AND CONDITIONS 4
2.5 EUT CONNECTION BLOCK DIAGRAM 4
2.6 SYSTEM CONFIGURATIONS 4
2.7 CABLE LIST 4
3 FIELD STRENGTH OF FUNDAMENTAL 5
3.1 TEST RESULT 5
3.2 TEST METHOD 5
3.3 TEST SITE 5
3.4 TEST EQUIPMENT 6
3.5 TEST DATA 7
4 FIELD STRENGTH OF SPURIOUS RADIATION 9
4.1 TEST RESULT 9
4.2 TEST METHOD 9
4.3 TEST SITE 9
4.4 TEST EQUIPMENT 10
4.5 TEST DATA 11
5 BANDWIDTH 14
5.1 TEST RESULT 14
5.2 TEST METHOD 14
5.3 TEST SITE 14
5.4 TEST EQUIPMENT 14
5.5 TEST DATA 14
6 AC POWERLINE CONDUCTED EMISSIONS 16
6.1 TEST RESULT 16
6.2 TEST METHOD 16
6.3 TEST SITE 16
6.4 TEST EQUIPMENT 16
6.5 TEST DATA 17
7 MEASUREMENT UNCERTAINTY 19
8 REVISION HISTORY 20

1 Summary of Test Results

Test Description	Test Specification	Test Result
Field Strength of Fundamental	15.249(a), RSS-210 B10(a)	Compliant
Field Strength of Spurious Radiation	15.249(a)(d) and 15.209 RSS-210 B10(a)(b)	Compliant
Fixed, Point-to-Point	15.249(b)	Not Applicable
20 dB Bandwidth	15.215(c)	Reported
99% Occupied Bandwidth	RSS-GEN 6.7	Reported
AC Powerline Conducted Emissions	15.207, RSS-GEN 8.8	Compliant

1.1 *Modifications Required for Compliance*

None

2 General Information

2.1 *Client Information*

Name: Seaira Global
Address: 14021 NC HWY 50
City, State, Zip, Country: Wilmington, North Carolina, 28445, USA

2.2 *Test Laboratory*

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01

2.3 *General Information of EUT*

Equipment Under Test: Lora Transmitter for Watchdog 550
Model Name: Watchdog SmartSync
Model Number: Watchdog SmartSync
Serial Number: SGS ID#: SUW_SP_20240401213
FCC ID: 2BF8M-WD-DRYFI

Tx Frequency Range: 915 MHz
Antenna Type: PCB

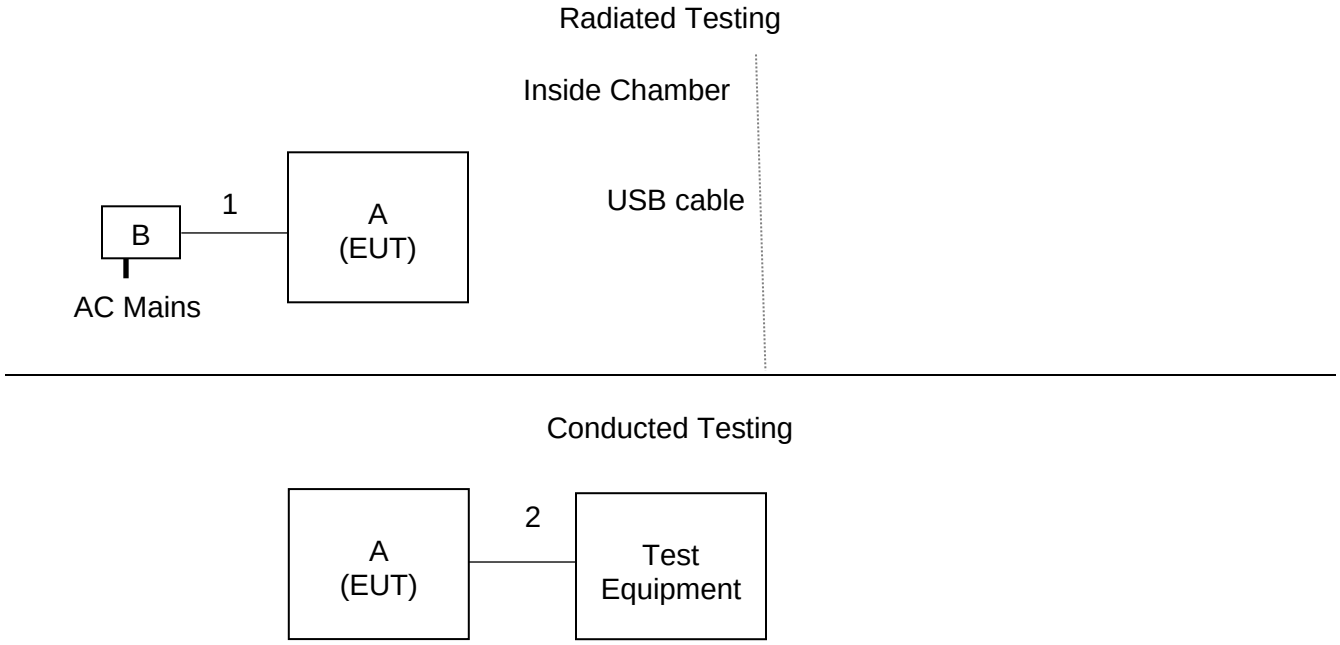
Rated Voltage: 120VAC,60Hz Adapter to 5VDC
Test Voltage: 120VAC,60Hz

Sample Received Date: 10 April 2024
Dates of testing: 10 April 2024 through 29 April 2024

2.4 *Operating Modes and Conditions*

The Watchdog SmartSync with display was connected to the AC Mains using the supplied AC/DC wall adapter. The secondary Watchdog SmartSync with no display was connected to the dehumidifier. Communication was confirmed with the green tower symbol on the display of the Watchdog SmartSync and the humidity reading was confirmed as the same as the reading on the dehumidifier. The EUT was not operated with test mode software. It was configured as provided for marketing. The EUT only used frequency at 915 MHz for communication.

2.5 *EUT Connection Block Diagram*



2.6 *System Configurations*

Device Reference	Manufacturer	Description	Model Number	Serial Number
A	Seaira Global	Lora Transmitter for Watchdog 550	Watchdog SmartSync	SGS ID#: SUW_SP_20240401213
B	Apple	AC/DC Power Adapter	A1265	HA91029Y459T

2.7 *Cable List*

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
1	USB Cable	EUT	AC/DC Adapter	1.2	N	N
2	SMA Pigtail	EUT	Test Equipment	<0.2	N	Y

3 Field Strength of Fundamental

3.1 *Test Result*

Test Description	Test Specification	Test Result
Field Strength of Fundamental	15.249(a) RSS-210 B10(a)	Compliant

3.2 *Test Method*

The test data was measured using a Quasi-Peak detector below 1GHz and a Peak detector above 1GHz. The receiver's resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements for 1GHz and higher. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

Used	Fundamental Frequency	QP / Average Limits			Peak Limits dBuV/m
		Millivolts/meter	Microvolts/m	dBuV/m	
Yes	902 - 928 MHz	50	50000	94 (1)	--
No	2400 - 2483.5 MHz	50	50000	94 (2)	114
No	5725 - 5875 MHz	50	50000	94 (2)	114
No	24 - 24.25 GHz	250	250000	108 (2)	128

(1) Quasi-peak limit
(2) Average limit

3.3 *Test Site*

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature:	22.84°C
Relative Humidity:	39.5%
Atmospheric Pressure:	98.7kPa

3.4 *Test Equipment*

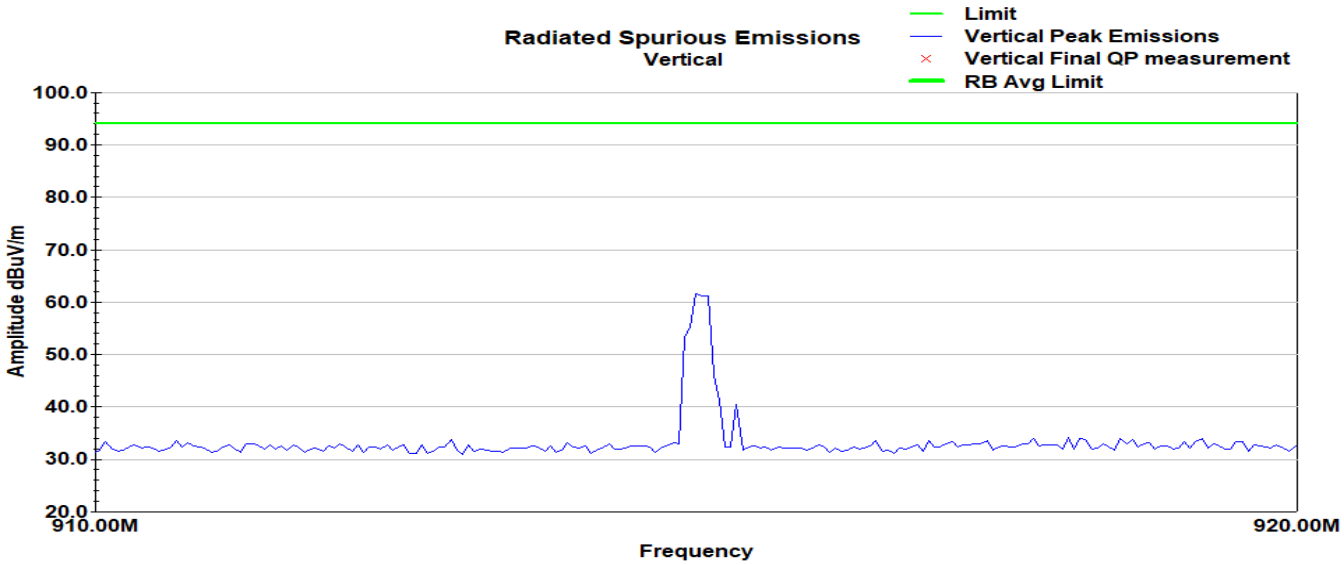
Test End Date: 26-Apr-2024 Tester: PL

Equipment	Model	Manufacturer	Asset	Cal Date	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	19-Apr-2022	19-Apr-2024
ROTARY NM TO NF CONNECTOR	18-2120-0	DIAMOND ANTENNA AND MICROWAVE CORP	22007	18-Mar-2024	18-Mar-2025
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22032	15-Nov-2023	15-Nov-2024
N to N RF Cable	90-076-020	TELEDYNE STORM MICROWAVE	22037	26-Dec-2023	26-Dec-2024
N to N RF Cable	RF280-06SP-06SP-2000	SAMTEC	23013	23-May-2023	23-May-2024
LOW NOISE AMPLIFIER	ZKL-2+	MINI-CIRCUITS	B079817	7-Aug-2023	7-Aug-2024
N-FEMALE TO N-MALE RF CABLE	EM-B810NMNF-118	ECHELON	23010	17-Apr-2024	17-Apr-2025

Software:
TILE! software profile “RE 30-1000 MHz 3m TILE7 230718” dated 07/18/23.

3.5 *Test Data*

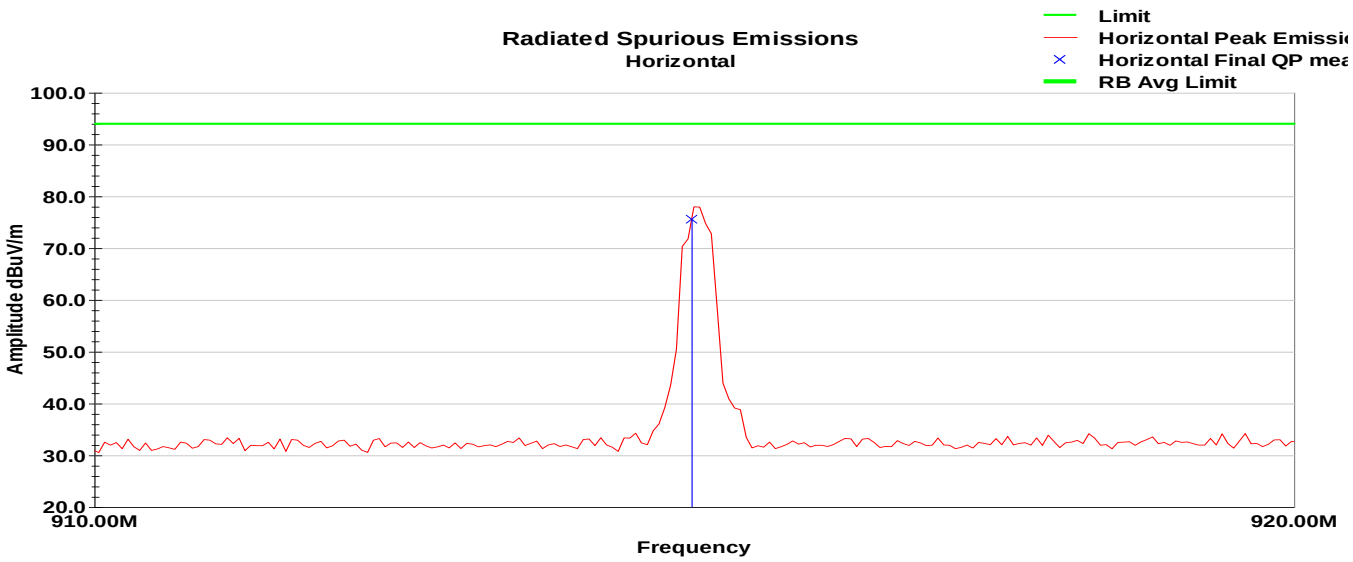
Vertical Plot



Vertical Data

Frequency MHz	Raw Peak dBuV	Polarity V/H	Azimuth degrees	Height cm	AF dB/m	Loss dB	Amp dB	Peak Value dBuV/m	Limit dBuV/m	Peak Margin dB
914.97	61.5	V	0.0	400.0	27.0	1.9	29.3	61.1	94.0	-32.9
P Value = Raw P + AF + Loss - Amp										
Margin = P Value - Limit										

Horizontal Plot



Horizontal Data

Frequency MHz	Raw Peak dBuV	Polarity V/H	Azimuth degrees	Height cm	AF dB/m	Loss dB	Amp dB	Peak Value dBuV/m	Limit dBuV/m	Peak Margin dB
914.97	78.0	H	15.0	144.0	27.0	1.9	29.3	77.6	94.0	-16.4
P Value = Raw P + AF + Loss - Amp										
Margin = P Value - Limit										

4 Field Strength of Spurious Radiation

4.1 *Test Result*

Test Description	Test Specification	Test Result
Field Strength of Spurious Radiation	15.249(a)(d) and 15.209 RSS-210 B10(a)(b)	Compliant

4.2 *Test Method*

The initial exploratory scans were performed over the frequency ranges as indicated in the table below using the max hold function using TILE! software. The pre-scans were performed with the EUT oriented in each of its three orthogonal axes to determine the orientation that produces the highest emissions. The final test data was measured using a Quasi-Peak detector below 1GHz and Peak and Average detectors above 1GHz. The receiver's resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements 1GHz and higher. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

Frequency	QP / Average Limits		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 (1)	--
88 - 216 MHz	150	43.5 (1)	--
216 - 960 MHz	200	46 (1)	--
960 - 1000 MHz	500	54 (1)	--
1 - 40 GHz	500	54 (2)	74

(1) Quasi-peak limit
(2) Average limit

4.3 *Test Site*

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 22.84°C
Relative Humidity: 39.5%
Atmospheric Pressure: 98.7kPa

4.4 *Test Equipment*

Test End Date: 26-Apr-2024 Tester: PL

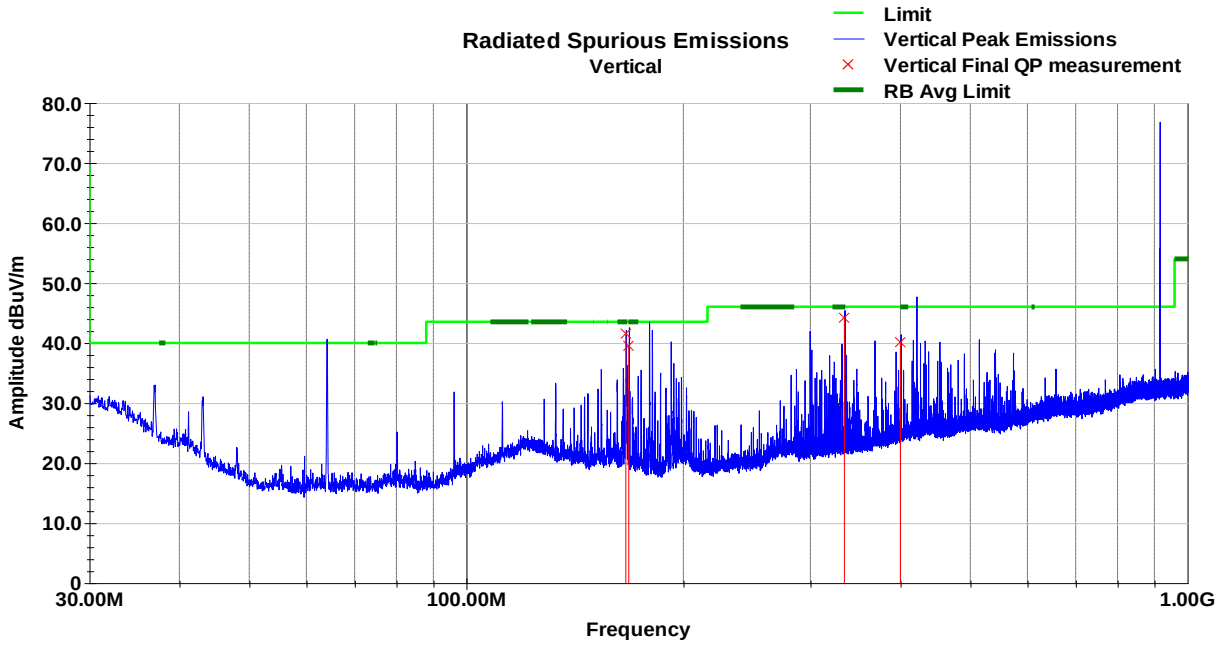
Equipment	Model	Manufacturer	Asset	Cal Date	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	19-Apr-2022	19-Apr-2024
ROTARY NM TO NF CONNECTOR	18-2120-0	DIAMOND ANTENNA AND MICROWAVE CORP	22007	18-Mar-2024	18-Mar-2025
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22032	15-Nov-2023	15-Nov-2024
N to N RF Cable	90-076-020	TELEDYNE STORM MICROWAVE	22037	26-Dec-2023	26-Dec-2024
N to N RF Cable	RF280-06SP-06SP-2000	SAMTEC	23013	23-May-2023	23-May-2024
LOW NOISE AMPLIFIER	ZKL-2+	MINI-CIRCUITS	B079817	7-Aug-2023	7-Aug-2024
N-FEMALE TO N-MALE RF CABLE	EM-B810NMNF-118	ECHELON	23010	17-Apr-2024	17-Apr-2025

TILE! software profile “RE 30-1000 MHz 3m TILE7 230718” dated 07/18/23.

4.5 *Test Data*

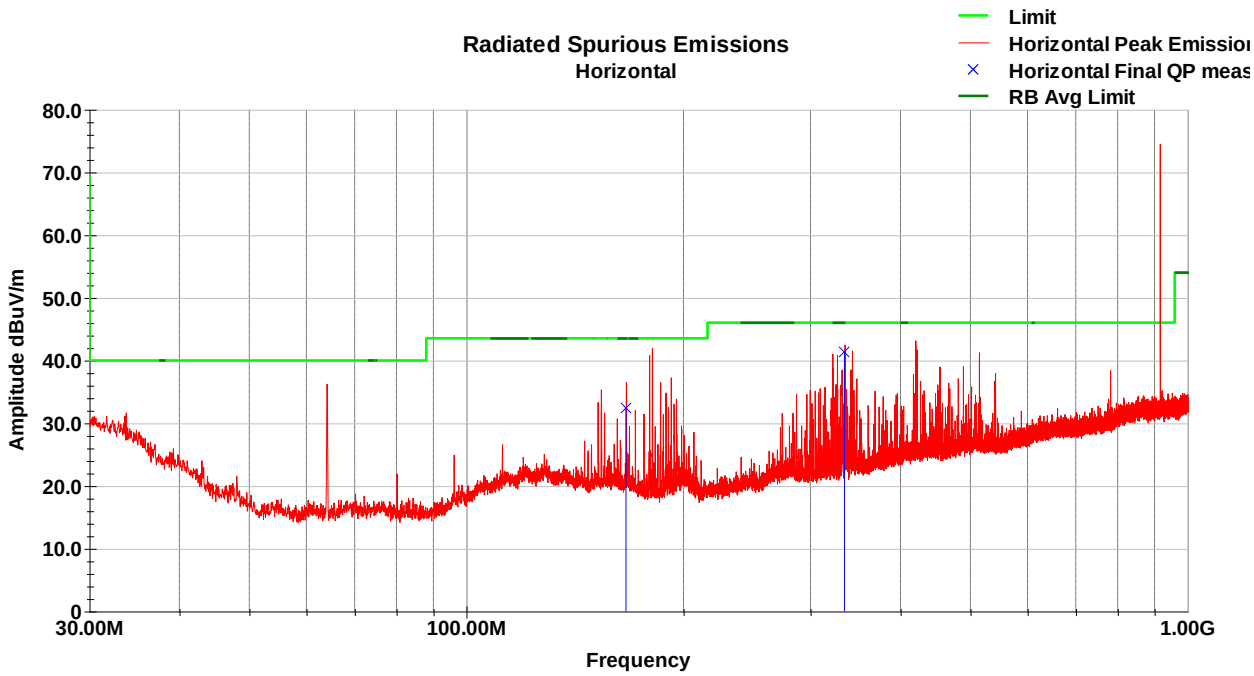
4.5.1 30-1000 MHz

ISM Band Low Channel (915 MHz)
Vertical Plot



Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
166.41	55.3	V	360.0	100.0	16.4	0.7	30.8	41.6	43.5	-1.9
168.01	53.1	V	329.0	100.0	16.3	0.7	30.7	39.4	43.5	-4.1
334.42	54.4	V	161.0	144.0	18.8	1.3	30.4	44.1	46.0	-1.9
399.99	48.6	V	145.0	130.0	20.2	1.6	30.2	40.2	46.0	-5.8
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

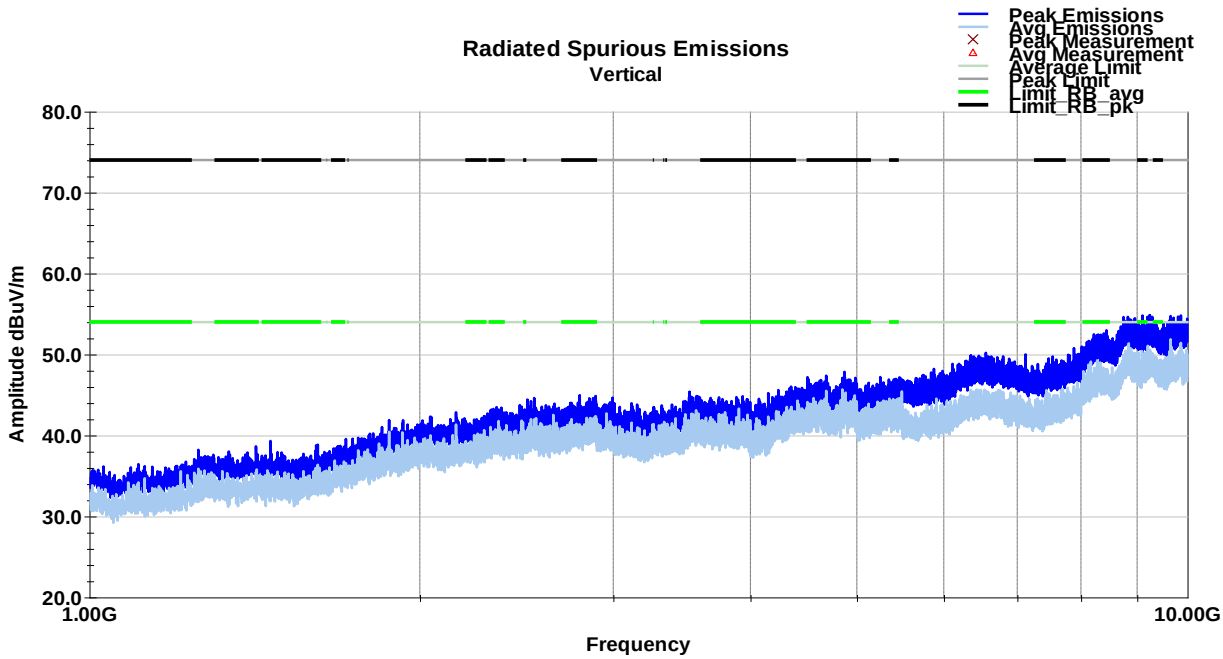
Horizontal Plot



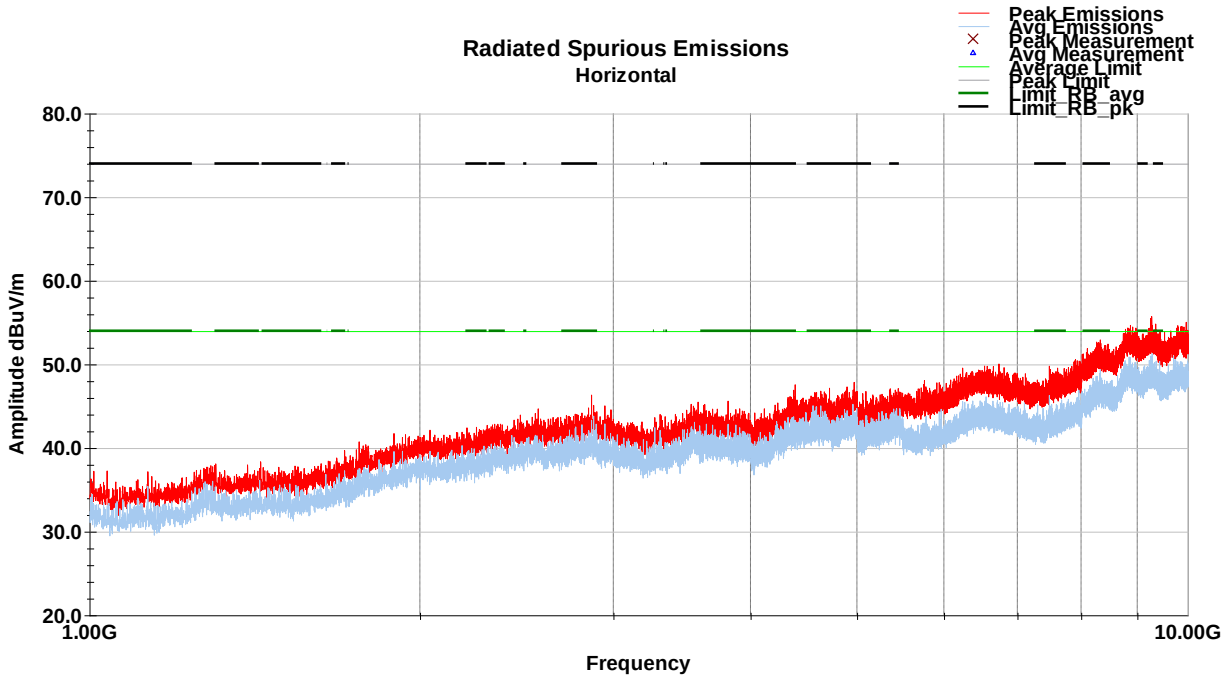
Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
166.44	46.1	H	46.0	186.0	16.4	0.7	30.8	32.5	43.5	-11.1
334.40	51.5	H	191.0	339.0	18.8	1.3	30.4	41.3	46.0	-4.7
QP Value = Raw QP + AF + Loss - Amp										
Margin = QP Value - Limit										

4.5.2 1-10 GHz

ISM Band Channel (915 MHz)
Vertical Plot



Horizontal Plot



5 Bandwidth

5.1 *Test Result*

Test Description	Basic Standards	Test Result
20 dB Bandwidth	15.215(c)	Reported
99% Occupied Bandwidth	RSS-GEN 6.7	Reported

5.2 *Test Method*

The procedures from ANSI C63.10 clause 6.9 were used to determine the 20 dB Bandwidth and the 99% Occupied Bandwidth.

5.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions:	04/15/2024	04/29/2024
Temperature:	22.91°C	22.87 °C
Relative Humidity:	42.1%	48.3 %
Atmospheric Pressure:	98.33 kPa	98.5 kPa

5.4 *Test Equipment*

Test End Date: 29-Apr-2024 Tester: DA

Equipment	Model	Manufacturer	Asset	Cal Date	Cal Due Date
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM MICROWAVE	20108	3/20324	20-Mar-2025
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	3-Jan-2024	3-Jan-2025

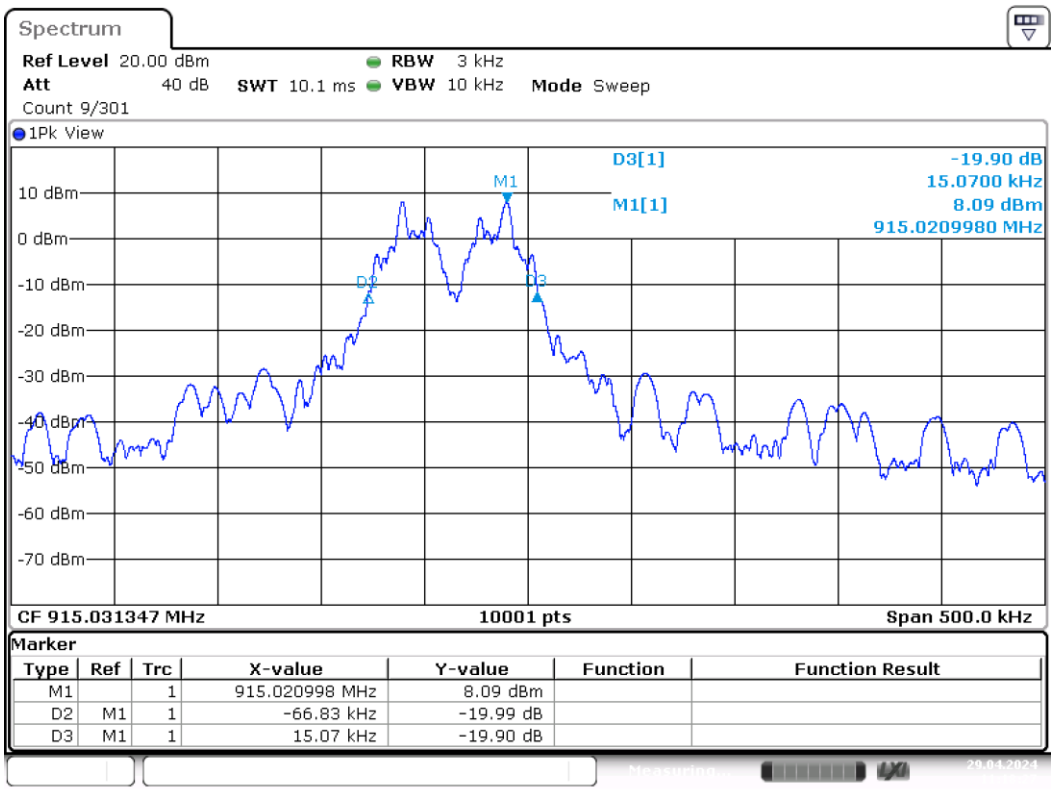
Test End Date: 15-Apr-2024 Tester: SGM

Equipment	Model	Manufacturer	Asset	Cal Date	Cal Due Date
RF CABLE SMA TO SMA, 0.01-40GHZ	084-0505-059	TELEDYNE STORM MICROWAVE	20109	3/20324	20-Mar-2025
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	3-Jan-2024	3-Jan-2025
TSTPASS SWITCHBOX	SB2	TSTPASS	23009	8-Apr-2024	8-Apr-2025

5.5 *Test Data*

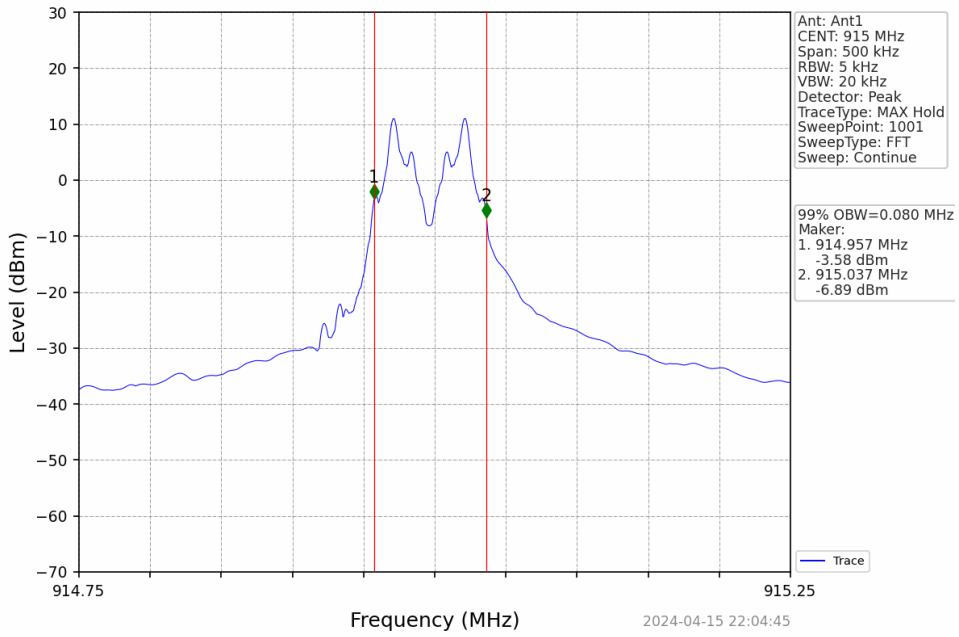
Test Description	EUT Frequency	Bandwidth
20 dB Bandwidth	915 MHz	81.9 kHz
99% Occupied Bandwidth	915 MHz	80 kHz

20 dB Bandwidth Plot



Date: 29.APR.2024 11:18:27

99% Bandwidth Plot



6 AC Powerline Conducted Emissions

6.1 *Test Result*

Test Description	Basic Standards	Test Result
AC Powerline Conducted Emissions	15.207 RSS-GEN 8.8 ANSI C63.10: 2013	Compliant

6.2 *Test Method*

With the receiver's resolution bandwidth was set to 9 kHz, exploratory scans were performed over the measuring frequency range (0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and Average detector and using the TILE! software. The final test data was measured using a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Limits (dBuV)
0.15 to 0.5 MHz	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 46 Pk 56
5 to 30 MHz	Avg 50 Pk 60

6.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions:

Temperature: 22.91°C
Relative Humidity: 42.1%
Atmospheric Pressure 98.33 kPa

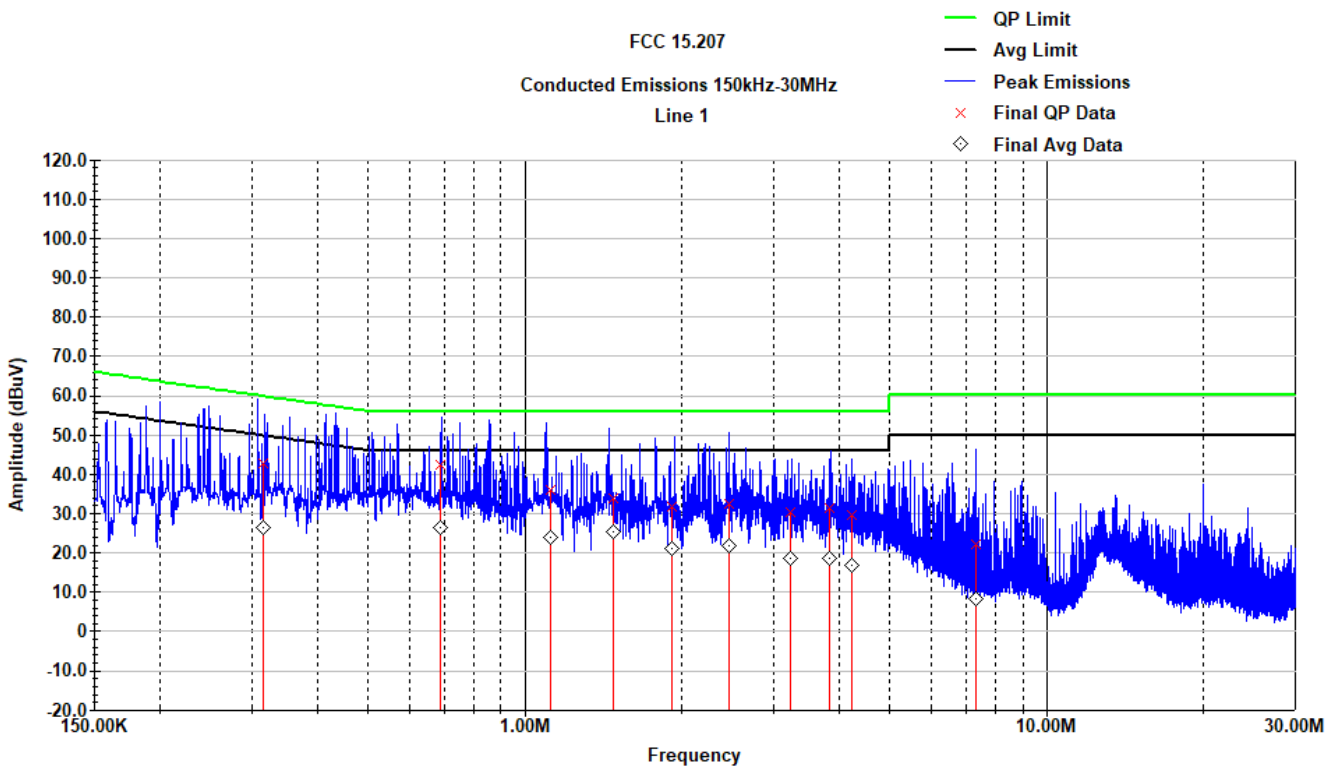
6.4 *Test Equipment*

Test End Date: 15-Apr-2024 Tester: SGM

Equipment	Model	Manufacturer	Asset Number	Cal Date	Cal Due Date
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B087573	4-Jan-2024	4-Jan-2025
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17016	7-Aug-2023	7-Aug-2024
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	6-Sep-2023	6-Sep-2024

Software: "Conducted Emissions 231028" TILE! profile dated 28 Oct 2023

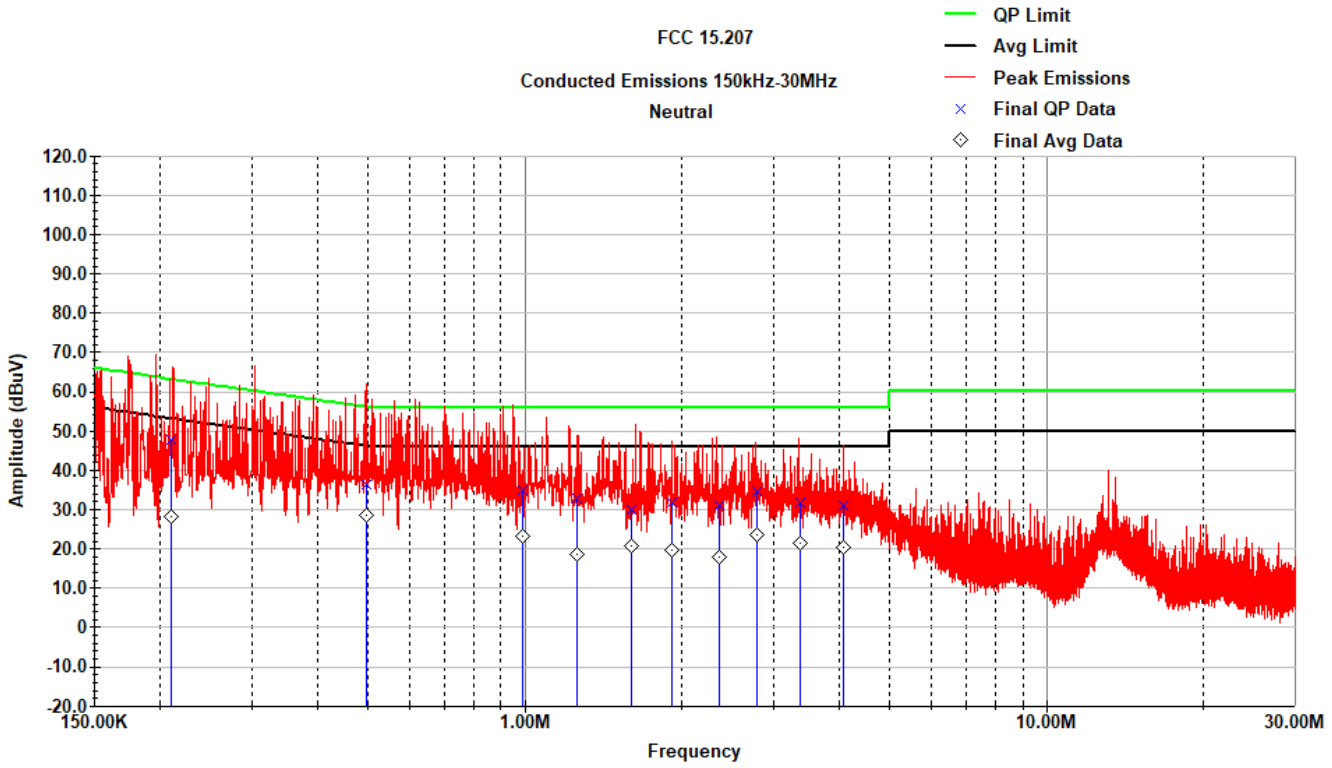
6.5 *Test Data*



Frequency MHz	LISN dB	CF dB	TL dB	Raw Avg dBuV	Final Avg dBuV	Avg Limit dBuV	Avg Margin dB	Raw QP dBuV	Final QP dBuV	QP Limit dBuV	QP Margin dB
0.316	9.8	0.00	0.0	16.6	26.4	49.8	-23.4	33.0	42.8	59.8	-17.0
0.689	9.8	0.00	0.0	16.7	26.5	46	-19.5	32.7	42.5	56.0	-13.5
1.12	9.8	0.00	0.0	14.1	24	46	-22	26.3	36.2	56.0	-19.8
1.479	9.8	0.00	0.0	15.4	25.3	46	-20.7	24.2	34.1	56.0	-21.9
1.909	9.8	0.00	0.0	11.3	21.2	46.0	-24.8	22.0	31.9	56.0	-24.1
2.467	9.8	0.00	0.0	11.8	21.7	46.0	-24.3	22.7	32.6	56.0	-23.4
3.223	9.8	0.00	0.0	8.7	18.5	46.0	-27.5	20.6	30.4	56.0	-25.6
3.826	9.8	0.00	0.0	8.6	18.5	46.0	-27.5	21.6	31.4	56.0	-24.6
4.224	9.8	0.00	0.0	6.8	16.7	46.0	-29.3	19.8	29.7	56.0	-26.3
7.310	9.9	0.00	0.0	-1.5	8.4	50.0	-41.6	12.3	22.2	60.0	-37.8

Final QP = Raw QP + LISN + CF + TL
QP Margin = Final QP - QP Limit

aw Avg + LISN + CF + TL
Avg Margin = Final Avg - Avg Limit



Frequency MHz	LISN dB	CF dB	TL dB	Raw Avg dBuV	Final Avg dBuV	Avg Limit dBuV	Avg Margin dB	Raw QP dBuV	Final QP dBuV	QP Limit dBuV	QP Margin dB
0.210	9.8	0.00	0.0	18.4	28.2	53.2	-25.0	37.8	47.6	63.2	-15.6
0.497	9.8	0.00	0.0	18.8	28.7	46.1	-17.4	26.4	36.2	56.1	-19.9
0.991	9.8	0.00	0.0	13.5	23.4	46	-22.6	25.1	34.9	56.0	-21.1
1.257	9.8	0.00	0.0	8.8	18.7	46	-27.3	22.8	32.7	56.0	-23.3
1.603	9.8	0.00	0.0	10.9	20.7	46.0	-25.3	20.1	30.0	56.0	-26.0
1.912	9.8	0.00	0.0	9.7	19.6	46.0	-26.4	22.0	31.9	56.0	-24.1
2.356	9.8	0.00	0.0	8.0	17.9	46.0	-28.1	21.3	31.2	56.0	-24.8
2.783	9.9	0.00	0.0	13.6	23.5	46.0	-22.5	24.5	34.4	56.0	-21.6
3.377	9.9	0.00	0.0	11.5	21.4	46.0	-24.6	21.8	31.7	56.0	-24.3
4.076	9.9	0.00	0.0	10.5	20.4	46.0	-25.6	21.0	30.9	56.0	-25.1

Final QP = Raw QP + LISN + CF + TL
QP Margin = Final QP - QP Limit

aw Avg + LISN + CF + TL
Avg Margin = Final Avg - Avg Limit

7 Measurement Uncertainty

Measurement uncertainty is not used to adjust the measurements to determine compliance.

Measurement uncertainty values in the table below comply with CISPR 16-4-2.

Measurement	Frequency Range	U_{cispr} dB	Lab dB
Conducted disturbance at mains port using AMN	(150 kHz to 30 MHz)	3.4	2.5
Radiated disturbance (electric field strength in a SAC)	(30 MHz to 1000 MHz)	6.3	5.0
Radiated disturbance (electric field strength in a FAR)	(1 GHz to 6 GHz)	5.2	4.2
Radiated disturbance (electric field strength in a FAR)	(6 GHz to 18 GHz)	5.5	4.5

8 Revision History

Revision Level	Description of changes	Revision Date
Draft	Draft Release	29 April 2024
0	Initial Release	02 May 2024