EMISSIONS TEST REPORT

(FULL COMPLIANCE)

Report Number: 101118340ATL-001a
Project Number: G101118340

Report Issue Date: October 11, 2017
Report Revised Date: October 18, 2017

Model(s) Tested: RF9540-N
Model(s) Partially Tested: None
Model(s) Not Tested but declared equivalent by the client: None

Standards: FCC Part 15 Subpart C Paragraph 15.205, 15.207, 15.209, 15.249 (08/25/2017)
RSS-210 Issue 9 August 2016 Annex B.10
RSS-GEN Issue 4, 2014
RSS-102 Issue 5, March 2015

Tested by:
Intertek Testing Services NA, Inc.
1950 Evergreen Blvd, Suite 100
Duluth, GA 30096 USA

Client:
Cooper Wiring Devices, Inc.
S203 Cooper Circle
Peachtree City, GA 30269 USA

Report prepared by

Mary T. Sampson/Senior Project Engineer

Report reviewed by

Kouma Sinn/EMC Staff Engineer

Table of Contents

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
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Radiated Emissions (47 CFR Part 15 Subpart C: 2017 Section 15.249 RSS-210 Issue 9, 2016, Annex B.10 RSS-GEN Issue 4, Section 8.9)	Compliant
7	AC Mains Conducted Emissions (47 CFR Part 15 Subpart C: 2017 Section 15.207(a) RSS-GEN Issue 4, Section 8.8)	Compliant
8	Duty Cycle (47 CFR Part 15 Subpart C: 2017 Section 15.35(c) RSS-GEN Issue 4, 2014, Section 6.10)	Compliant
9	20 dB and Occupied Bandwidth (47 CFR Part 15 Subpart C:2014 Section 15.231(c) RSS-210 Issue 8, 2010, Section A1.1.3)	Compliant
10	RF Exposure (47 CFR Part 2 Subpart J: 2014 Section 2.1091 RSS-102 Issue 5)	Compliant
11	Revision History	--

3 Client Information

This EUT was tested at the request of:

Client: Cooper Wiring Devices, Inc.
203 Cooper Circle
Peachtree City, GA 30269
USA

Contact: Ahmed El-Gayyar
Telephone: 770-631-2156
Fax: Not Provided
Email: Ahmed.Elgayya@cooperindustries.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Cooper Wiring Devices, Inc.
203 Cooper Circle
Peachtree City, GA 30269
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
RF Smart Dimmer Master	Cooper Wiring Devices, Inc.	RF9540-N	Continuous Transmission Sample - ATL1709011418-002
RF Smart Dimmer Master	Cooper Wiring Devices, Inc.	RF9540-N	Normal Duty Sample - ATL1709011418-001

Receive Date:	08/29/2017
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
The RF9540-N is a dimmer switch with a transmitter operating at 908 MHz.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
120Vac	300W Dimmable LED/CFL, 600W Incandescent/Halogen/Magnetic Low-Voltage/Electronic Low-Voltage	60Hz	1

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Continuous Transmission
2	Normal duty cycle

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	V1.1

Radio/Receiver Characteristics	
Frequency Band(s)	908.4 MHz
Modulation Type(s)	FSK
Maximum Output Power	0.07196499 mW (Calculated from radiated emission)
Test Channels	One (908.4 MHz)
Occupied Bandwidth	61.0 kHz
Frequency Hopper: Number of Hopping Channels	N/A
Frequency Hopper: Channel Dwell Time	N/A
Frequency Hopper: Max interval between two instances of use of the same channel	N/A
MIMO Information (# of Transmit and Receive antenna ports)	N/A
Equipment Type	Standalone
ETSI LBT/Adaptivity	N/A
ETSI Adaptivity Type	N/A
ETSI Temperature Category (I, II, III)	N/A
ETSI Receiver Category (1, 2, 3)	N/A
Antenna Type and Gain	0.0 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
A	AC Power – Continuous Transmission Sample AC Power – Normal Duty Cycle Sample	1.84 0.96	No	No	AC Mains
B	Load Cable	0.2	No	No	Light

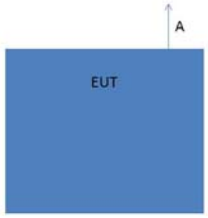
Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Light	SV Lighting	151511U	None provided

5.1 Method:

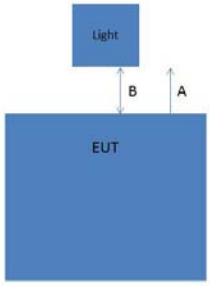
Configuration as required by FCC Part 15 Subpart C Section 15.249:08/25/2017, RSS-210 Issue 9 August 2016 Annex B.10, RSS-GEN Issue 4, 2014, RSS-102 Issue 5, March 2015, ANSI C63.10:2013, and ANSI C63.4:2014.

5.2 EUT Block Diagram:

Continuous Transmission



Normal Duty Cycle Sample



6 Radiated Emissions

6.1 Method

Tests are performed in accordance with 47 CFR Part 15 Subpart C: 2017 Section 15.205, 15.209(a), 15.249, RSS-210 Issue 9, 2016, Annex B.10, and RSS-GEN Issue 4, 2014, Section 8.9.

TEST SITE:

10 Meter Semi-Anechoic Chamber The test site for radiated emissions is located at 1950 Evergreen Blvd, Suite 100, Duluth, Georgia 30096. It is a 10 meter semi-anechoic chamber manufactured by Panashield. Embedded in the floor is a 3 meter diameter turntable.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	3.6 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	3.9 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.2 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.2 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.2 dB	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, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
213187;	Pocket weatherman - Rated 300 to 1099 mbar, 0 to 50°C, 0 to 100% RH.	Mannix	SAM700BAR	10030208	02/27/2017	02/27/2018
232944;	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
MP3;	Cable MP3, 18 GHz, N, 10m	Megaphase	G919-NKNK-394	MP3	05/03/2017	05/03/2018
ST-6;	RF Coax Cable - Rated 9 kHz to 18 GHz.	Teledyne Storm Micro	A81-0303-275	16-01-801	02/07/2017	02/07/2018
E-211;	RF Coax Cable	Megaphase	TM18-N1N1-120	15055601001	06/22/2017	06/22/2018
MM1;	RF Coax Cable 10KHz-18GHz	Maury Microwave	UC-N-MM36	161471	05/03/2017	05/03/2018
200074;	Preamplifier, 10 MHz to 2000 MHz, 37 dB gain	Mini-Circuits	ZKL-2	D052005	11/16/2016	11/16/2017
25401;	Comparison Noise Emitter, broadband noise source	York EMC	CNE III	679	10/27/2007	Verified
213061;	Antenna, Horn, <18 GHz	EMCO	3115	9208-3919	09/16/2016	09/16/2017
200108;	Preamplifier, 20 MHz to 18 GHz, 40 dB	A.H. Systems	PAM-0118	199	06/22/2017	06/22/2018
MM9;	RF Coax Cable 9KHz-18GHz	Maury Microwave	UC-N-MM267	1635290	10/07/2016	10/07/2017
MM5;	RF Coax Cable 10KHz-18GHz	Maury Microwave	UC-N-MM-118	163203	10/28/2016	10/28/2017

Software Utilized:

Name	Manufacturer	Version
Tile – Emissions for MXE	Quantum Change	3.4.K.22

6.3 Results:

The sample tested was found to Comply.

§15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz.

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(b) Fixed, point-to-point operation as referred to in this paragraph shall be limited to systems employing a fixed transmitter transmitting to a fixed remote location. Point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information are not allowed. Fixed, point-to-point operation is permitted in the 24.05-24.25 GHz band subject to the following conditions:

(1) The field strength of emissions in this band shall not exceed 2500 millivolts/meter.

(2) The frequency tolerance of the carrier signal shall be maintained within ±0.001% 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.

(3) Antenna gain must be at least 33 dBi. Alternatively, the main lobe beamwidth must not exceed 3.5 degrees. The beamwidth limit shall apply to both the azimuth and elevation planes. At antenna gains over 33 dBi or beamwidths narrower than 3.5 degrees, power must be reduced to ensure that the field strength does not exceed 2500 millivolts/meter.

(c) Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

§15.209 Radiated emission limits; general requirements.

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in §§15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

(f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based

on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device.

(g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

RSS-210 Annex B10.0

B.10 Bands 902-928 MHz, 2400-2483.5 MHz and 5725-5875 MHz

Devices shall comply with the following requirements:

(a) The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively. The field strength limits shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

(b) Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

The provisions of RSS-Gen regarding pulsed operation do not apply to CISPR measurement for the band 902-928 MHz.

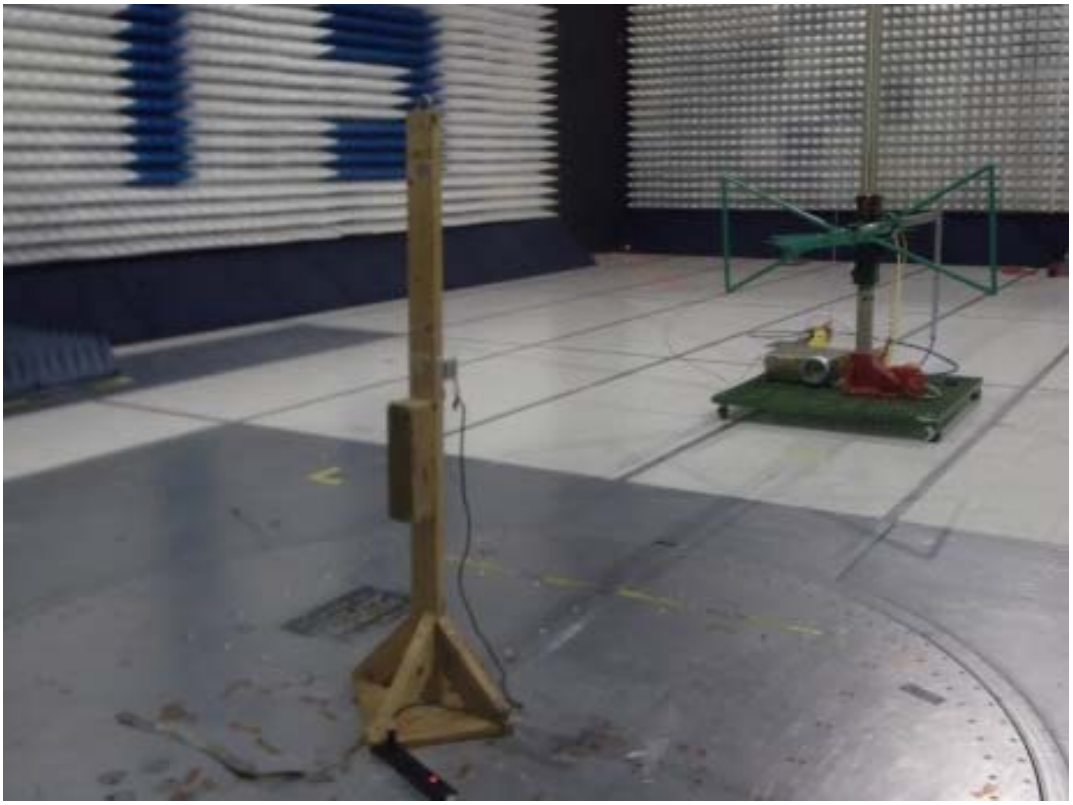
RSS-GEN Section 8.9

Fundamental Frequency (MHz)	Field Strength of Fundamental (µv/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

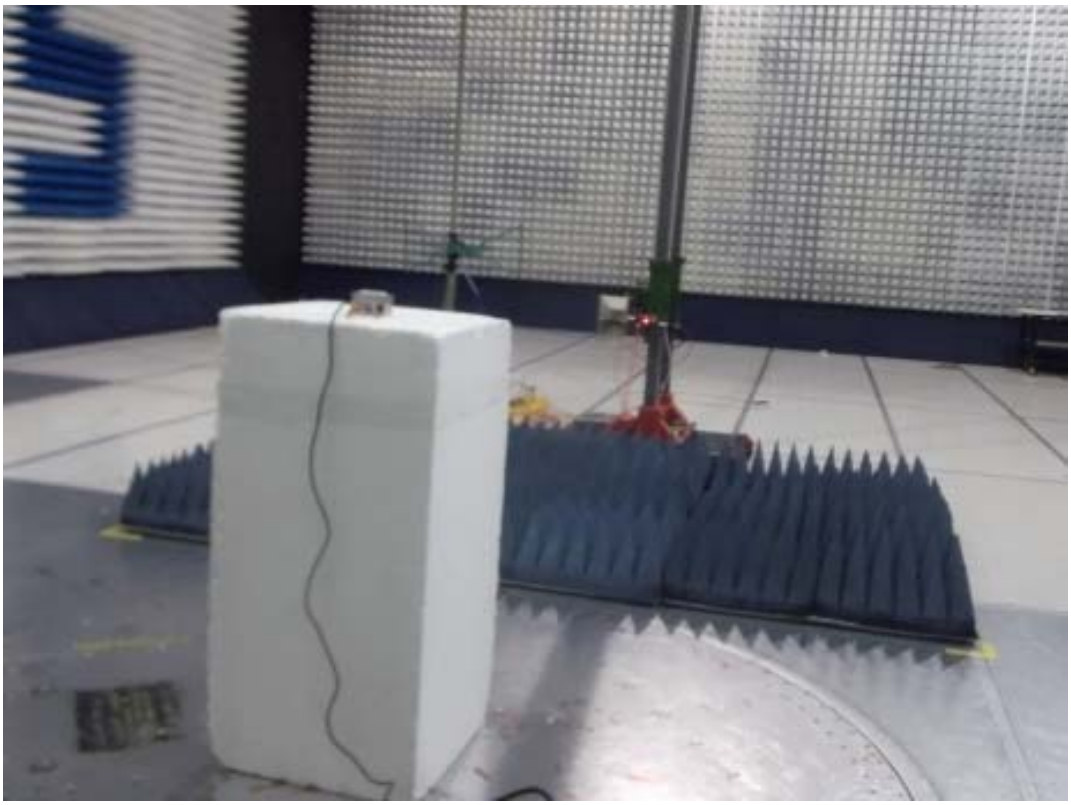
*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.
Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

6.4 Setup Photographs:

Below 1 GHz

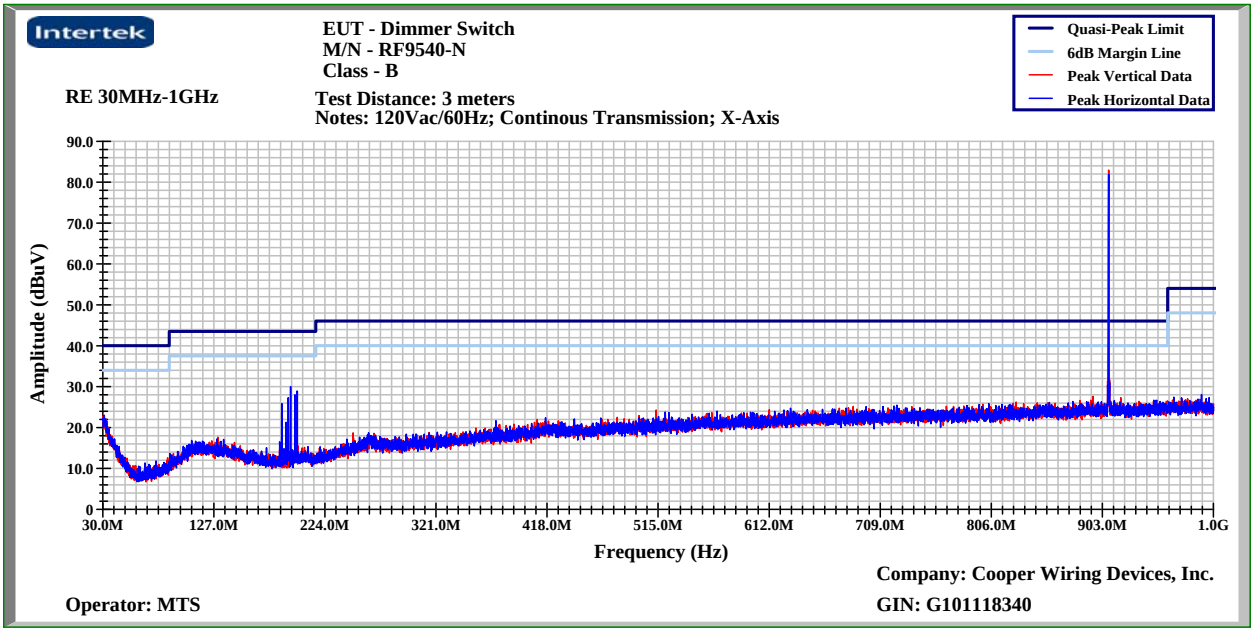


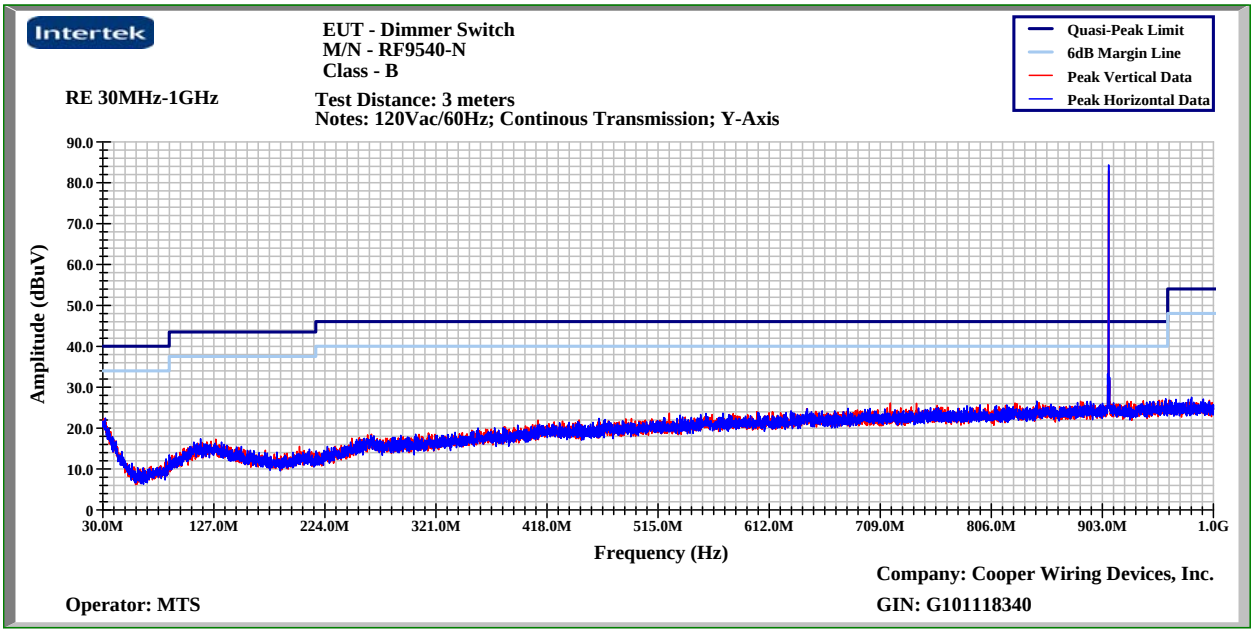
Above 1 GHz

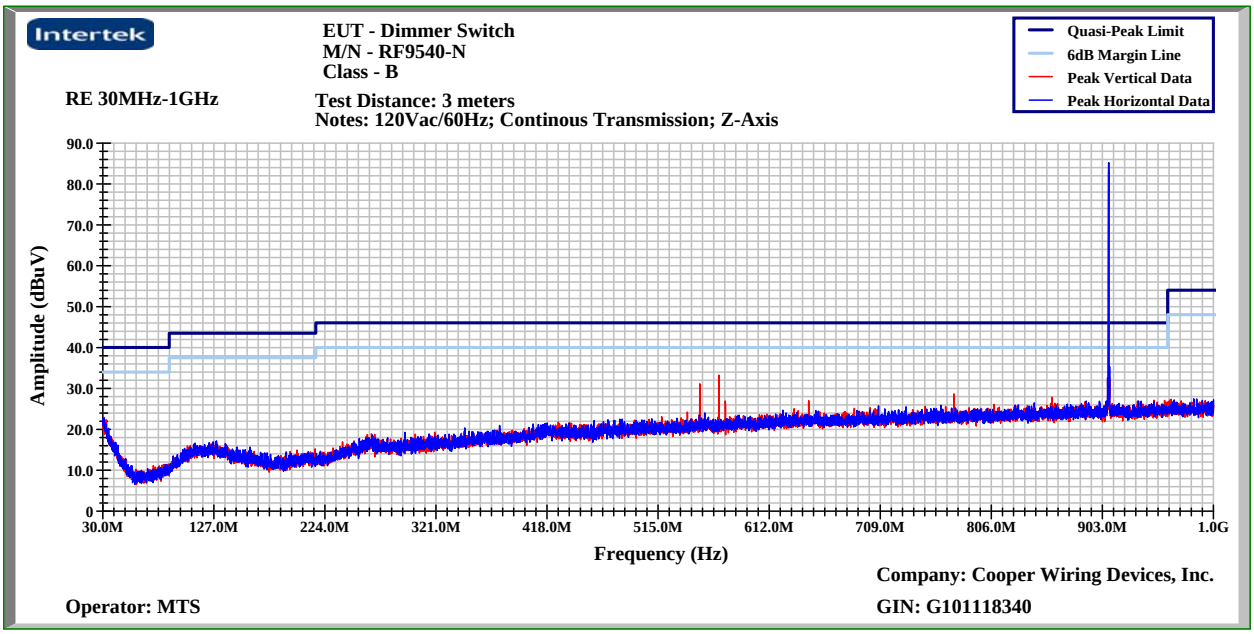


6.5 Plots/Data:

Below 1GHz





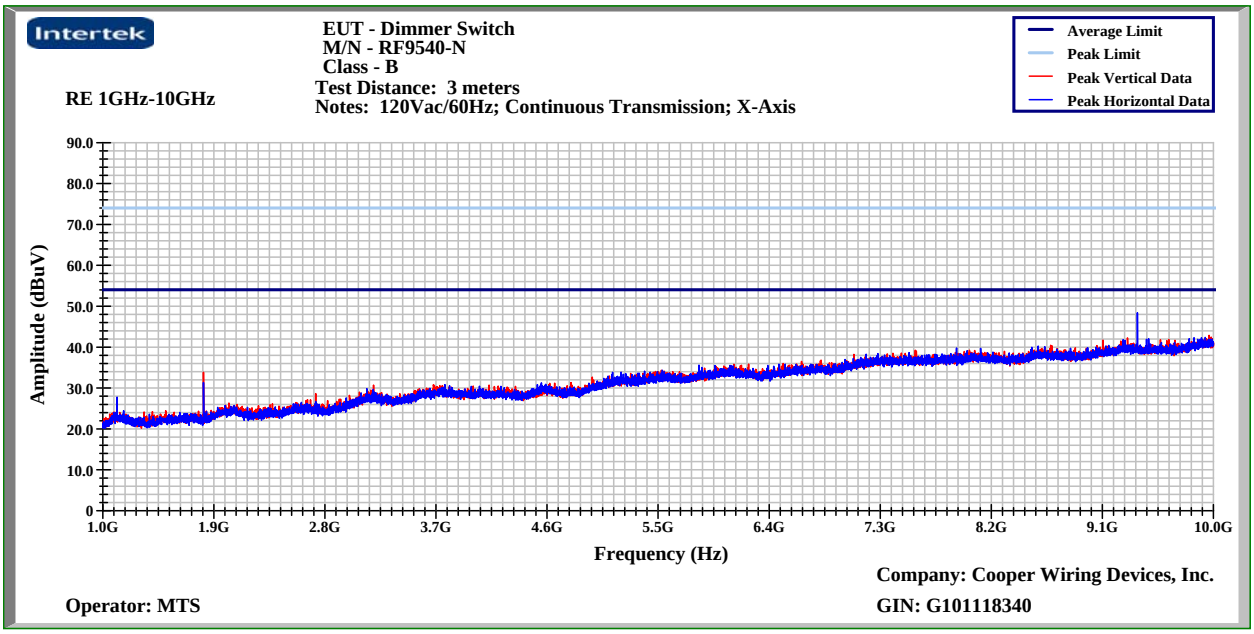


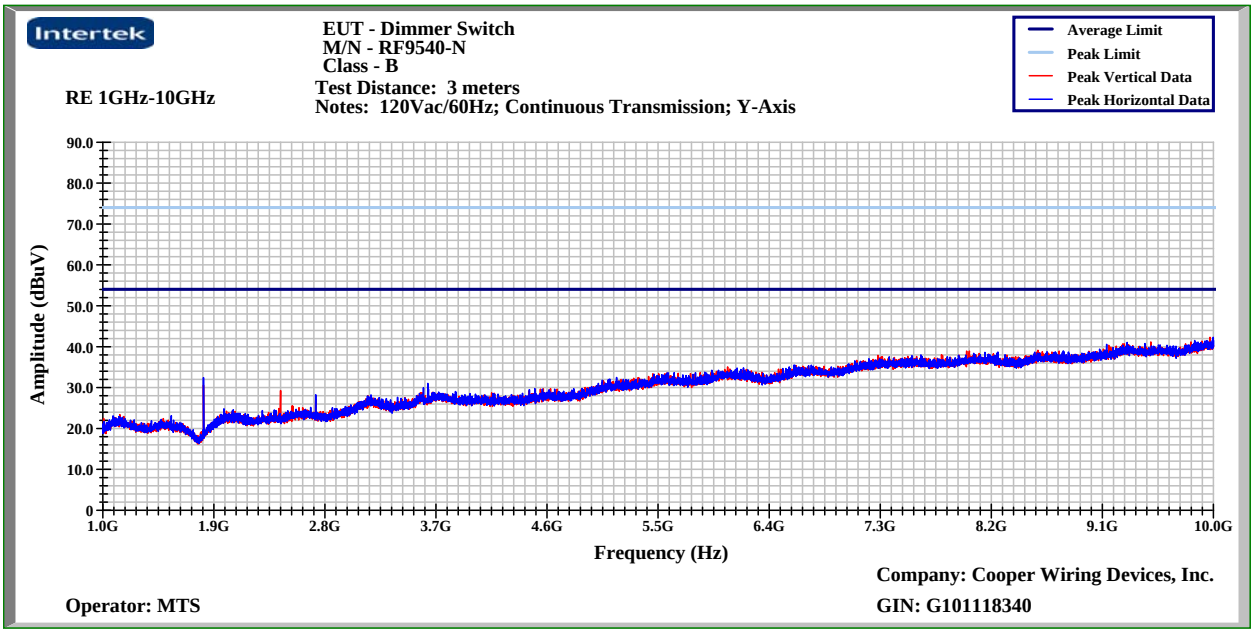
Client: Cooper Wiring Devices, Inc.
Model Number: RF0540-N
Project Number: G101118340
Tested By: MTS
Date: 08/30/2017
Frequency Range (MHz): 30MHz-1000MHz
Input power: 120Vac/60Hz
Detector(s): QP

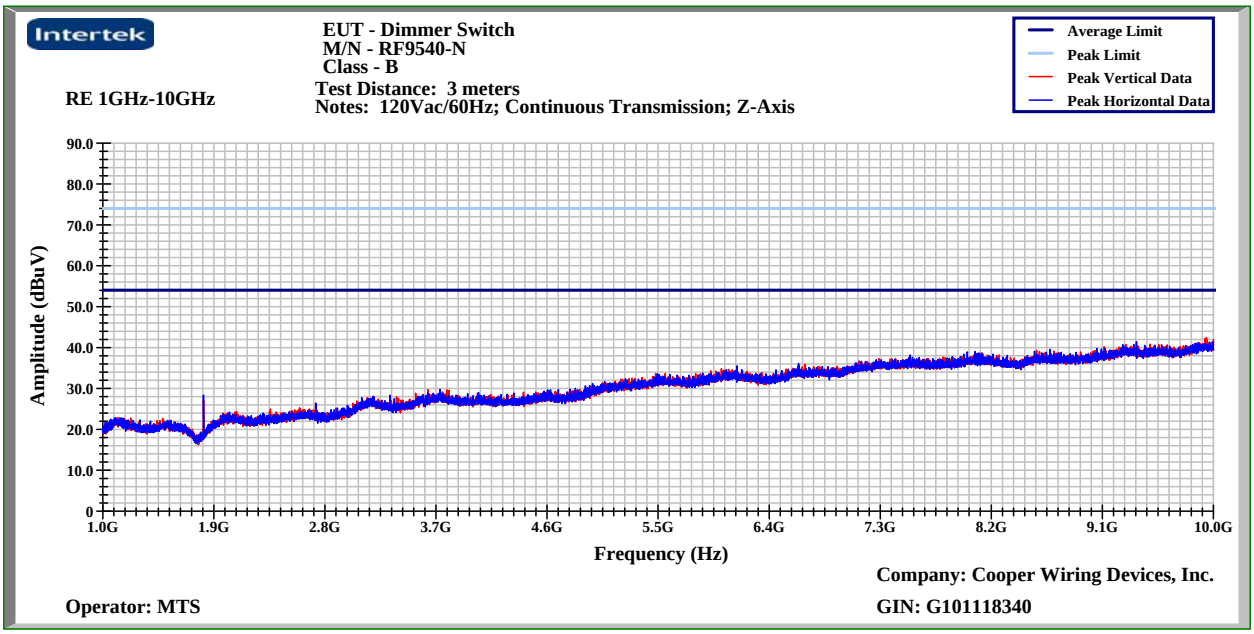
Receiver: Agilent MXE
Antenna: Teseq 40527
Cables: ST-6+MM1 +MP3+E-211
Preamp: ZKL-2 200074
Bandwidths: 120kHz/360kHz
Test Distance (m): 3
Limit: FCC15 Class B-3m
Modifications for compliance (y/n): n

A	B	C	D	E	F	G	H	I	J
Ant. Pol. (V/H)	**Frequency MHz**	**Reading dB(uV)**	**Antenna Factor dB(1/m)**	**Cable Loss dB**	**Pre-amp Factor dB**	**Net dB(uV/m)**	**3m Limit dB(uV/m)**	**Margin dB**	**Antenna Height / Table Azimuth Meters / Degrees**
Z-AXIS									
V	551.375	29.4	24.8	3.8	40.2	17.9	46.0	-28.1	1.0/0
V	568.108	29.4	24.7	3.9	40.2	17.8	46.0	-28.2	1.0/0
V	573.685	29.4	24.8	3.9	40.2	18.0	46.0	-28.0	1.82/0
V	646.556	29.3	25.8	4.2	40.3	19.1	46.0	-26.9	1.65/0
H	907.584	39.2	26.6	4.9	40.7	30.1	46.0	-15.9	1.55/0
H	908.406	90.7	26.6	4.9	40.7	81.5	94.0	-12.5	1.54/0
H	909.185	39.8	26.5	4.9	40.7	30.6	46.0	-15.4	1.61/0
Y-AXIS									
H	907.610	40.8	26.6	4.9	40.7	31.7	46.0	-14.3	1.0/285
H	908.401	93.0	26.6	4.9	40.7	83.8	94.0	-10.2	1.0/316
H	909.220	41.1	26.5	4.9	40.7	31.9	46.0	-14.1	1.0/285
X-AXIS									
V	907.605	40.9	27.8	4.9	40.7	33.0	46.0	-13.0	1.0/163
V	908.401	91.7	27.8	4.9	40.7	83.8	94.0	-10.2	1.0/135
V	909.216	40.2	27.8	4.9	40.7	32.2	46.0	-13.8	1.0/157
Calculations		G=C+D+E-F		I=G-H					

Above 1 GHz


Intertek
EUT - Dimmer Switch
M/N - RF9540-N
Class - B
RE 1GHz-10GHz
Test Distance: 3 meters
Notes: 120Vac/60Hz; Continuous Transmission; X-Axis
Average Limit
Peak Limit
Peak Vertical Data
Peak Horizontal Data
Amplitude (dBuV)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
1.0G
1.9G
2.8G
3.7G
4.6G
5.5G
6.4G
7.3G
8.2G
9.1G
10.0G
Frequency (Hz)
Company: Cooper Wiring Devices, Inc.
Operator: MTS
GIN: G101118340


Intertek
EUT - Dimmer Switch
M/N - RF9540-N
Class - B
RE 1GHz-10GHz
Test Distance: 3 meters
Notes: 120Vac/60Hz; Continuous Transmission; Y-Axis
Average Limit
Peak Limit
Peak Vertical Data
Peak Horizontal Data
Amplitude (dBuV)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
1.0G
1.9G
2.8G
3.7G
4.6G
5.5G
6.4G
7.3G
8.2G
9.1G
10.0G
Frequency (Hz)
Company: Cooper Wiring Devices, Inc.
Operator: MTS
GIN: G101118340



Client: Cooper Wiring Devices, Inc.
Model Number: RF0540-N
Project Number: G101118340
Tested By: MTS
Date: 08/30/2017
Frequency Range (MHz): 1000-10000MHz
Input power: 120Vac/60Hz

Receiver: Agilent MXE
Antenna: EMCO 3115
Cables: MM9 +MP3+E-211+MM5
Preamp: PAM-0118
Limit: FCC15 Class B-3m
Test Distance (m): 3
Modifications for compliance (y/n): n

Notes: Continuous Transmission

A	B	C	D	E	F	G	H	I	J	K
Ant. Pol. (V/H)	**Frequency MHz**	**Reading dB(uV)**	**Antenna Factor dB(1/m)**	**Cable Loss dB**	**Pre-amp Factor dB**	**Duty Cycle Factor dB**	**Net dB(uV/m)**	**3m Limit dB(uV/m)**	**Margin dB**	**Axis / Detector**
V	1816.750	38.8	26.4	8.9	35.6	0.0	38.6	74.0	-35.4	XP
V	1816.750	38.8	26.4	8.9	35.6	9.3	29.3	54.0	-24.7	XA
H	1816.785	36.5	26.4	8.9	35.6	0.0	36.2	74.0	-37.8	YP
H	1816.785	36.5	26.4	8.9	35.6	9.3	26.9	54.0	-27.1	YA
H	1816.805	36.3	26.4	8.9	35.6	0.0	36.0	74.0	-38.0	ZP
H	1816.805	36.3	26.4	8.9	35.6	9.3	26.7	54.0	-27.3	ZA
Calculations		G=C+D+E-F		I=G-H						

Test Personnel: Mary T. Sampson MTS
Test Date: 08/30/2017
Supervising/Reviewing Engineer: (Where Applicable) N/A
Product Standard: 47 CFR Part 15 Subpart C: 2017 Section 15.249; RSS-210 Issue 9, 2016, Annex B.10; RSS-GEN Issue 4, Section 8.9
Limit Applied: See Section 6.3
Input Voltage: 120Vac/60Hz
Ambient Temperature: 23.2 ºC
Pretest Verification w/ Ambient Signals or BB Source: BB Source
Relative Humidity: 38.9 %
Atmospheric Pressure: 984.9 mbars

Deviations, Additions, or Exclusions: None

7 AC Mains Conducted Emissions

7.1 Method

Tests are performed in accordance with 47 CFR Part 15 Subpart C: 2017 Section 15.207 and RSS-GEN Issue 4, 2014, Section 8.8.

TEST SITE:

10 Meter Semi-Anechoic Chamber The test site for radiated emissions is located at 1950 Evergreen Blvd, Suite 100, Duluth, Georgia 30096. It is a 10 meter semi-anechoic chamber manufactured by Panashield. Embedded in the floor is a 3 meter diameter turntable.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.8 dB	3.4dB

As shown in the table above our conducted 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, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculations

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN or ISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(49.1\ dB\mu V / 20)}$ = 285.1 μV/m

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
213187;;	Pocket weatherman - Rated 300 to 1099 mbar, 0 to 50°C, 0 to 100% RH.	Mannix	SAM700BAR	10030208	02/27/2017	02/27/2018
232944;	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
213149;	Line Input Stabilization Network (LISN)	Com-Power	LI-215A	191966	04/20/2017	04/20/2018
MM10;	RF Coax Cable 9KHz-18GHz	Maury Microwave	UC-N-MM267	164365	01/01/2017	01/01/2018
MP3;	Cable MP3, 18 GHz, N, 10m	Megaphase	G919-NKNK-394	MP3	05/03/2017	05/03/2018
E211;	RF Coax Cable	Megaphase	TM18-N1N1-120	15055601001	06/22/2017	06/22/2018
213100;	Transient Limiter	Hewlett Packard	11947A	3107A01550	11/16/2016	11/16/2017
200076;	Conducted Emissions Site Source	Com-Power	CGC-255	311024	VBU	Verified

Software Utilized:

Name	Manufacturer	Version
Tile – Emissions for MXE	Quantum Change	3.4.K.22

7.3 Results:

The sample tested was found to Comply.

§15.207 Conducted limits.

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-Peak	Average**
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device

which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

RSS-GEN Section 8.8

8.8 AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits in Table 3. Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 3 below. The more stringent limit applies at the frequency range boundaries. The conducted emissions shall be measured in accordance with the reference publication mentioned in Section 3.

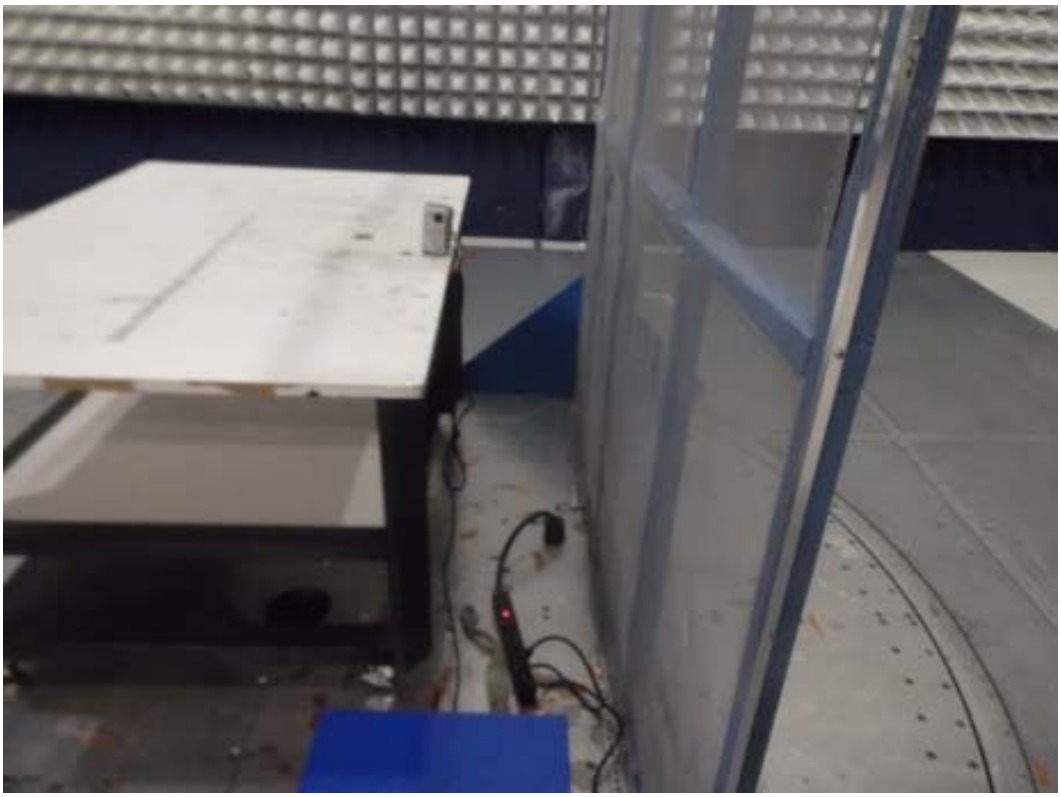
Table 3 – AC Power Line Conducted Emissions Limits

Frequency (MHz)	Conducted limit (dBµV)	
	Quasi-Peak	Average**
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

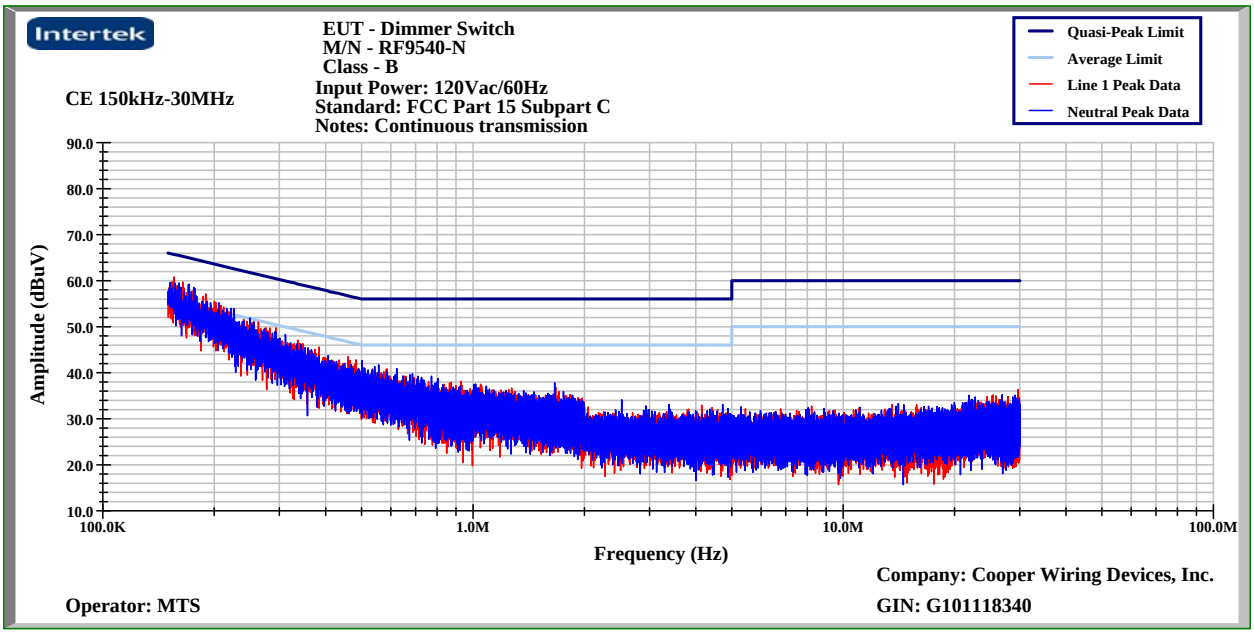
* The level decreases linearly with the logarithm of the frequency.

** A linear average detector is required.

7.4 Setup Photographs:



7.5 Plots/Data:



Client: Cooper Wiring Devices, Inc.
Model Number: RF0540-N
Project Number: G101118340
Tested By: MTS
Date: 08/30/2017
Frequency Range (MHz): .15 to 30
Input power: 120Vac/60Hz

Receiver: Agilent MXE
Cables: MM10+MP3+E-211+Transient Limiter 213100
LISN 1: 213149 Line 1
LISN 2: 213149 Line 2
Limit: CISPR Class B
Modifications for compliance (y/n): n

A	B	C	D	E	F	G	H	I
LISN Number 1,2	**Detector (P,QP, A)**	**Frequency MHz**	**Reading dBuV**	**Cable Loss dB**	**LISN Ins. Loss dB**	**Net dBuV**	**Limit dBuV**	**Margin dB**
1	QP	0.209	22.8	9.7	0.1	32.5	63.4	-30.9
1	A	0.209	16.1	9.7	0.1	25.8	53.4	-27.6
1	QP	0.219	22.7	9.7	0.1	32.4	63.0	-30.6
1	A	0.219	15.8	9.7	0.1	25.5	53.0	-27.5
1	QP	0.240	22.4	9.7	0.1	32.1	62.1	-30.0
1	A	0.240	15.6	9.7	0.1	25.4	52.1	-26.7
1	QP	0.245	22.3	9.7	0.1	32.0	62.1	-30.1
1	A	0.245	15.5	9.7	0.1	25.3	52.1	-26.9
1	QP	0.263	25.7	9.7	0.0	35.4	61.4	-26.0
1	A	0.263	18.8	9.7	0.0	28.5	51.4	-22.9
1	QP	0.283	24.8	9.7	0.0	34.5	60.8	-26.3
1	A	0.283	18.1	9.7	0.0	27.8	50.8	-23.0
1	QP	0.294	25.5	9.7	0.0	35.2	60.5	-25.3
1	A	0.294	19.0	9.7	0.0	28.7	50.5	-21.8
2	QP	0.191	23.3	9.7	0.1	33.0	64.0	-31.0
2	A	0.191	16.6	9.7	0.1	26.3	54.0	-27.7
2	QP	0.206	23.0	9.7	0.0	32.7	63.4	-30.7
2	A	0.206	15.9	9.7	0.0	25.6	53.4	-27.8
2	QP	0.216	22.6	9.7	0.0	32.3	63.0	-30.7
2	A	0.216	15.8	9.7	0.0	25.6	53.0	-27.5
2	QP	0.222	22.4	9.7	0.0	32.1	62.8	-30.7
2	A	0.222	15.6	9.7	0.0	25.4	52.8	-27.5
2	QP	0.226	22.4	9.7	0.0	32.1	62.6	-30.5
2	A	0.226	15.6	9.7	0.0	25.3	52.6	-27.3
2	QP	0.250	22.3	9.7	0.0	32.0	61.9	-29.9
2	A	0.250	15.5	9.7	0.0	25.2	51.9	-26.7
2	QP	0.256	25.9	9.7	0.0	35.6	61.6	-26.0
2	A	0.256	18.9	9.7	0.0	28.6	51.6	-23.0
Calculations		G=D+E+F		I=G-H				

Note: Peak measurements are compared to the average limit.

Test Personnel: Mary T. Sampson MTS
Test Date: 08/30/2017
Supervising/Reviewing Engineer: (Where Applicable) N/A
Product Standard: 47 CFR Part 15 Subpart C: 2017 Section 15.207(a) RSS-GEN Issue 4, Section 8.8
Limit Applied: See Section 7.3
Input Voltage: 120Vac/60Hz
Ambient Temperature: 23.2 ºC
Pretest Verification w/ Ambient Signals or BB Source: BB Source
Relative Humidity: 38.9 %
Atmospheric Pressure: 984.9 mbars

Deviations, Additions, or Exclusions: None

8 Duty Cycle

8.1 Method

Tests are performed in accordance with Tests are performed in accordance with 47 CFR Part 15 Subpart C: 2017 Section 15.35(c) and RSS-GEN Issue 4, 2014, Section 6.10.

10 Meter Semi-Anechoic Chamber The test site for radiated emissions is located at 1950 Evergreen Blvd, Suite 100, Duluth, Georgia 30096. It is a 10 meter semi-anechoic chamber manufactured by Panashield. Embedded in the floor is a 3 meter diameter turntable.

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
212104;	Barometric Pressure/Humidity/Temperature Datalogger	Extech	SD700	A.074980	10/21/2016	10/21/2017
031690;	EMC Analyzer	Agilent	E7405A	US40240205	09/21/2016	09/21/2017

Software Utilized:

Name	Manufacturer	Version
None (Spectrum Analyzer Firmware used)		

8.3 Results:

The sample tested was found to Comply.

§15.35 Measurement detector functions and bandwidths.

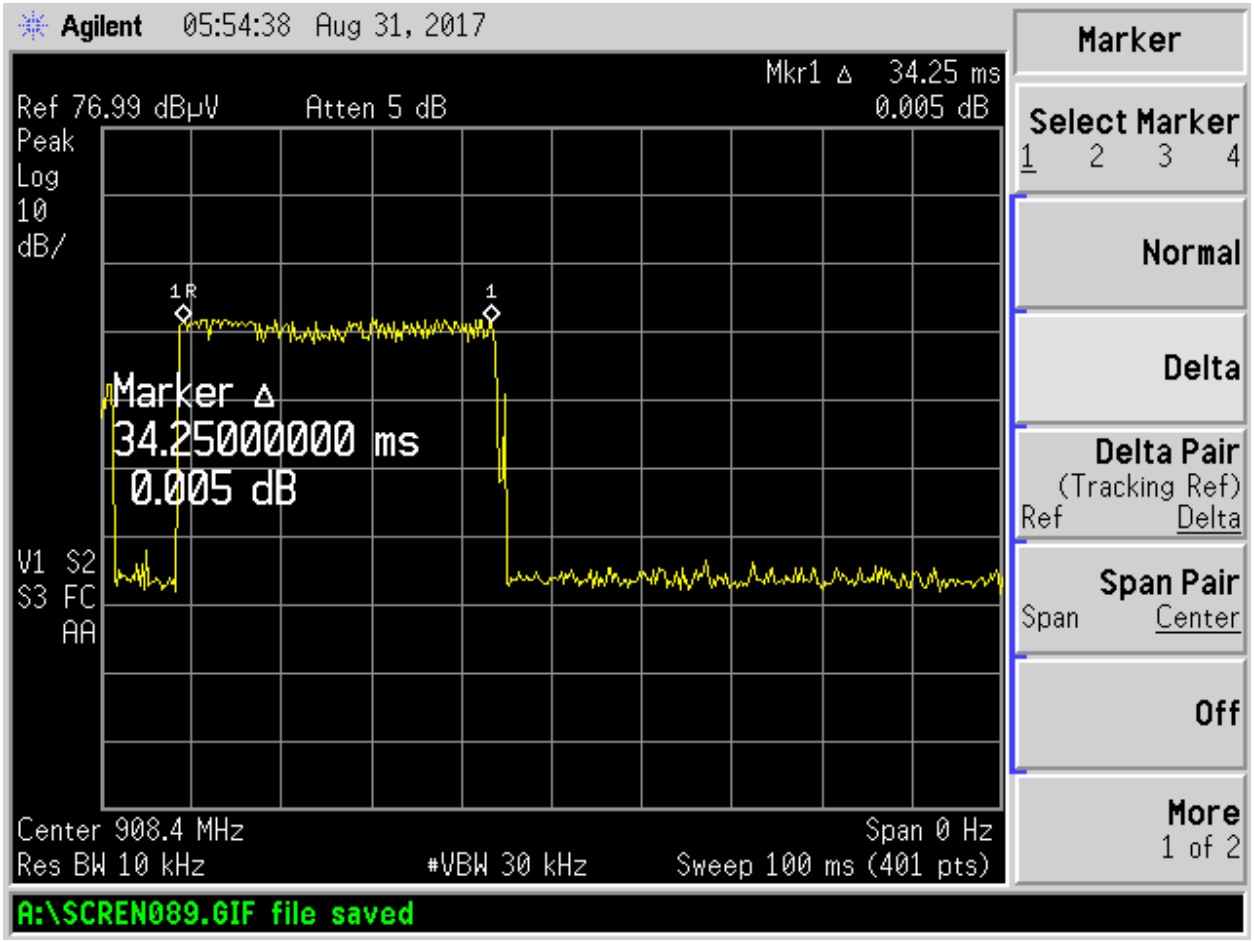
(c) Unless otherwise specified, e.g., §§15.255(b), and 15.256(l)(5), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

RSS-GEN Section 6.10

6.10 Pulsed Operation

When the field strength (or envelope power) is not constant or it is in pulses, and an average detector is specified to be used, the value of field strength or power shall be determined by averaging over one complete pulse train, including blanking intervals within the pulse train, as long as the pulse train does not exceed 0.1 second. In cases where the pulse train exceeds 0.1 second, the average value of field strength or output power shall be determined during a 0.1 second interval during which the field strength or power is at its maximum value. The exact method of calculating the average field strength shall be submitted with the application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

8.4 Plots/Data:



The duty cycle = 34.25ms/100ms = 0.3425
Average factor = 20*LOG(0.3425) = -9.3 dB

Test Personnel:	Mary T. Sampson MTS	Test Date:	08/31/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	47 CFR Part 15 Subpart C: 2017 Section 15.35(c) and RSS-GEN Issue 4, 2014, Section 6.10	Limit Applied:	See Section 8.3
Input Voltage:	120Vac/60Hz	Ambient Temperature:	23.2 ºC
Pretest Verification:	N/A	Relative Humidity:	52.8 %
		Atmospheric Pressure:	985.0 mbars

Deviations, Additions, or Exclusions: None

9 20 dB and Occupied Bandwidth

9.1 Method

Tests are performed in accordance with CFR47 FCC Part 15 Subpart C: 2017 Section 15.215 and RSS-GEN Issue 3 December 2014, Section 6.6.

TEST SITE: EMC Lab Shielded Room

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
212104;	Barometric Pressure/Humidity/Temperature Datalogger	Extech	SD700	A.074980	10/21/2016	10/21/2017
200162;	EMI Receiver (20Hz-40GHz)	Rohde & Schwarz	ESU 40	100314	10/10/2017	10/10/2018

Software Utilized:

Name	Manufacturer	Version
None (Spectrum Analyzer Firmware)		

9.3 Results:

The sample tested was found to Comply.

§15.215 Additional provisions to the general radiated emission limitations.

(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 Section 6.6

6.6 Occupied Bandwidth The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

• 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 (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

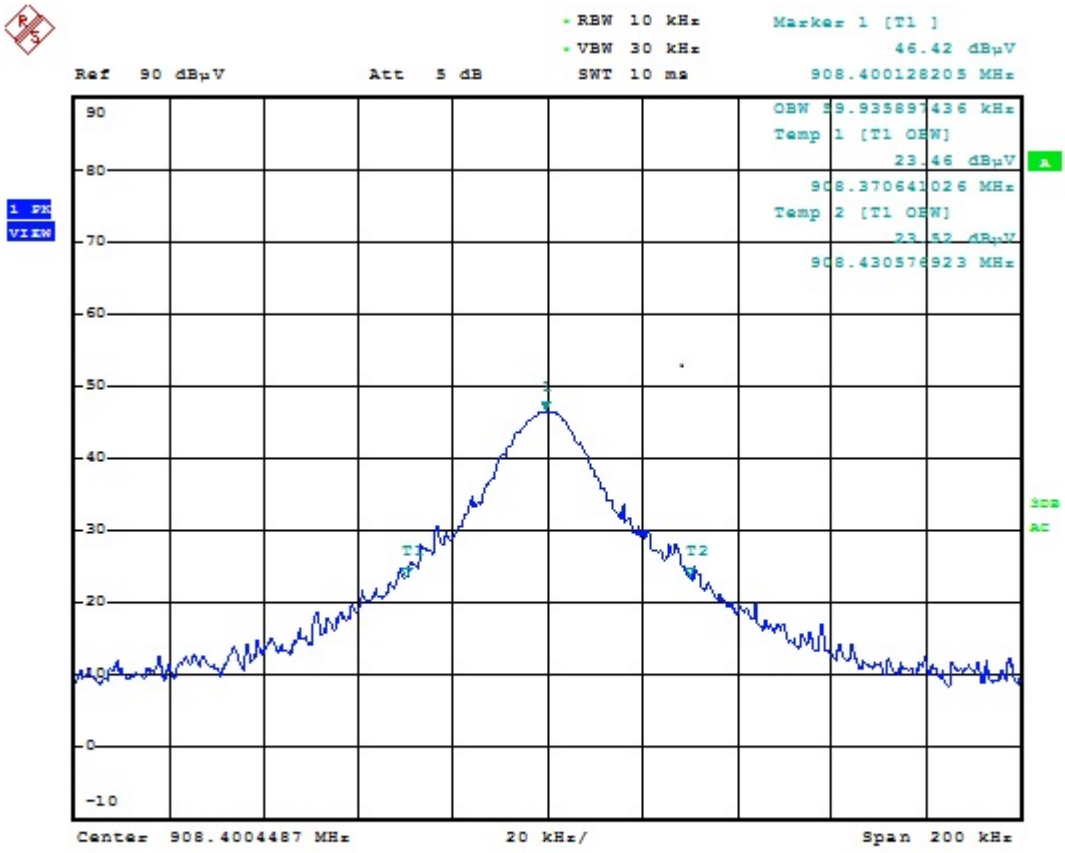
Note: Video averaging is not permitted.

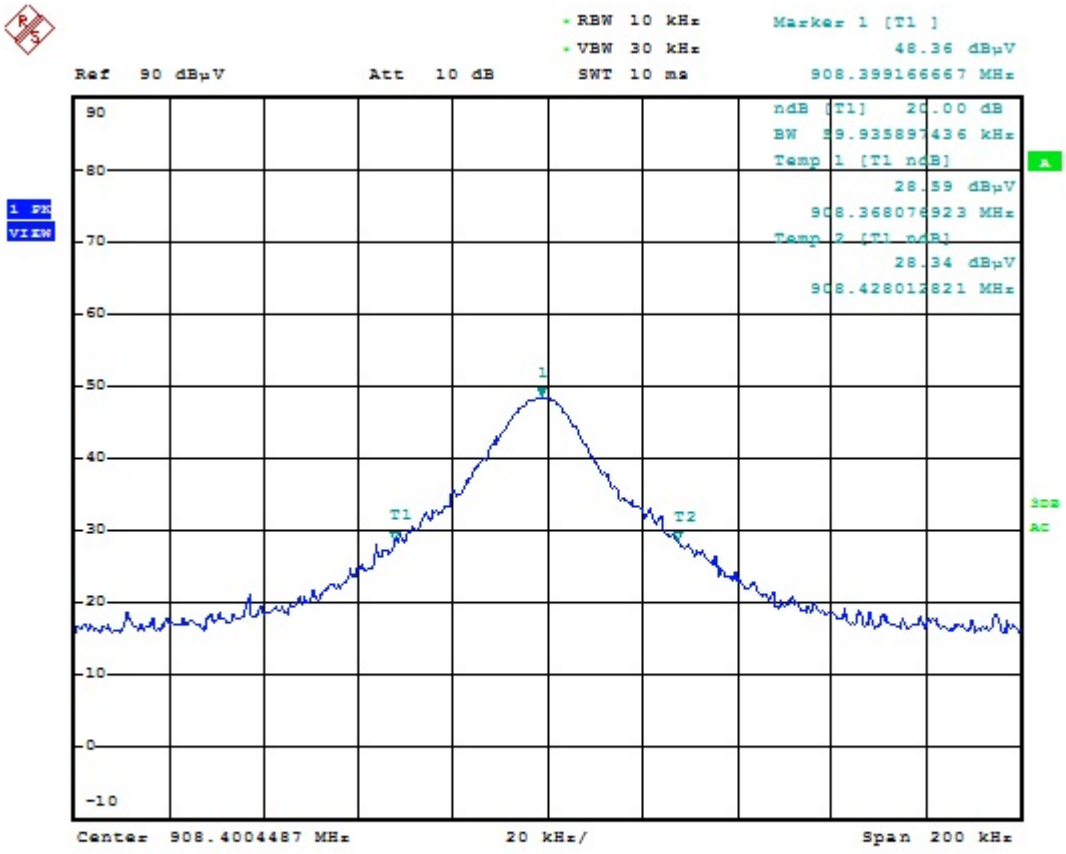
A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

The difference between the two recorded frequencies is the 99% occupied bandwidth.

9.4 Test Data:


RBW 10 kHz
VBW 30 kHz
Ref 90 dBµV
Att 5 dB
SWT 10 ms
Marker 1 [T1]
46.42 dBµV
908.400128205 MHz
OBW 99.935897436 kHz
Temp 1 [T1 OBW]
23.46 dBµV
908.370641026 MHz
Temp 2 [T1 OBW]
23.52 dBµV
908.430576923 MHz
1 PK VIEW
90
80
70
60
50
40
30
20
10
0
-10
T1
T2
Center 908.4004487 MHz
20 kHz/
Span 200 kHz
Date: 11.OCT.2017 14:21:19



Date: 11.OCT.2017 14:35:31

Test Personnel:	Mary T. Sampson MTS	Test Date:	10/11/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	47 CFR Part 15 Subpart C: 2017 Section 15.215 and RSS-GEN Issue 4, 2014, Section 6.6	Limit Applied:	See Section 9.3
Input Voltage:	120Vac/60Hz	Ambient Temperature:	23.5 ºC
Pretest Verification:	N/A	Relative Humidity:	49.0 %
		Atmospheric Pressure:	985.8 mbars

Deviations, Additions, or Exclusions: None

10 RF Exposure

SAR test exclusion threshold formula according to FCC KDB 447898 D01 v05r02 is

$P^*\sqrt{f}/d < 3$

where
P is max. power of channel, including tune-up tolerance, mW
f is operating frequency in GHz
d is min. test separation distance, mm

The maximum measured radiated power is 0.07196499 mW (-11.43dBm). The antenna gain, G is 0.0 dBi (0.0 numerical). Therefore, the conducted power (P) is 0.0000719448978 W.

At 5mm distance the condition for SAR exclusion threshold is

0.0000719448978 × □0.9084 ÷ 5 = 0.000013 which is less than 3.

Therefore, SAR testing is not required as the SAR Test Exclusion Threshold condition is satisfied.

SAR Exemption limit according to ISED RSS-102 Issue 5, at 5 mm separation distance = 68.5 mW
Routine evaluation is not required since the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time averaged output power is below the exemption limit.

11 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	10/11/2017	101118340ATL-001a	MTS MTS	KPS KPS	Original Issue
1	10/18/2017	101118340ATL-001a	MTS MTS	KPS KPS	Manufacturer name and address updated per client request.