

COMPLIANCE WORLDWIDE INC. TEST REPORT 185-22R1

In Accordance with the Requirements of
Federal Communications Commission CFR Title 47 Part 15.231, Subpart C
Innovation, Science and Economic Development Canada RSS 210, Issue 10
Low Power License-Exempt Radio Communication Devices
Intentional Radiators

Issued to

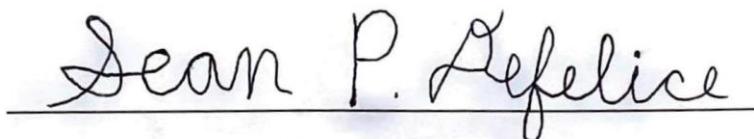
SimpliSafe Inc
294 Washington Street, 9th Floor
Boston, MA 02108

for the
Base Station
Model: SSBS3
433.42 MHz

FCC ID: U9K-BS3001
IC: 29902-BS3001

Report Issued on May 6, 2022
Revision R1 Issued on November 29, 2002

Tested by



Sean P. Defelice

Reviewed by



Larry K. Stillings

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1. Scope

This test report certifies that the Simplisafe, Inc, Base Station Model SSBS3 with 433.42 MHz Transmitter, as tested, meets the Subpart C, FCC Part 15.231 requirements and the ISED Canada RSS 210, Issue 10, Annex II Rules. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required. Revision R1 updates section 7.2.3 to reflect that device does not perform polling or supervision transmissions.

2. Product Details

2.1. Manufacturer:	SimpliSafe
2.2. Model Number:	SSBS3
2.3 Serial Number:	0045D022
2.4 Description of EUT:	The Base Station is the brains of your system. When one sensor or camera detects danger, it sends a signal to the Base Station, which sounds the siren and notifies you immediately. If it's unplugged or the power goes out, the 24-hour backup battery keeps you covered.
2.5 Power Source:	Battery 4.8 VDC, External AC Power Supply 6.5 VDC
2.6 Hardware Revision:	C
2.7 Software/Firmware Revision:	2.9.16
2.8. Modulation Type:	Frequency Shift Keying (2FSK)
2.9. Operating Frequency:	433.42 MHz
2.10. EMC Modifications:	None

3. Product Configuration

3.1. Operational Characteristics & Software

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Volts	Freq (Hz)	Description/Function
SimpliSafe	SSBS3	0045D022	6.5	VDC	Base Station
GangQi Electronic Co	GQ12-065160-FU	None	120	60	Switching Power Supply

3.3. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
None					



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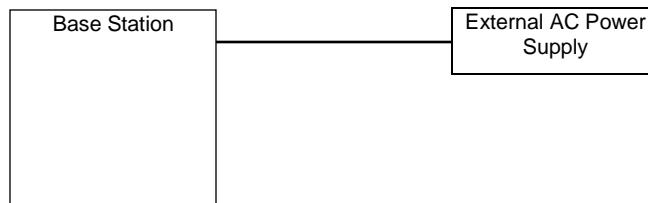
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3. Product Configuration (continued)

3.4. Equipment Cables

Cable Type	Length	Shield	From	To
Power Cable	3M	No	EUT	Power Supply

3.5. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
EMI Test Receiver, 9kHz - 7GHz ¹	Rohde & Schwarz	ESR7	101156	10/26/2023	2 Years
EMI Test Receiver, 10 Hz - 7GHz ¹	Rohde & Schwarz	ESR7	101770	7/23/2023	2 Years
Spectrum Analyzer, 2 Hz to 26.5 GHz ²	Rohde & Schwarz	FSW26	102057	6/24/2023	2 Years
Spectrum Analyzer, 9 kHz to 40 GHz ³	Rohde & Schwarz	FSV40	100899	8/12/2022	2 Years
Spectrum Analyzer 10 Hz – 40 GHz ¹	Rohde & Schwarz	FSVR40	100909	9/18/2022	2 Years
Biconilog Antenna, 30 MHz - 2 GHz	Sunol Sciences	JB1	A050913	7/1/2023	2 Years
Loop Antenna 9 kHz - 30 MHz	EMCO	6512	9309-1139	4/14/2024	2 Years
Dbl Ridged Guide Antenna 1- 18 GHz	ETS-Lindgren	3117	00143292	5/11/2024	2 Years
Dbl Ridged Guide Antenna 1- 18 GHz	ETS-Lindgren	3117	00227631	4/21/2024	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A01323	11/30/2023	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B H02	3008A00329	1/20/2024	2 Years
LISN	EMCO	3825/2	9109-1860	1/4/2023	1 Year
Digital Barometer	Control Company	4195	ID236	1/27/2024	2 Years

¹ ESR7 Firmware revision: V3.48 SP3, Date installed: 09/30/2020

Previous V3.48 SP2, installed 07/23/2020.

² FSW26 Firmware revision: V4.71 SP1, Date installed: 11/16/2020

Previous V4.61, installed 08/11/2020.

³ FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016

Previous V2.30 SP1, installed 10/22/2014.

⁴ FSVR40 Firmware revision: V2.23 SP1, Date installed: 08/19/2016

Previous V2.23, installed 10/22/2014.



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4. Measurements Parameters (continued)

4.2. Software Used to Perform Test

Manufacturer	Software Description	Title or Model #	Rev.	Report Sections
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	Used to process conducted emissions data

4.3 Measurement & Equipment Setup

Test Dates:	5/2/2022, 5/3/2022
Test Engineer:	Sean Defelice
Site Temperature (°C):	19.5
Relative Humidity (%RH):	32
Frequency Range:	30 kHz to 5 GHz
Measurement Distance:	3 Meters and 1 Meter
EMI Receiver IF Bandwidth:	200 Hz (30 kHz – 150 kHz) 9 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1 GHz) 1 MHz (>1 GHz)
EMI Receiver Avg Bandwidth:	≥ 3 * RBW or IF(BW)
Detector Functions:	Peak, Quasi-Peak and Average

4.4 Test Procedure

Test measurements were made in accordance FCC Part 15.231: Periodic operation within the bands 40.66 – 40.70 MHz and above 70 MHz, ISED RSS-210, Issue 10 Annex II and RSS-GEN, Issue 5.

The test methods used to generate the data in this test report are in accordance with ANSI C63.10: 2013, American National Standard for Methods for Unlicensed Wireless Devices.



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5. Choice of Equipment for Test Suits

5.1. Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2. Presentation

The test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for the product equipment configuration.

5.3. Choice of Operating Frequencies

The transmitter in the unit under test utilizes a single operating frequency at approximately 433.42 MHz

Test Mode Mode 1: Transmit mode
Description: Automatic FSK message every 2 seconds
Radio PA Setting: -20dB
Data Rate: 4.8kbps
Frequency Deviation: 26 kHz
Modulation: 2FSK
Maximum Packet Length (ms): 570

Mode 2: Normal mode
Description: Representative of Production FW
Radio PA Setting: -20dB
Data Rate: 4.8kbps
Frequency Deviation: 26 kHz
Modulation: 2FSK
Typical Packet Length (ms): 570



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6. Measurement Summary

Test Requirement	FCC Requirement	ISED Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN 6.8	7.1	Compliant	The antenna is enclosed within the device under test.
Operational Requirements	15.231 (a)(1)	RSS-210 A1.1(a)	7.2.1	N/A	The EUT is not a manually operated transmitter
	15.231 (a)(2)	RSS-210 A1.1(b)	7.2.2	Compliant	
	15.231 (a)(3)	RSS-210 A1.1(c)	7.2.3	Compliant	
	15.231 (a)(4)	RSS-210 A1.1(d)	7.2.4	N/A	Not something that is measured.
	15.231 (a)(5)	N/A	7.2.5	N/A	Not something that is measured
Radiated Field Strength of Fundamental	15.231 (b)	RSS-210 A1.1.2 (a)	7.3	Compliant	
Radiated Field Strength of Harmonics	15.231 (b)(3)	RSS-210 A1.1.2 (b)	7.4	Compliant	
Spurious Radiated Emissions	15.231 (b)(3), 15.209	RSS-GEN 6.13.2	7.5	Compliant	
Emission Bandwidth (20 dB)	15.231 (c)	Not Required	7.6	Compliant	
Bandwidth of Momentary Signals (99% Emission BW)	Not Required	IC RSS-210 A1.3 RSS-GEN 6.7	7.7	Compliant	
Conducted Emissions	15.207	RSS-GEN 8.8	7.8	Compliant	
Determination of Average Factor (Duty Cycle)	15.35 (c)	RSS-GEN 8.2	7.9	TBD	For pulsed transmissions less than 100 mS, PRF <=20 Hz

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7. Measurement Data

7.1. Antenna Requirement (Section 15.203 RSS-GEN 6.8)

Requirement: 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.

Status: Compliant - The antenna utilized by the device under test is contained inside a sealed plastic enclosure.

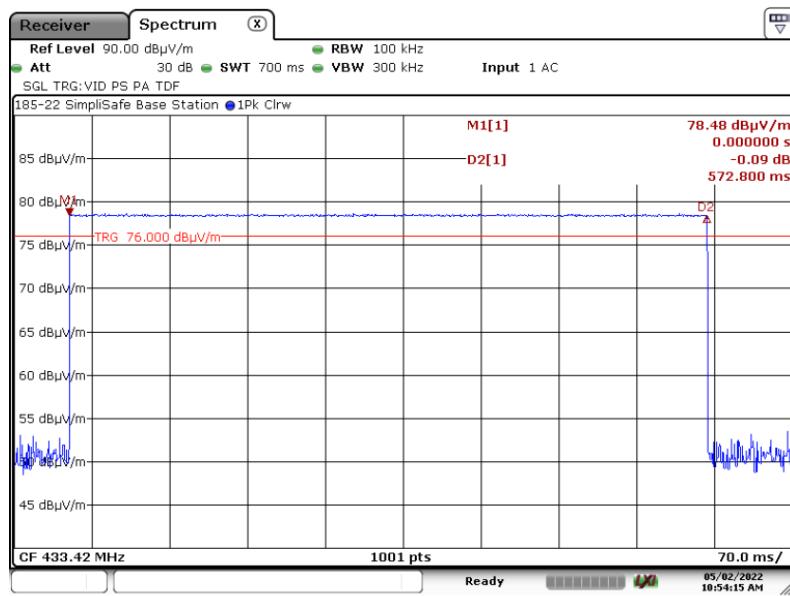
7.2. Operational Requirements (Section 15.231(a), RSS-210 A1.1(a))

7.2.1. Requirement: A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released (Section 15.231(a)(1)).

Status: The transmitter is activated automatically. Therefore this section does not apply. Refer to section 6.2.2.

7.2.2. Requirement: A transmitter activated automatically shall cease transmission within 5 seconds after activation (Section 15.231(a)(2), RSS-210 A1.1(b)).

Status: Compliant – The device's longest transmission is for 572.8 mS.



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7.2. Operational Requirements (Section 15.231(a)) RSS-210 A1.1 (continued)

7.2.3. Requirement: Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour (Section 15.231(a)(3), RSS-210 A1.1(c)).

Status: N/A, the device does not perform polling or supervision transmissions..

7.2.4. Requirement: Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition. (Section 15.231(a)(4), RSS-210 A1.1(d)).

Status: Noted.

7.2.5. Requirement: Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

Status: Noted.

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7. Measurement Data (continued)

7.3. Radiated Field Strength of Fundamental (15.231, Section (b), RSS-210 A1.1.2(a))

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operating within the 260-470 MHz frequency bands shall comply with the limits specified in FCC Part 15.231, Section (b). The limit is based on a linear interpolation of the following field strength:

Fundamental Frequency (MHz)		Field Strength of Fundamental (μ V/m)
260–470		3,750 to 12,500 μ V/m

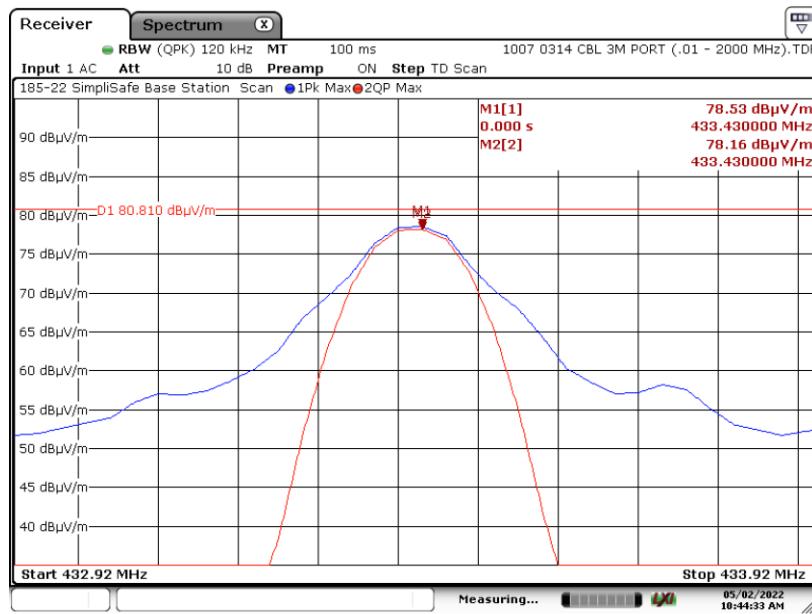
Fundamental Limit at 433.42 MHz = 10,976 μ V/m = 80.81 dB μ V/m

Test Note: A Quasi Peak Detector was used to compare against the average limits due to the longest duration of a digital transmission.

Conclusion: Compliant - The radiated field strength of the device under test complies with the requirements detailed in FCC Part 15.231, Section (b) and RSS-210 A1.1.2(a).

7.3.1. Worst Case Radiated Field Strength of Fundamental

Frequency (MHz)	Amplitude ¹ (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)		Ant Polarity	Ant Height	Turntable Azimuth	Result
	Peak	Avg	Peak	Avg	Peak	Avg				
433.43	78.53	78.16	100.81	80.81	-27.28	-2.65	V	111	324	Compliant



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7. Measurement Data (continued)

7.4. Radiated Field Strength of Harmonics (15.231, Section (b), RSS-210 A.1.1.2(b))

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operating within the 260-470 MHz frequency band shall comply with the limits specified in FCC Part 15.231, Section (b). The limit is based on a linear interpolation of the following field strength:

Fundamental Frequency (MHz)	Field Strength of Spurious Emissions (μ V/m)
260–470	375 to 1250

$$\text{Spurious Emissions Limit} = 1,097.58 \mu\text{V/m} = 60.81 \text{ dB}\mu\text{V/m}$$

Test Notes: For emissions falling within in the restricted bands of operation (reference FCC Part 15.205), the lower FCC Part 15.209 limits take precedence. The peak field strength may not be greater than 20 dB above the average limit.

Conclusion: Compliant - The device under test complies with the requirements detailed in FCC 15.231, Section B and RSS-210 A1.1.2(b).

7.4.1. Harmonics < 1 GHz

Freq. (MHz)	Measured Peak Field Strength ($\text{dB}\mu\text{V/m}$)		Duty Cycle CF (dB)	CISPR QP Field Strength ($\text{dB}\mu\text{V/m}$) ¹	Limit ($\text{dB}\mu\text{V/m}$)		Margin ($\text{dB}\mu\text{V/m}$) ²		Ant. Pol. (H/V)	Ant. Ht. (cm)	Table Position (Deg)	Result
	Peak	Avg.			Peak	Avg.	Peak	Avg.				
866.840	41.53	32.54	0.00	32.54	80.81	60.81	-39.28	-28.27	V	100	0	Compliant

7.4.2. Harmonics > 1 GHz

Freq. (MHz)	Measured Peak Field Strength ($\text{dB}\mu\text{V/m}$)		Duty Cycle CF (dB)	Average Field Strength ($\text{dB}\mu\text{V/m}$) ¹	Limit ($\text{dB}\mu\text{V/m}$)		Margin ($\text{dB}\mu\text{V/m}$) ²		Ant. Pol. (H/V)	Ant. Ht. (cm)	Table Position (Deg)	Result
	Peak	Avg.			Peak	Avg.	Peak	Avg.				
1300.260	40.14	28.64	0.00	40.14	74.00	54.00	-33.86	-25.36	H	150	0	Compliant
1733.680	41.34	30.34	0.00	41.34	80.81	60.81	-39.47	-30.47	H	150	0	Compliant
2167.100	44.12	32.42	0.00	44.12	80.81	60.81	-36.69	-28.39	H	150	0	Compliant
2600.520	45.62	33.40	0.00	45.62	80.81	60.81	-35.19	-27.41	H	150	0	Compliant
3033.940	45.86	34.00	0.00	45.86	80.81	60.81	-34.95	-26.81	H	150	0	Compliant
3467.360	45.76	34.12	0.00	45.76	80.81	60.81	-35.05	-26.69	H	150	0	Compliant
3900.780	46.86	34.65	0.00	46.86	74.00	54.00	-27.14	-19.35	V	150	0	Compliant
4334.200	47.67	35.27	0.00	47.67	74.00	54.00	-26.33	-18.73	V	150	0	Compliant

¹ Average Field Strength = Peak Field Strength – Duty Cycle Correction Factor



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7. Measurement Data (continued)

7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231, Section (b), RSS-GEN 6.13.2)

Requirement: The spurious radiated emissions requirements for intentional radiators shall demonstrate compliance with the field strength limits detailed in Part 15.231, Section B, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

Procedure: This test was performed in accordance with the information provided in 47CFR Part 15.231, Section (b).

Test measurements were made in accordance with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

Conclusion: Compliant - The Emissions from the DUT did not exceed the field strength levels specified in Part 15.231, Section B and RSS-GEN 6.13.2.

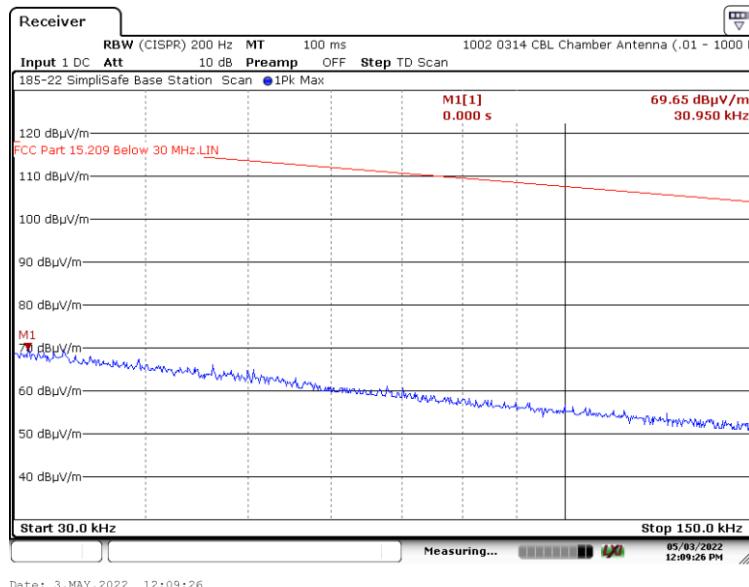
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7. Measurement Data (continued)

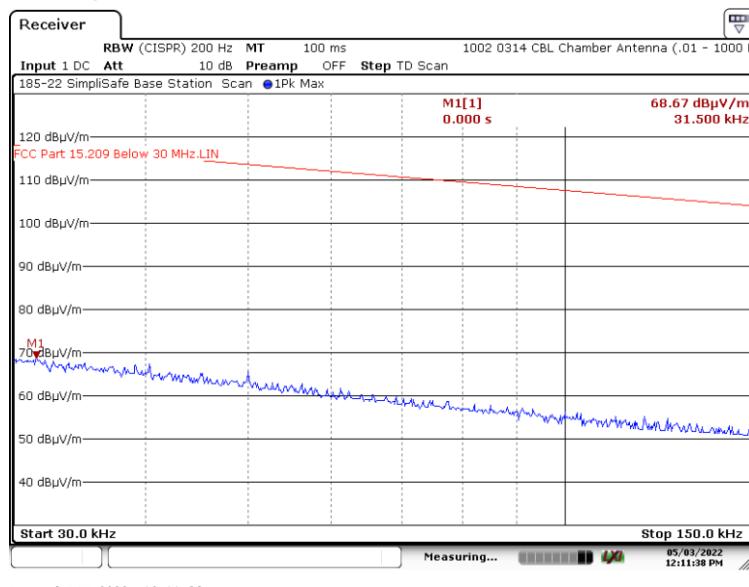
7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b), RSS-GEN 6.13.2) (continued)

7.5.1. Spurious Radiated Emissions, 30 kHz to 150 kHz Test Results

7.5.1.1. Parallel Antenna



7.5.1.2. Perpendicular Antenna





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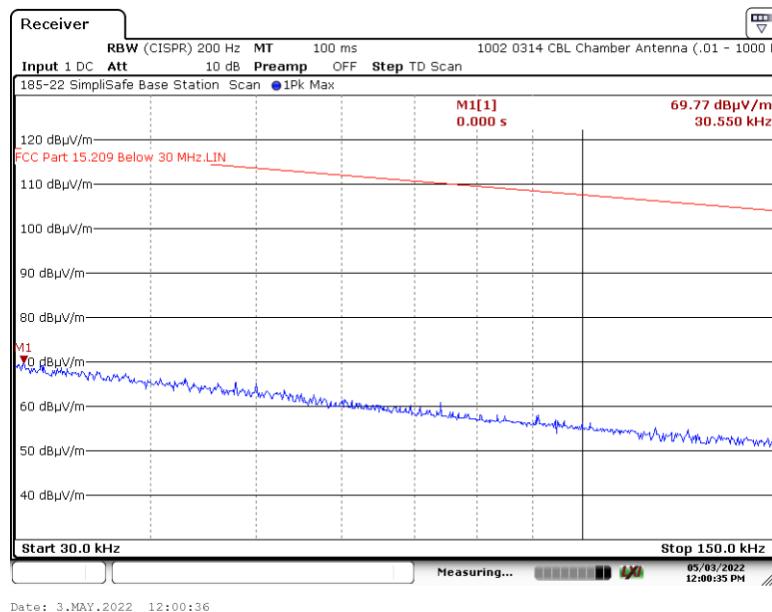
Issue Date: 11/29/2022

7. Measurement Data (continued)

7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b), RSS-GEN 6.13.2) (continued)

7.5.1. Spurious Radiated Emissions, 30 kHz to 150 kHz Test Results

7.5.1.3. Ground Parallel Antenna



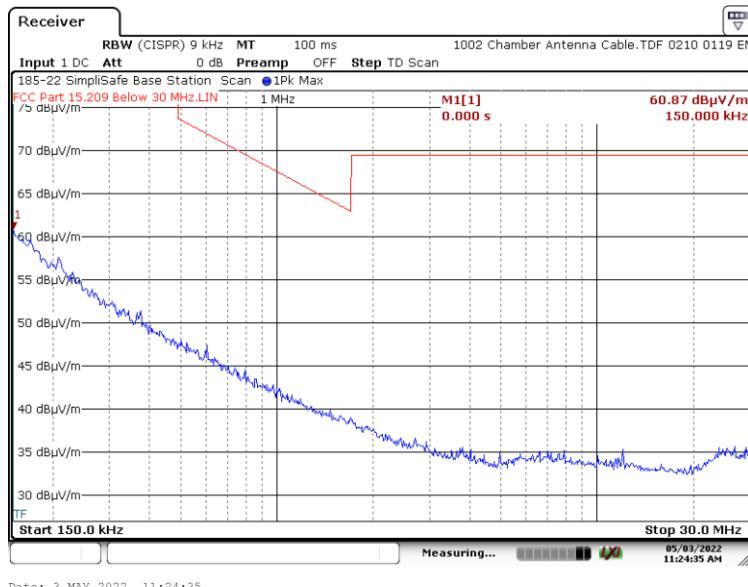
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7. Measurement Data (continued)

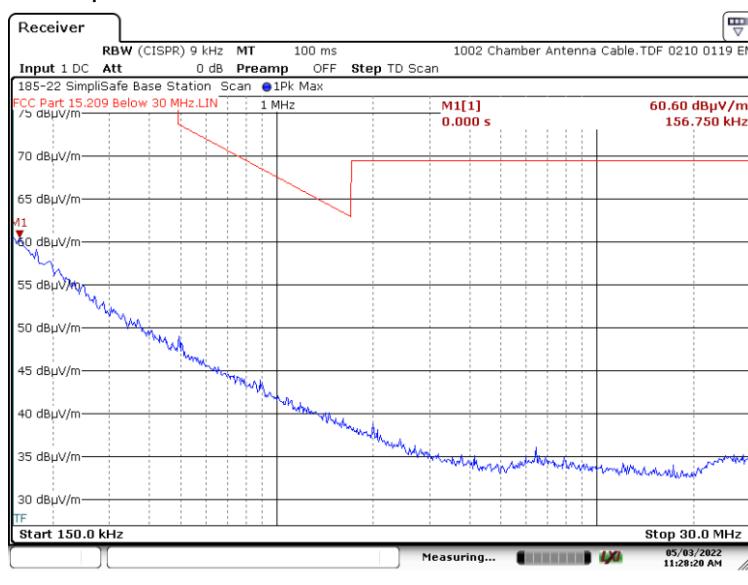
7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b), RSS-GEN 6.13.2) (continued)

7.5.2. Spurious Radiated Emissions, 150 kHz to 30 MHz Test Results

7.5.2.1. Parallel Antenna



7.5.2.2. Perpendicular Antenna



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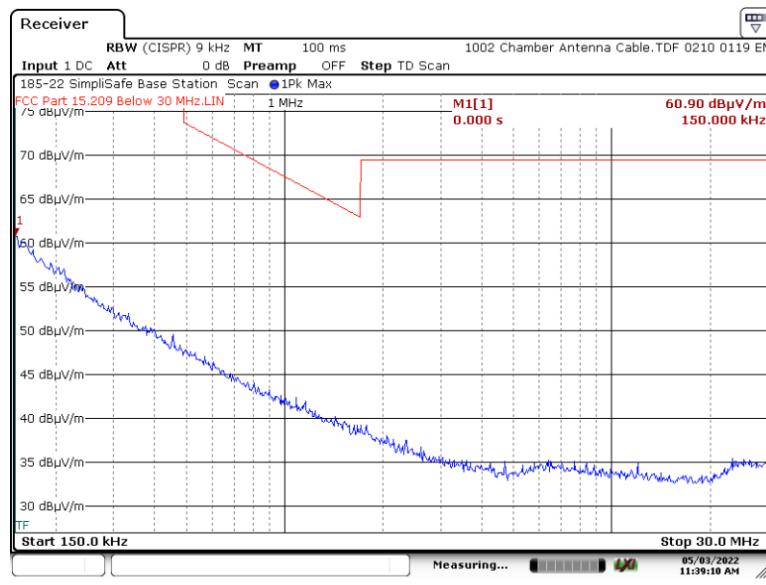
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7. Measurement Data (continued)

7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b), RSS-GEN 6.13.2) (continued)

7.5.2. Spurious Radiated Emissions, 150 kHz to 30 MHz Test Results

7.5.2.3. Ground Parallel Antenna



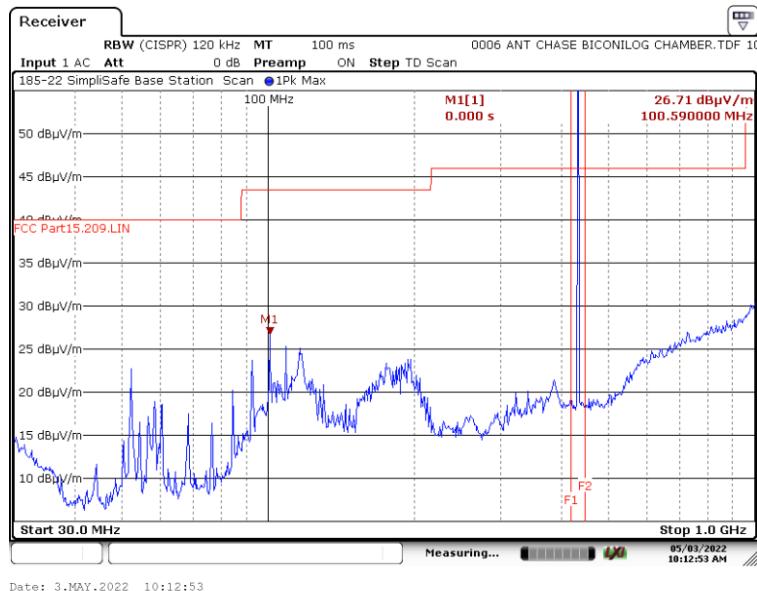
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7. Measurement Data (continued)

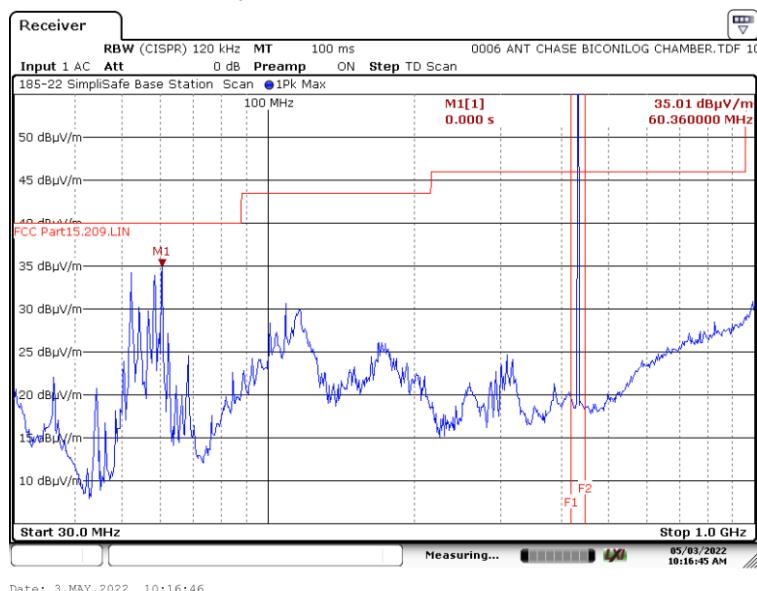
7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b), RSS-GEN 6.13.2) (continued)

7.5.3. Spurious Radiated Emissions, 30 MHz to 1 GHz Test Results

7.5.3.1. Horizontal Polarity



7.5.3.2. Vertical Polarity



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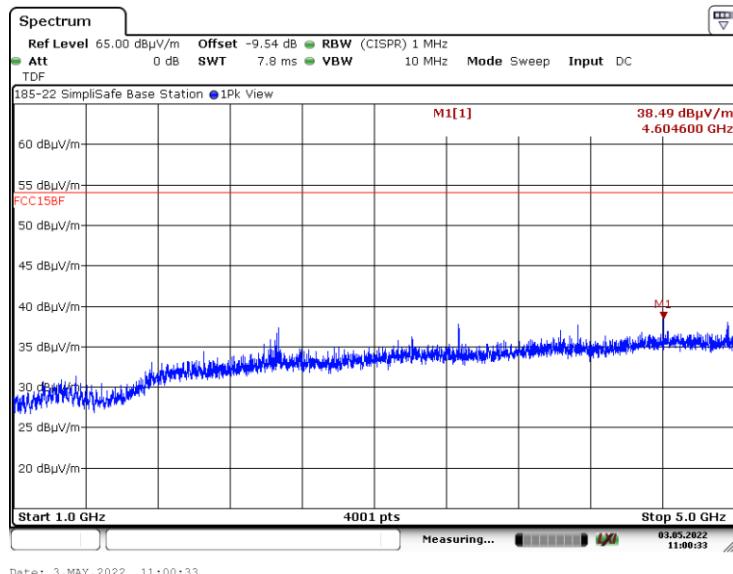
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7. Measurement Data (continued)

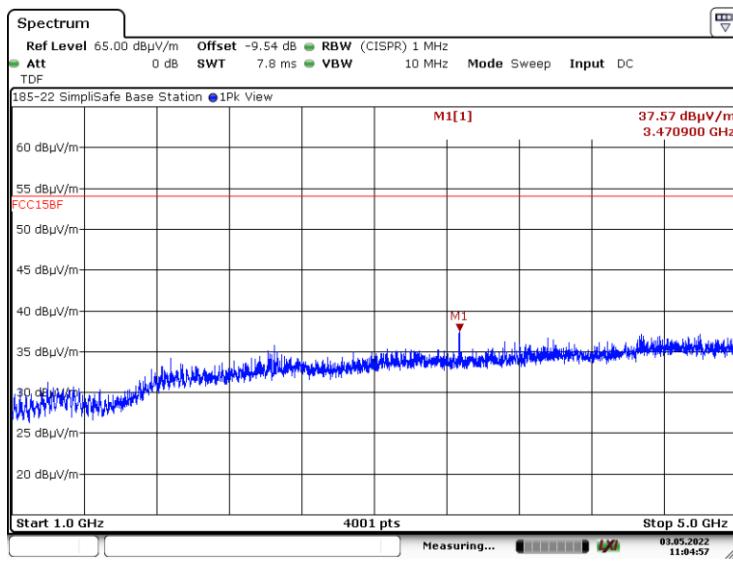
7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b), RSS-GEN 6.13.2) (continued)

7.5.4. Spurious Radiated Emissions, 1 to 5 GHz Test Results

7.5.4.1. Horizontal Polarity



7.5.4.2. Vertical Polarity



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7. Measurement Data (continued)

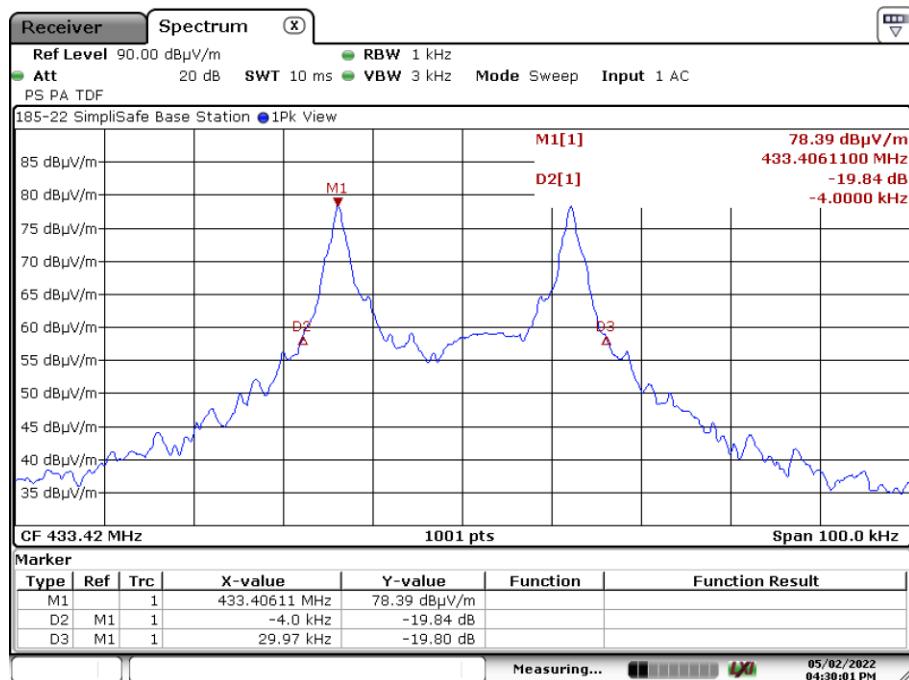
7.6. Emission Bandwidth (FCC P15.231 (c)

Requirement: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Note: Reference ANSI C63.10:2013, Section 6.9.2. The span range for the SA display shall be between two times and five times the OBW. The nominal IF filter bandwidth (3 dB RBW) should be approximately 1% to 5% of the OBW, unless otherwise specified, depending on the applicable requirement. The dynamic range of the SA at the selected RBW shall be more than 10 dB below the target "dB down" (attenuation) requirement.

Conclusion: Compliant - The DUT emission bandwidth meets the above requirement.

Fundamental Frequency (MHz)	-20 dB Bandwidth (MHz)	Limit (MHz)	Result
433.42	0.03397	1.084	Compliant



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7. Measurement Data (continued)

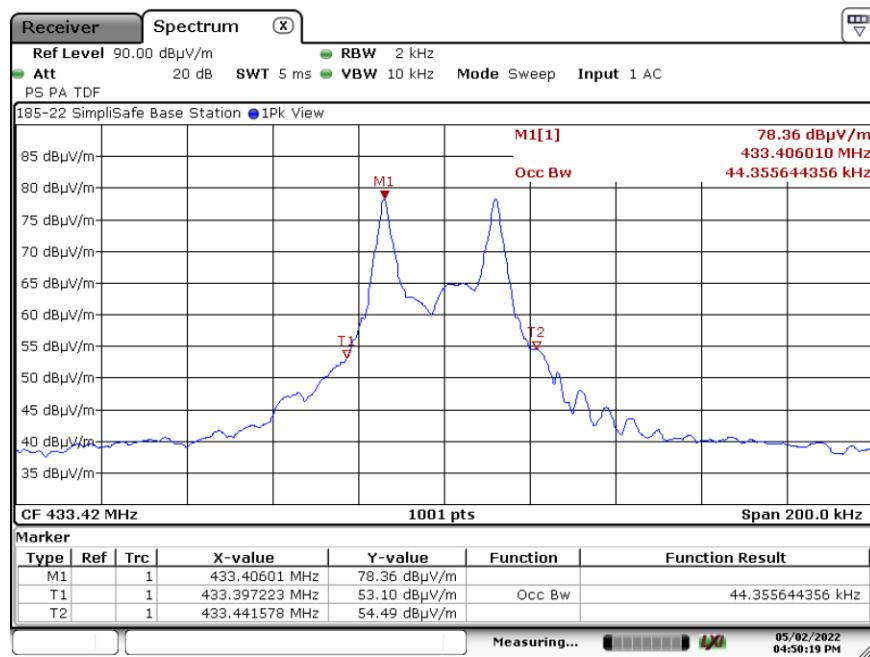
7.7. Bandwidth of Momentary Signals (IC RSS-210 A1.1.3)

Requirement: The 99% bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz - 900 MHz.

Test Note: Reference RSS-Gen, Section 4.6.1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

Conclusion: Compliant - The DUT bandwidth meets the above requirement.

Fundamental Frequency	99% Bandwidth	Limit	Result
(MHz)	(MHz)	(MHz)	
433.42	0.04436	1.084	Compliant



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7. Measurement Data (continued)

7.8. Conducted Emissions Test Setup

7.8.1. Regulatory Limit: FCC Part 15.207, RSS-GEN 8.8

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

7.8.2. Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
LISN	EMCO	3825/2	9109-1860	1/4/2023
EMI Test Receiver	Rohde & Schwarz	ESR7	101156	10/16/2023
Manufacturer	Software Description	Title/Model #	Rev.	
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	

7.8.3. Measurement & Equipment Setup

Test Date:	5/4/2022
Test Engineer:	Sean Defelice
Site Temperature (°C):	24
Relative Humidity (%RH):	25
Frequency Range:	0.15 MHz to 30 MHz
EMI Receiver IF Bandwidth:	9 kHz
EMI Receiver Avg Bandwidth:	≥ 3 * RBW or IF(BW)
Detector Functions:	Peak, Quasi-Peak. & Average
Measurement Uncertainty	± 3.56 dB

7.8.4. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2014, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

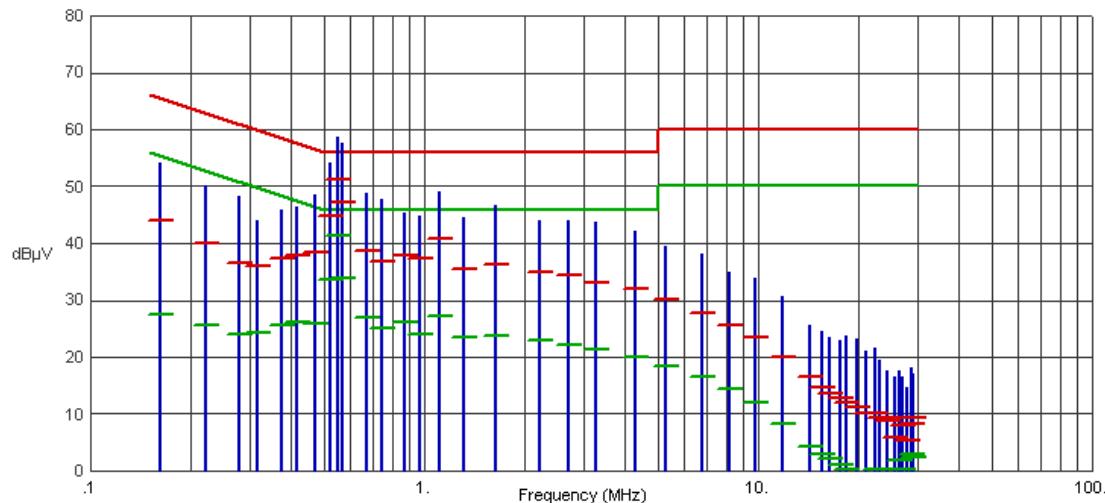
Sample Calculation: Final Result = Measurement Value + LISN Factor + Cable Loss.

Note: All correction factors are loaded into the measurement instrument prior to testing to determine the final result.

Test Number: 185-22R1
Issue Date: 11/29/2022

7. Conducted Emissions Test Results

7.8.5. 120 Volts, 60 Hz Phase

Test No.: 185-22, 120 Volts, 60 Hz Phase
FCC, Class B


Frequency (MHz)	Pk Amp (dB μ V)	QP Amp (dB μ V)	QP Limit (dB μ V)	QP Margin (dB)	Avg Amp (dB μ V)	Avg Limit (dB μ V)	Avg Margin (dB)	Comments
.1613	54.14	44.09	65.40	-21.31	27.41	55.40	-27.99	
.2220	50.10	39.96	62.74	-22.78	25.69	52.74	-27.05	
.2783	48.23	36.42	60.87	-24.45	24.05	50.87	-26.82	
.3165	44.08	35.92	59.80	-23.88	24.27	49.80	-25.53	
.3728	45.99	37.35	58.44	-21.09	25.68	48.44	-22.76	
.4155	46.53	37.92	57.54	-19.62	26.18	47.54	-21.36	
.4718	48.64	38.31	56.48	-18.17	25.88	46.48	-20.60	
.5213	54.10	44.83	56.00	-11.17	33.54	46.00	-12.46	
.5528	58.75	51.26	56.00	-4.74	41.44	46.00	-4.56	
.5708	57.48	47.17	56.00	-8.83	33.79	46.00	-12.21	
.6698	48.73	38.67	56.00	-17.33	26.97	46.00	-19.03	
.7440	47.81	36.90	56.00	-19.10	25.20	46.00	-20.80	
.8768	45.24	37.77	56.00	-18.23	26.07	46.00	-19.93	
.9668	44.71	37.21	56.00	-18.79	23.99	46.00	-22.01	
1.1063	49.10	40.90	56.00	-15.10	27.24	46.00	-18.76	
1.3178	44.55	35.36	56.00	-20.64	23.37	46.00	-22.63	
1.6440	46.55	36.27	56.00	-19.73	23.70	46.00	-22.30	
2.2245	44.09	34.87	56.00	-21.13	22.82	46.00	-23.18	
2.7128	44.09	34.46	56.00	-21.54	22.24	46.00	-23.76	
3.2528	43.67	33.04	56.00	-22.96	21.28	46.00	-24.72	
4.2855	42.12	31.94	56.00	-24.06	19.89	46.00	-26.11	
5.2890	39.50	30.02	60.00	-29.98	18.39	50.00	-31.61	
6.7673	38.04	27.83	60.00	-32.17	16.50	50.00	-33.50	
8.2253	34.83	25.69	60.00	-34.31	14.40	50.00	-35.60	
9.7890	33.93	23.40	60.00	-36.60	11.98	50.00	-38.02	
11.8140	30.58	20.13	60.00	-39.87	8.15	50.00	-41.85	
14.3183	25.68	16.44	60.00	-43.56	4.32	50.00	-45.68	
15.4793	24.42	14.63	60.00	-45.37	2.89	50.00	-47.11	
16.3568	23.56	13.68	60.00	-46.32	2.09	50.00	-47.91	
17.5200	22.96	12.70	60.00	-47.30	.99	50.00	-49.01	



Test Number: 185-22R1



Issue Date: 11/29/2022

7. Conducted Emissions Test Results

7.8.5. 120 Volts, 60 Hz Phase (Continued)

Frequency (MHz)	Pk Amp (dB μ V)	QP Amp (dB μ V)	QP Limit (dB μ V)	QP Margin (dB)	Avg Amp (dB μ V)	Avg Limit (dB μ V)	Avg Margin (dB)	Comments
18.3840	23.83	11.92	60.00	-48.08	.28	50.00	-49.72	
19.7048	23.25	11.22	60.00	-48.78	-.32	50.00	-50.32	
20.9985	20.99	10.09	60.00	-49.91	-.36	50.00	-50.36	
22.4678	21.68	10.13	60.00	-49.87	.36	50.00	-49.64	
23.1383	19.37	9.30	60.00	-50.70	-.23	50.00	-50.23	
24.3510	17.52	8.85	60.00	-51.15	.37	50.00	-49.63	
25.6988	16.58	5.85	60.00	-54.15	-2.22	50.00	-52.22	
26.4863	17.52	9.33	60.00	-50.67	1.90	50.00	-48.10	
27.1590	16.52	7.96	60.00	-52.04	.27	50.00	-49.73	
27.9825	14.54	5.37	60.00	-54.63	-2.15	50.00	-52.15	
28.6823	18.05	8.33	60.00	-51.67	3.03	50.00	-46.97	
29.2335	16.97	9.27	60.00	-50.73	2.31	50.00	-47.69	



Test Number: 185-22R1



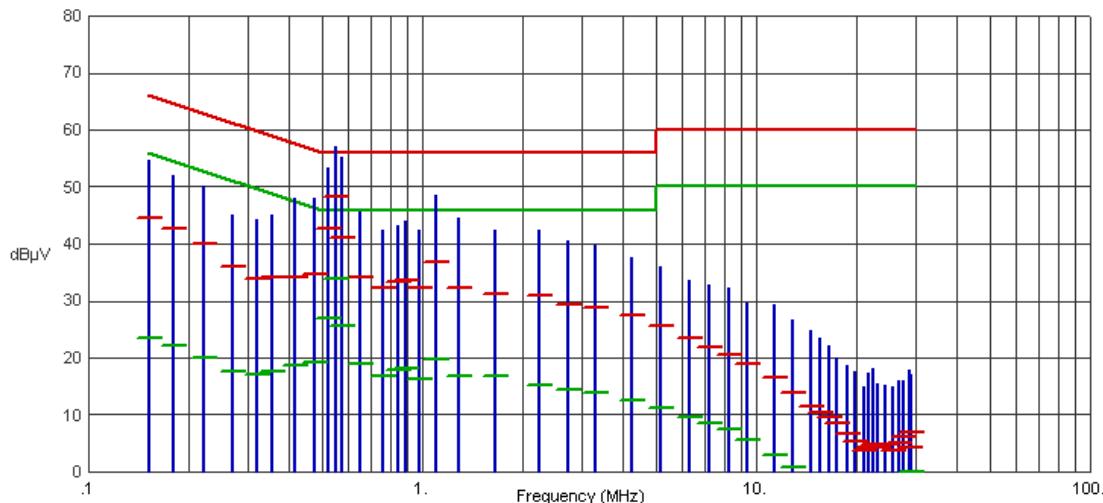
Issue Date: 11/29/2022

7. Conducted Emissions Test Results (continued)

7.8.6. 120 Volts, 60 Hz Neutral

Test No.: 185-22, 120 Volts, 60 Hz Neutral

FCC, Class B



Frequency (MHz)	Pk Amp (dB μ V)	QP Amp (dB μ V)	QP Limit (dB μ V)	QP Margin (dB)	Avg Amp (dB μ V)	Avg Limit (dB μ V)	Avg Margin (dB)	Comments
.1523	54.66	44.53	65.87	-21.34	23.55	55.87	-32.32	
.1793	51.95	42.59	64.52	-21.93	22.10	54.52	-32.42	
.2220	50.19	39.89	62.74	-22.85	19.97	52.74	-32.77	
.2715	44.95	36.00	61.07	-25.07	17.58	51.07	-33.49	
.3188	44.15	33.85	59.74	-25.89	17.14	49.74	-32.60	
.3548	45.19	34.12	58.85	-24.73	17.64	48.85	-31.21	
.4155	47.88	34.12	57.54	-23.42	18.72	47.54	-28.82	
.4740	47.98	34.69	56.44	-21.75	19.11	46.44	-27.33	
.5235	53.43	42.54	56.00	-13.46	27.02	46.00	-18.98	
.5528	57.12	48.29	56.00	-7.71	33.78	46.00	-12.22	
.5753	55.30	41.18	56.00	-14.82	25.65	46.00	-20.35	
.6540	45.58	34.01	56.00	-21.99	18.99	46.00	-27.01	
.7620	42.38	32.18	56.00	-23.82	16.67	46.00	-29.33	
.8475	43.19	33.44	56.00	-22.56	17.86	46.00	-28.14	
.8948	43.87	33.62	56.00	-22.38	18.24	46.00	-27.76	
.9803	42.39	32.37	56.00	-23.63	16.30	46.00	-29.70	
1.1018	48.45	36.74	56.00	-19.26	19.85	46.00	-26.15	
1.2908	44.41	32.23	56.00	-23.77	16.82	46.00	-29.18	
1.6553	42.31	31.30	56.00	-24.70	16.77	46.00	-29.23	
2.2448	42.39	30.82	56.00	-25.18	15.29	46.00	-30.71	
2.7218	40.62	29.26	56.00	-26.74	14.37	46.00	-31.63	
3.2820	39.65	28.87	56.00	-27.13	13.75	46.00	-32.25	
4.2585	37.57	27.54	56.00	-28.46	12.66	46.00	-33.34	
5.1968	36.08	25.53	60.00	-34.47	11.25	50.00	-38.75	
6.2880	33.62	23.45	60.00	-36.55	9.71	50.00	-40.29	
7.2533	32.78	21.92	60.00	-38.08	8.65	50.00	-41.35	
8.2838	32.23	20.52	60.00	-39.48	7.42	50.00	-42.58	
9.3728	29.68	19.03	60.00	-40.97	5.56	50.00	-44.44	
11.3415	29.27	16.64	60.00	-43.36	3.06	50.00	-46.94	
12.8355	26.66	13.96	60.00	-46.04	.72	50.00	-49.28	



Test Number: 185-22R1



Issue Date: 11/29/2022

7. Conducted Emissions Test Results (continued)

7.8.6. 120 Volts, 60 Hz Neutral (Continued)

Frequency (MHz)	Pk Amp (dB μ V)	QP Amp (dB μ V)	QP Limit (dB μ V)	QP Margin (dB)	Avg Amp (dB μ V)	Avg Limit (dB μ V)	Avg Margin (dB)	Comments
14.5050	24.88	11.52	60.00	-48.48	-1.34	50.00	-51.34	
15.5400	23.52	10.47	60.00	-49.53	-2.18	50.00	-52.18	
16.4693	22.04	9.69	60.00	-50.31	-2.68	50.00	-52.68	
17.4165	20.12	8.46	60.00	-51.54	-3.26	50.00	-53.26	
18.6473	18.54	6.72	60.00	-53.28	-3.97	50.00	-53.97	
19.8308	17.54	5.37	60.00	-54.63	-4.45	50.00	-54.45	
21.0345	15.01	3.80	60.00	-56.20	-4.50	50.00	-54.50	
21.6578	17.31	4.26	60.00	-55.74	-4.03	50.00	-54.03	
22.4588	18.16	4.82	60.00	-55.18	-1.75	50.00	-51.75	
23.1360	15.41	4.28	60.00	-55.72	-3.70	50.00	-53.70	
24.3510	15.13	4.70	60.00	-55.30	-2.82	50.00	-52.82	
25.5210	14.85	3.69	60.00	-56.31	-3.39	50.00	-53.39	
26.6303	15.98	5.08	60.00	-54.92	-2.70	50.00	-52.70	
27.6495	16.00	6.12	60.00	-53.88	-2.37	50.00	-52.37	
28.6778	17.91	4.35	60.00	-55.65	-2.92	50.00	-52.92	
29.2335	17.12	6.99	60.00	-53.01	.09	50.00	-49.91	

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Issue Date: 11/29/2022

7. Measurement Data (continued)

7.9. Duty Cycle Calculations (ANSI C63.10:2013, Section 7.5, RSS-GEN 8.2)

Requirement: When the average value of the pulsed emissions from a DUT must be determined, the average can be found by measuring the peak pulse amplitude and determining the duty cycle correction factor of the pulse modulation. The duty cycle correction factor δ may be expressed in dB as in the following equation:

$$\delta \text{ (dB)} = 20 \log_{10} (\delta)$$

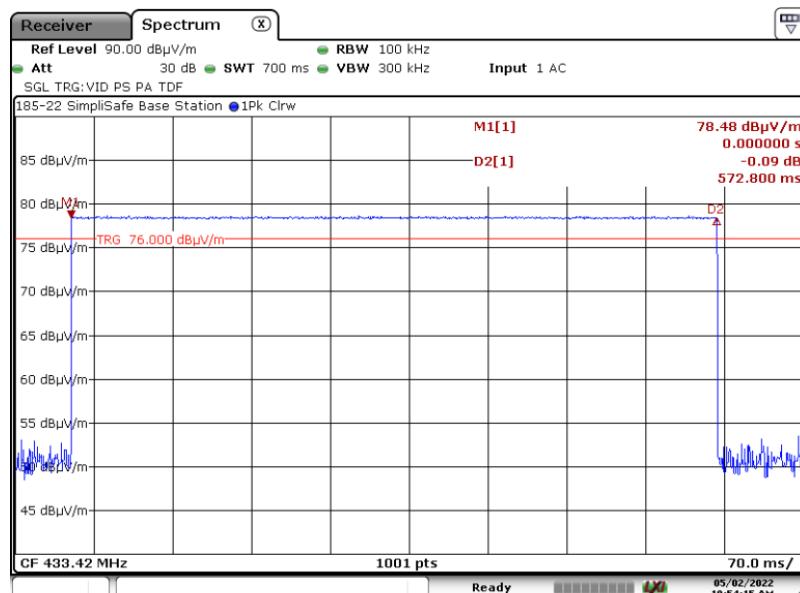
The longest transmitted frame exceeds 100 mS and therefore no duty cycle correction is applied to the measurements.

Note: The DUT was operated at its maximum transmission rate under normal operations to produce the following duty cycle.

7.9.1. Duty Cycle for the Device as Tested

Time of One Full Cycle (mS)	Time On During One Full Cycle (mS)	Duty Cycle	Duty Cycle Correction Factor (dB)	Applied Duty Cycle Correction Factor (dB)
2000.3	572.8	28.64%	-10.862	N/A

7.9.1a Duty Cycle Transmission Time (On Time)



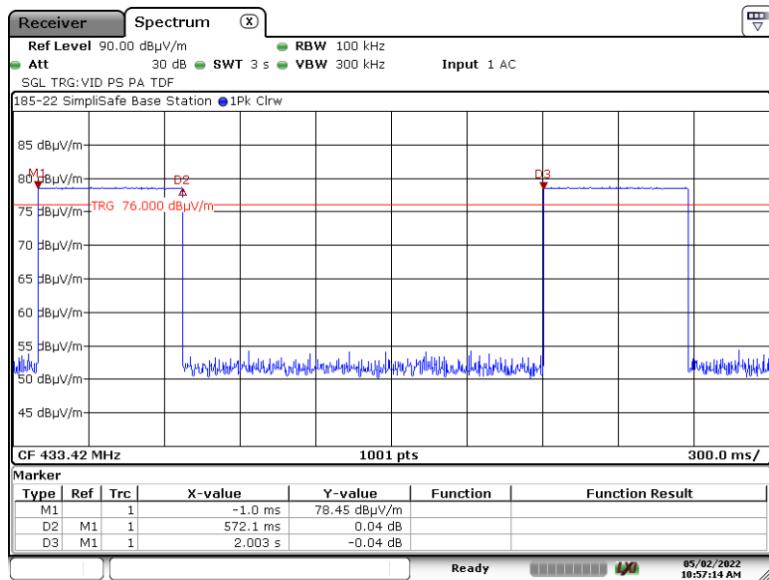
Date: 2 MAY 2022 10:54:15

Test Number: 185-22R1
Issue Date: 11/29/2022

7. Measurement Data (continued)

7.9. Duty Cycle Calculations (ANSI C63.10:2013, Section 7.5)

7.9.1d Repetition Time (On and Off Times)



Date: 2.MAY.2022 10:57:14

Note: This repetition time was chosen for measurement purposes.

8. Test Setup Photographs

8.1. Radiated Emissions Front View (Below 30 MHz)



8. Test Setup Photographs

8.2. Radiated Emissions Rear View < 30 MHz



8. Test Setup Photographs

8.3. Radiated Emissions Rear View 30 MHz – 1 GHz



8. Test Setup Photographs

8.5. Radiated Emissions Front View > 1 GHz



8. Test Setup Photographs

8.5. Radiated Emissions Rear View > 1 GHz



8. Test Setup Photographs

8.6. Conducted Emissions Front



8. Test Setup Photographs

8.7. Conducted Emissions Rear





Test Number: 185-22R1



Issue Date: 11/29/2022

9. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with the Federal Communications Commission (FCC) and Innovation Science and Economic Development Canada (ISED) standards. Through our American Association for Laboratory Accreditation (A2LA) ISO Guide 17025 Accreditation our test sites are designated with the FCC (designation number **US1091**), Industry Canada (file number **IC 3023A-1**) and VCCI (Member number 3168) under registration number A-0274.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 11, KN 13, KN 14-1, KN 22, KN 32, KN 61000-6-3, KN 61000-6-4.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022. A second conducted emissions site is also located in the basement of the OATS site with a 2.3 x 2.5 meter ground plane and a 2.4 x 2.4 meter vertical wall.

The radiated emissions test site for measurements above 1GHz is a 3 Meter open area test site (OATS) with a 3.6 by 3.6 meter anechoic absorber floor patch to achieve a quasi-free space measurement environment per ANSI C63.4/C63.10 and CISPR 16-1-4 standards.

The sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.