

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

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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

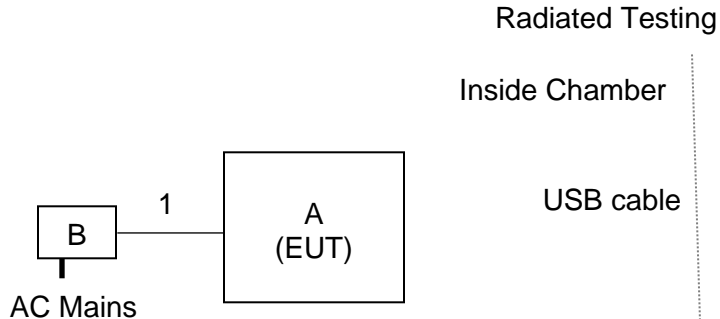
Rated Voltage: 120VAC,60Hz Adapter to 5VDC
 Test Voltage: 120VAC,60Hz

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

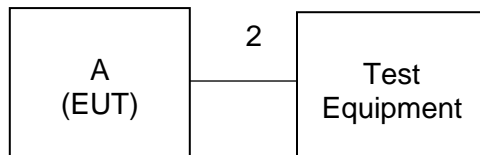
2.4 Operating Modes and Conditions

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



Conducted Testing



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

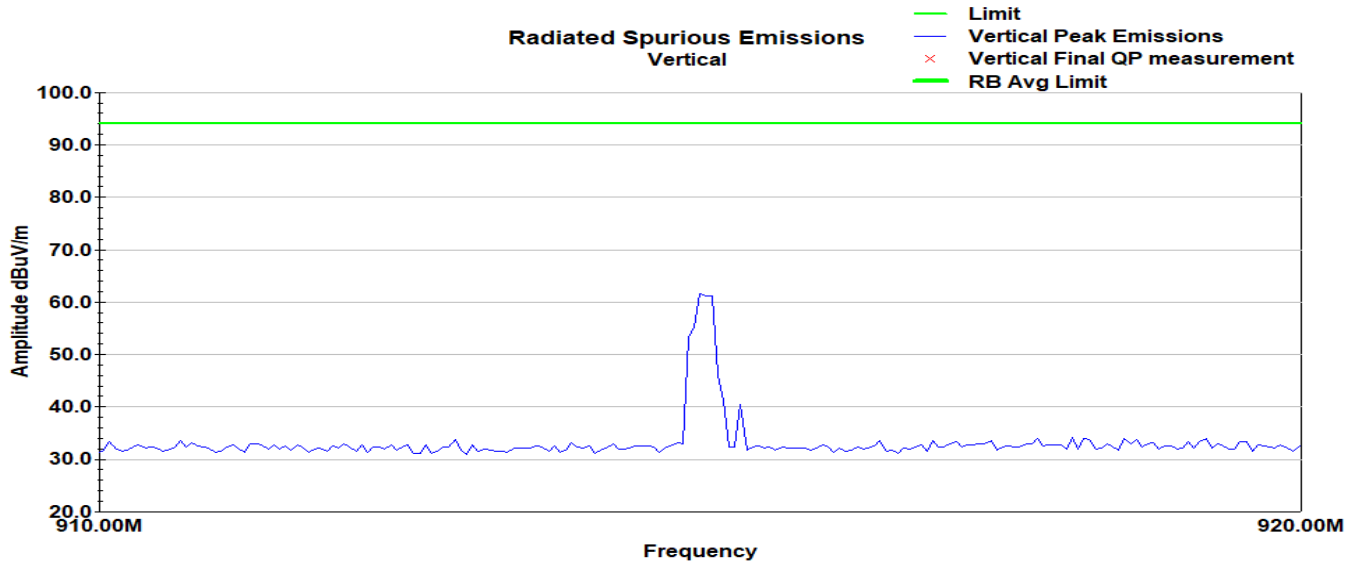
Equipment	Model	Manufacturer	Asset	Cal Date	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	19-Apr-2022	19-Apr-2024
ROTARY NM TO NF CONNECTOR	18-2120-0	DIAMOND ANTENNA AND MICROWAVE CORP	22007	18-Mar-2024	18-Mar-2025
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22032	15-Nov-2023	15-Nov-2024
N to N RF Cable	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

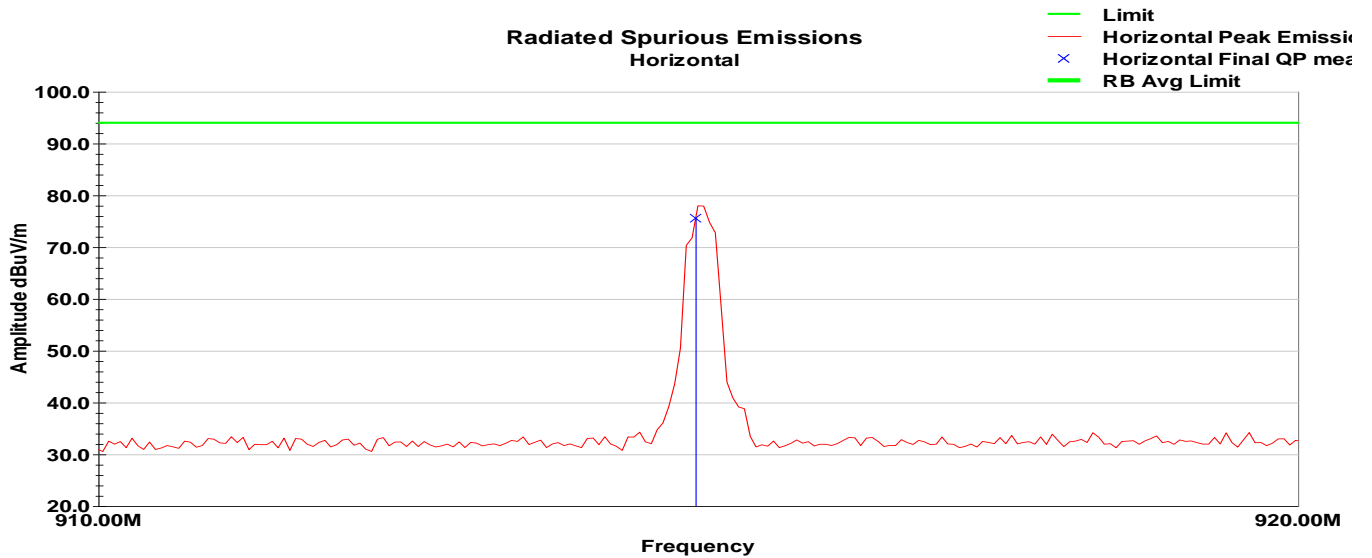
Vertical Plot



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

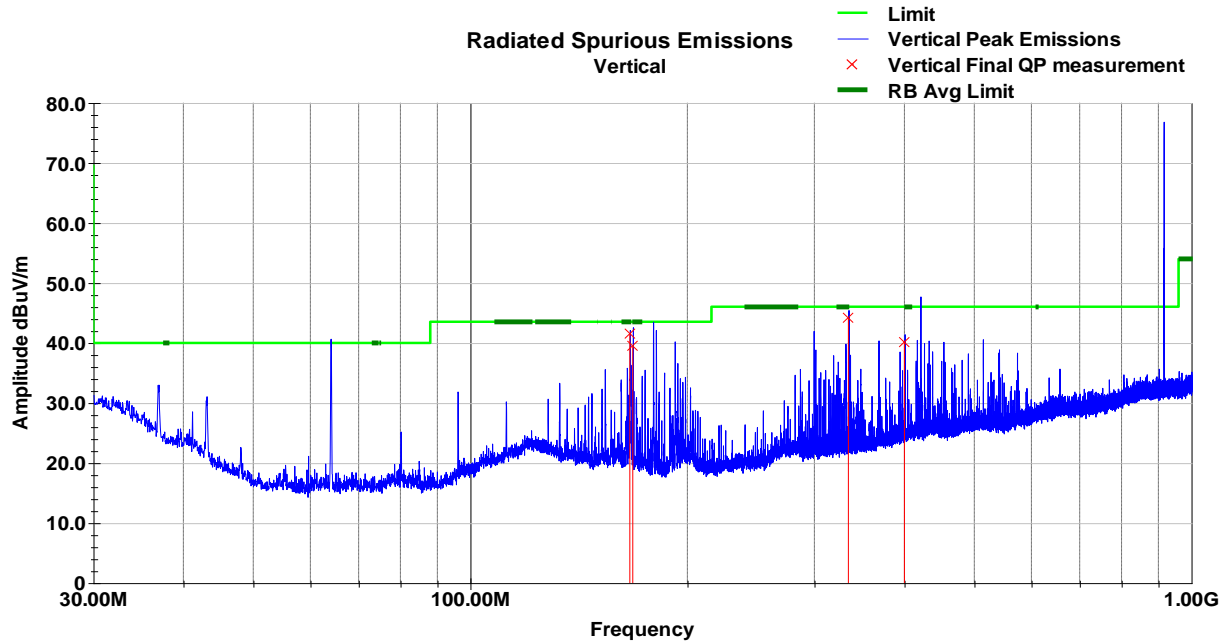
Equipment	Model	Manufacturer	Asset	Cal Date	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	19-Apr-2022	19-Apr-2024
ROTARY NM TO NF CONNECTOR	18-2120-0	DIAMOND ANTENNA AND MICROWAVE CORP	22007	18-Mar-2024	18-Mar-2025
EMI TEST RECEIVER	ESW44	ROHDE & SCHWARZ	22032	15-Nov-2023	15-Nov-2024
N to N RF Cable	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

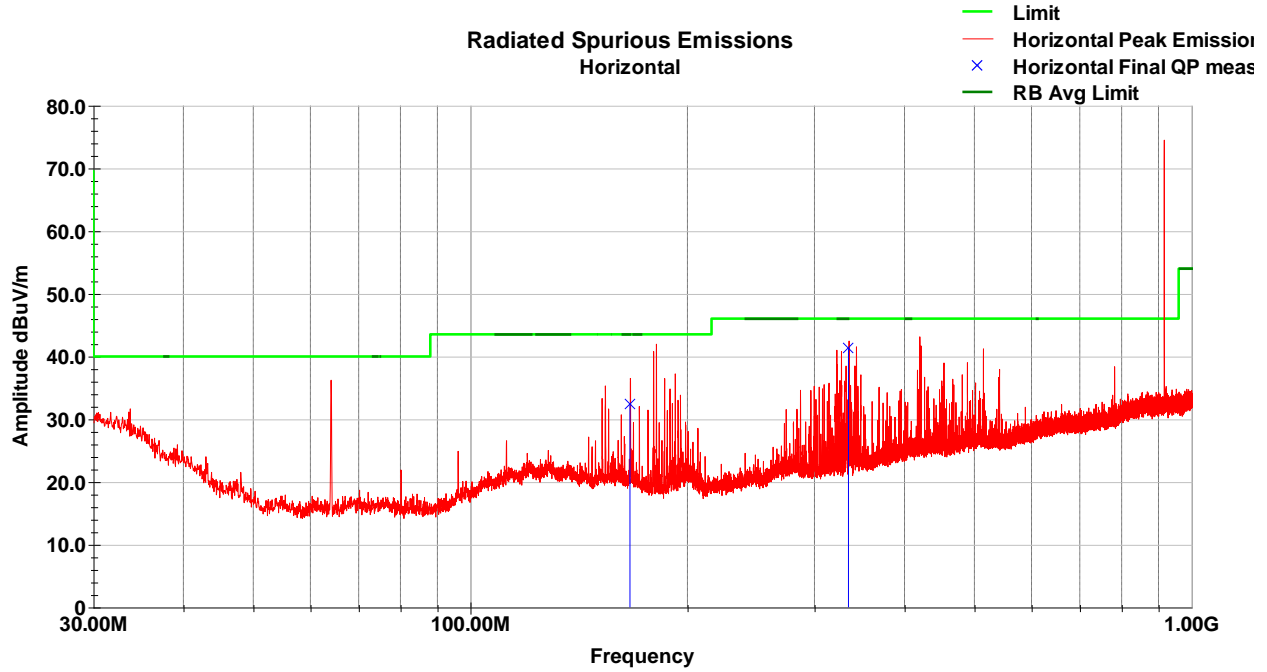
4.5.1 30-1000 MHz

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										

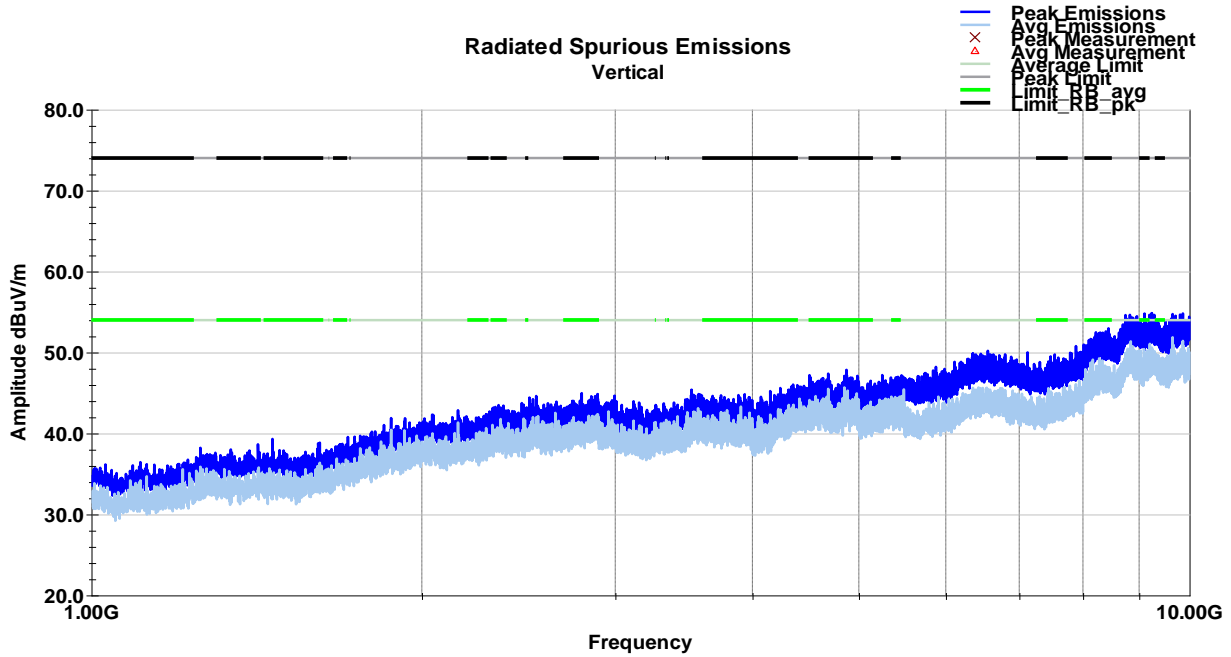
Horizontal Plot



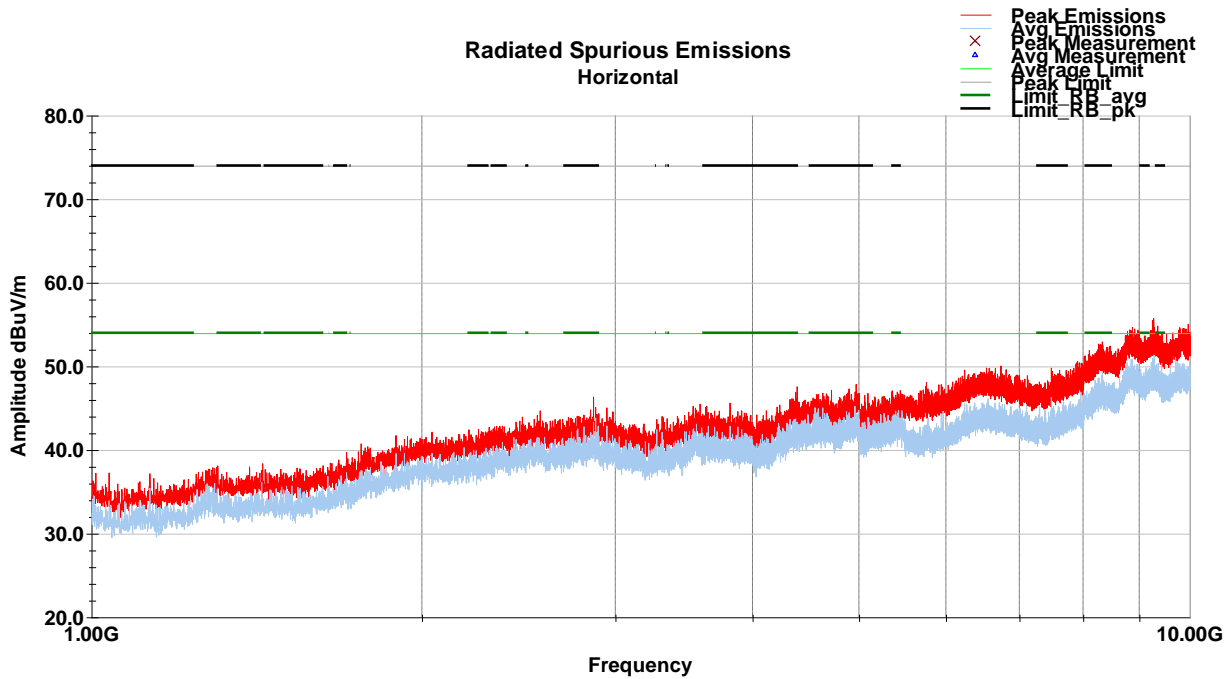
Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
166.44	46.1	H	46.0	186.0	16.4	0.7	30.8	32.5	43.5	-11.1
334.40	51.5	H	191.0	339.0	18.8	1.3	30.4	41.3	46.0	-4.7
QP Value = Raw QP + AF + Loss - Amp								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

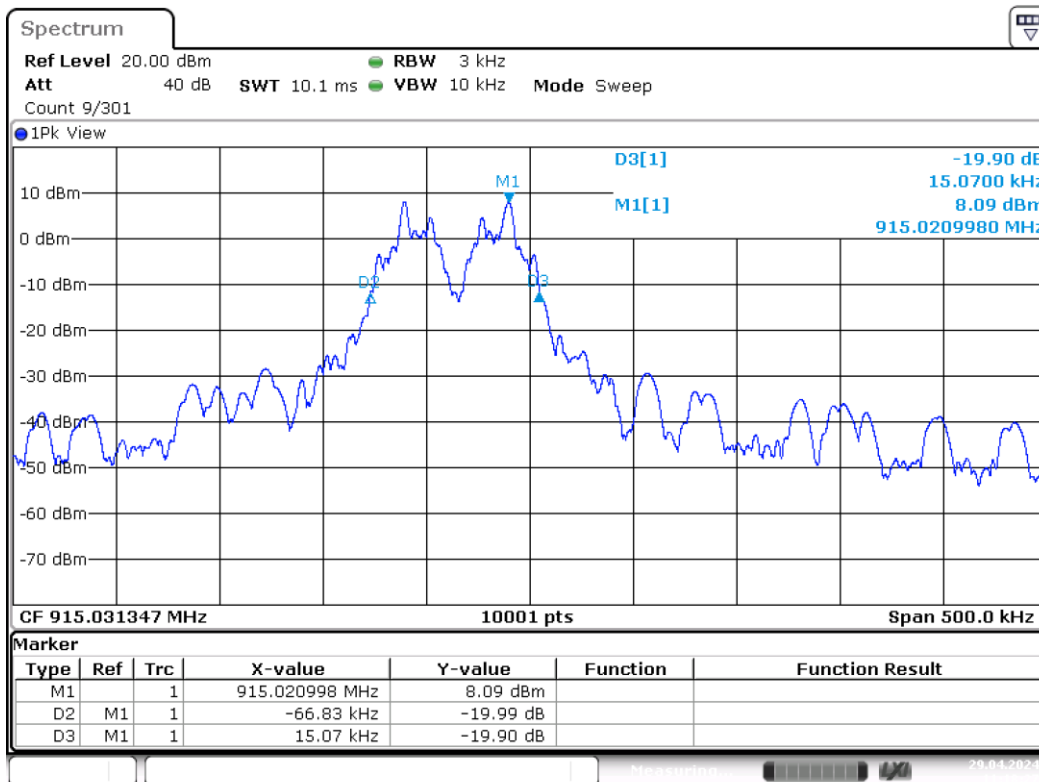
Tester: SGM

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

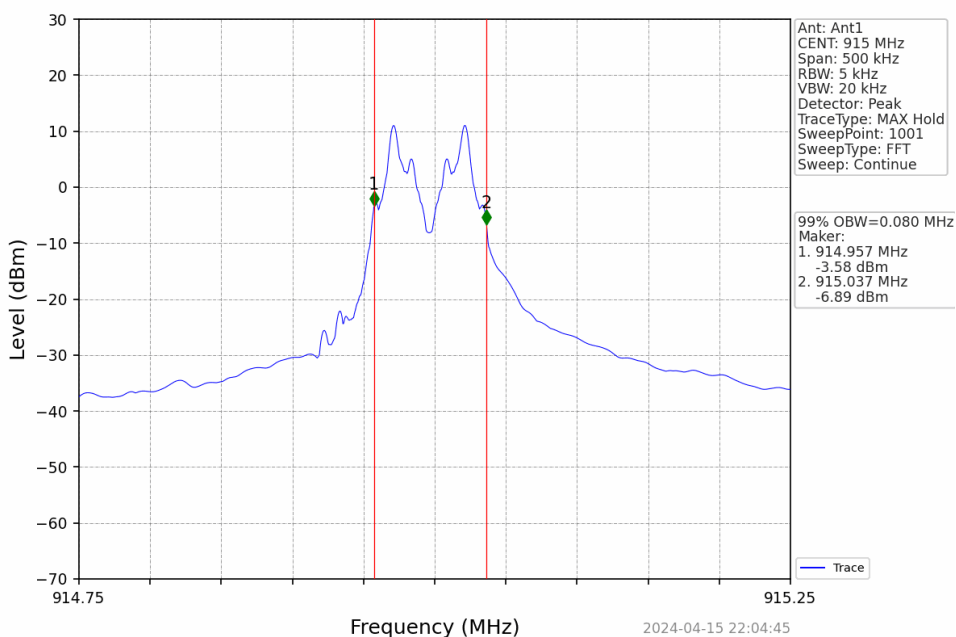
Test Description	EUT Frequency	Bandwidth
20 dB Bandwidth	915 MHz	81.9 kHz
99% Occupied Bandwidth	915 MHz	80 kHz

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

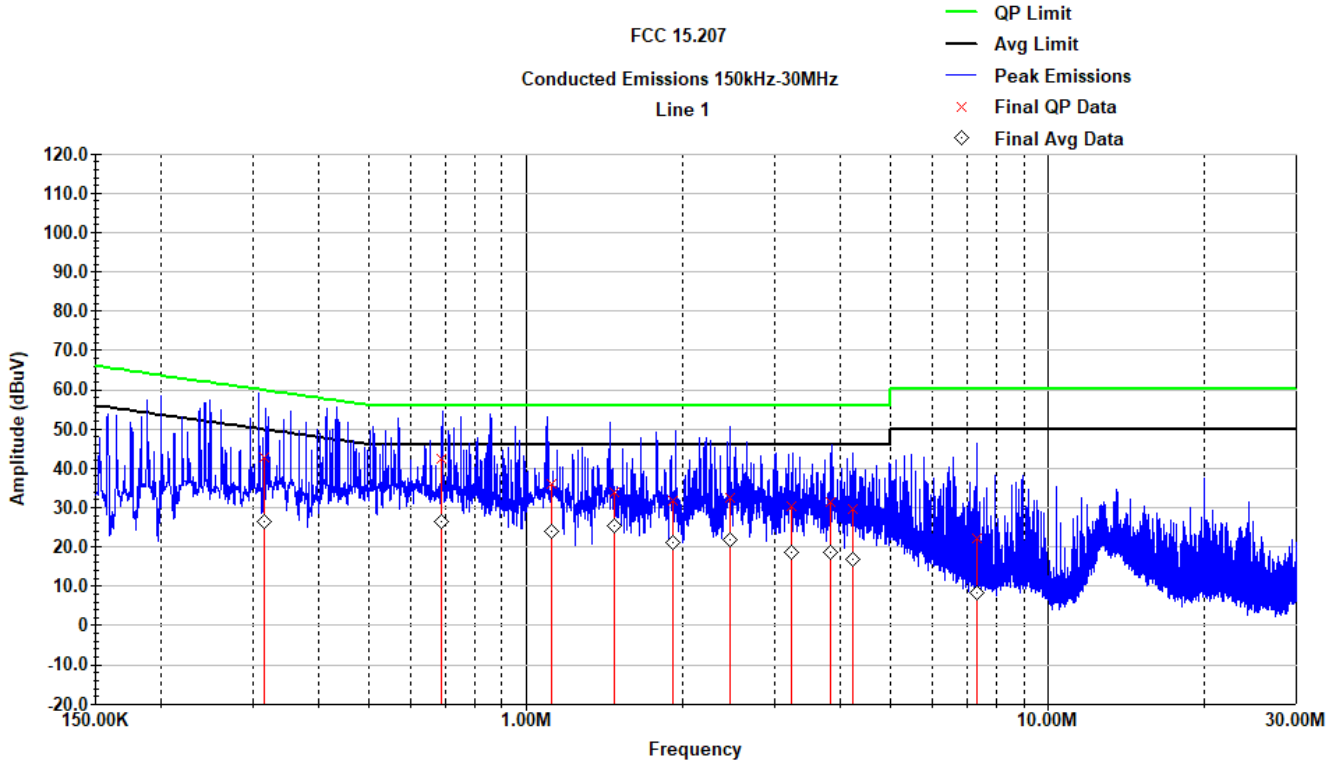
Test End Date: 15-Apr-2024

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



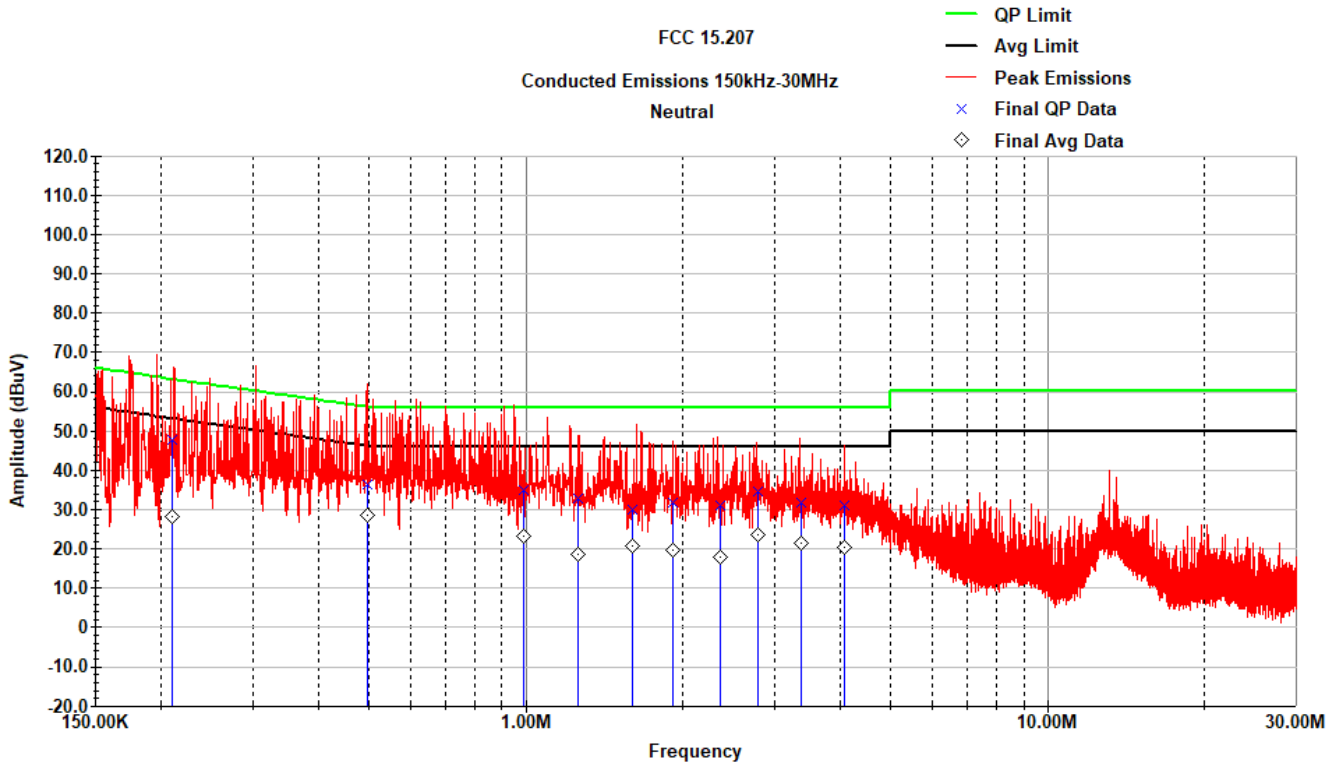
Frequency MHz	LISN dB	CF dB	TL dB	Raw Avg dBuV	Final Avg dBuV	Avg Limit dBuV	Avg Margin dB	Raw QP dBuV	Final QP dBuV	QP Limit dBuV	QP Margin dB
0.316	9.8	0.00	0.0	16.6	26.4	49.8	-23.4	33.0	42.8	59.8	-17.0
0.689	9.8	0.00	0.0	16.7	26.5	46	-19.5	32.7	42.5	56.0	-13.5
1.12	9.8	0.00	0.0	14.1	24	46	-22	26.3	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

Raw 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											
Raw 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