Cooper Industries
TEST REPORT

SCOPE OF WORK
EMC TESTING – RF9601, RF9617 AND RFTR9605-T

REPORT NUMBER
103369962ATL-003c

ISSUE DATE
06-June-2018

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[08-August-2018]
[24-August-2018]

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DOCUMENT CONTROL NUMBER
Non-Specific EMC Report Shell Rev. December 2017

EMC TEST REPORT

(DATA REPORT)

Report Number: 103369962ATL-003c
Project Number: G103369962

Report Issue Date: 06/06/2018
Report Revision Date: 08/24/2018

Model(s) Tested: RF9601, RF9617 and RFTR9605-T

Standards: FCC Part 15 Subpart B:15.107; 15.109
FCC Part 15 Subpart C Paragraph 15.205, 15.249 08/25/2018
ICES-005:2015 Ed. 5
RSS-210 Issue 9 August 2017 Annex B.10
RSS-GEN Issue , 2018
RSS-102 Issue 5, March 2015

Tested by:
Intertek
1950Evergreen Blvd
Suite 100
Duluth, Ga 30096
USA

Client:
Cooper Industries
203 Cooper Cir
Peachtree City, GA 30269-3075
USA

Report prepared by Reviewer

Dan Alvarez / 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 B: 2018 Section 15.109 & 15.249; ICES-005:2015 Ed. 5; RSS-210 Issue 9, 2017, Annex B.10; RSS-GEN Issue 4, Section 8.9)	Compliant
7	AC Mains Conducted Emissions (47 CFR Part 15 Subpart B: 2018 Section 15.107(a); ICES-005:2015 Ed. 5; RSS-GEN Issue 4, Section 8.8)	Compliant
8	Duty Cycle (47 CFR Part 15 Subpart C: 2018 Section 15.249 & 15.35(c) RSS-GEN Issue 4, 2014, Section 6.10)	Compliant
9	20 dB and Occupied Bandwidth (47 CFR Part 15 Subpart C:2018 Section 15.249& 15.231(c) RSS-210 Issue 9, 2017, Section A1.1.3)	Compliant
10	RF Exposure (47 CFR Part 2 Subpart J: 2018 Section 15.249 & 2.1091 RSS-102 Issue 5)	Compliant
11	Revision History	--

3 Client Information

This EUT was tested at the request of:

Client: Cooper Industries
203 Cooper Cir
Peachtree City, GA 30269-3075
USA

Contact: Ahmed El-Gayyar
Telephone: (770) 631 2156
Email: ahmed.elgayyar@cooperindustries.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Cooper Industries
203 Cooper Cir
Peachtree City, GA 30269-3075
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Switch	Cooper Industries	RF9601	Intertek Assigned ATL1802230924-003
Accessory Switch	Cooper Industries	RF9617	Intertek Assigned ATL1802230924-001
Receptacle	Cooper Industries	RFTR9605-T	Intertek Assigned ATL1802230924-002
New RF Switch	Cooper Industries	RF9601	Intertek Assigned ATL1803221255-001
RF Switch (-4 Pwr Lvl)	Cooper Industries	RF9601	N/A (04/25/18)
Receptacle (-2 Pwr Lvl)	Cooper Industries	RFTR9605-T	N/A (04/25/18)
Receptacle (-6 Pwr Lvl)	Cooper Industries	RFTR9605-T	Intertek Assigned ATL1805171529-001
Accessory Switch (-6 Pwr Lvl)	Cooper Industries	RF9617	ATL1805301006-001

Note: Model number of RFTR9605 changed to RFTR9605-T. This model change is reflected all sections of the report except for the test data sections which remain unmodified.

Receive Date:	02/23/2018
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
RF 15A Split Receptacle (RFTR9605-T) replaces regular receptacles and provides local and remote wireless ON/OFF control of a single outlet. Receptacle can be manually controlled and remotely controlled by commands sent from an ASPIRE RF controller. RF Accessory Switch (RF9617) replaces regular switches or dimmers to provide local and remote ON/OFF control. The device also provides 3-way, multi-location or virtual 3-way remote ON/OFF control of a selected RF switch without the need for traditional 3-way wiring. The Z-Wave Wireless Single Pole Switch (RF9601) replaces regular switches where a neutral is present) to provide local and remote ON/OFF control for Incandescent, Magnetic Low-Voltage, Electronic Low-Voltage and Fluorescent lighting loads.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
120 VAC	15 A	60 Hz	1

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	All units powered at 120v/60Hz, once switched on EUT(s) were ready for testing.

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

Radio/Receiver Characteristics	
Frequency Band(s)	908.4 MHz
Modulation Type(s)	FSK (40kbps)
Test Channels	908.4 MHz
Occupied Bandwidth	20.5 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)	1
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	Fixed
Power Level Settings	RF9601 (-4); RF9617 (-6); RFTR9605-T (-6)

5 System Setup and Method

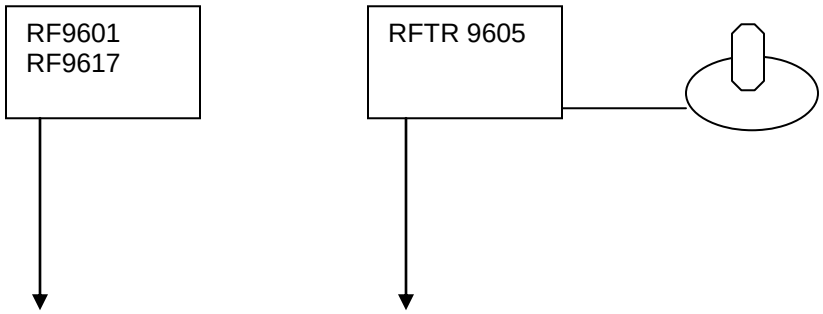
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	Power cable	2	None	None	AC Mains
2	Light Receptacle power cable	1	None	None	Light Fixture

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Light Fixture	Leviton	Not- labeled	Not labeled

5.1 Method:

Configuration as required by ANSI C63.4:2014 & ANSI C63.10:2013.

5.2 EUT Block Diagram:

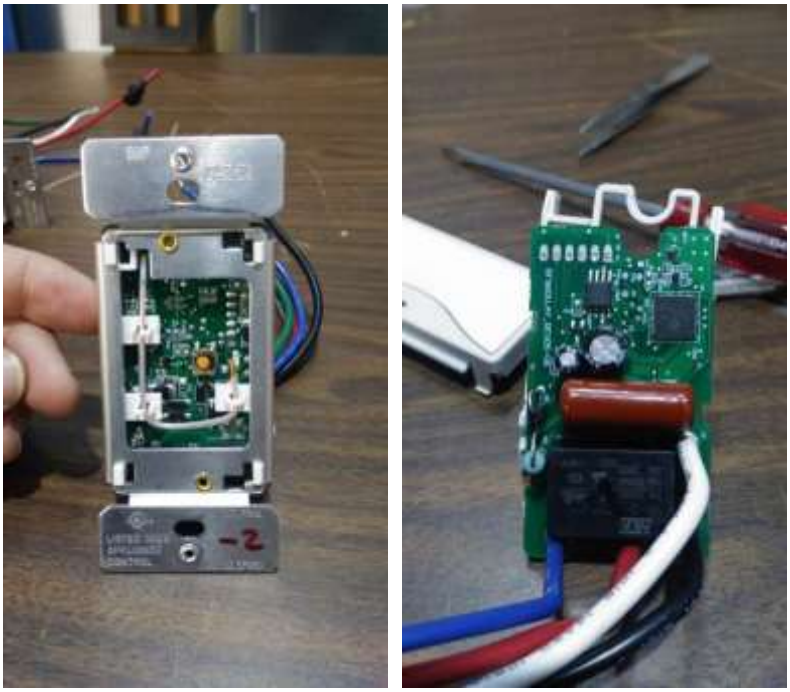


5.1 Product Photo:

Product Tested – Model: RF9601 Switch

External Photo

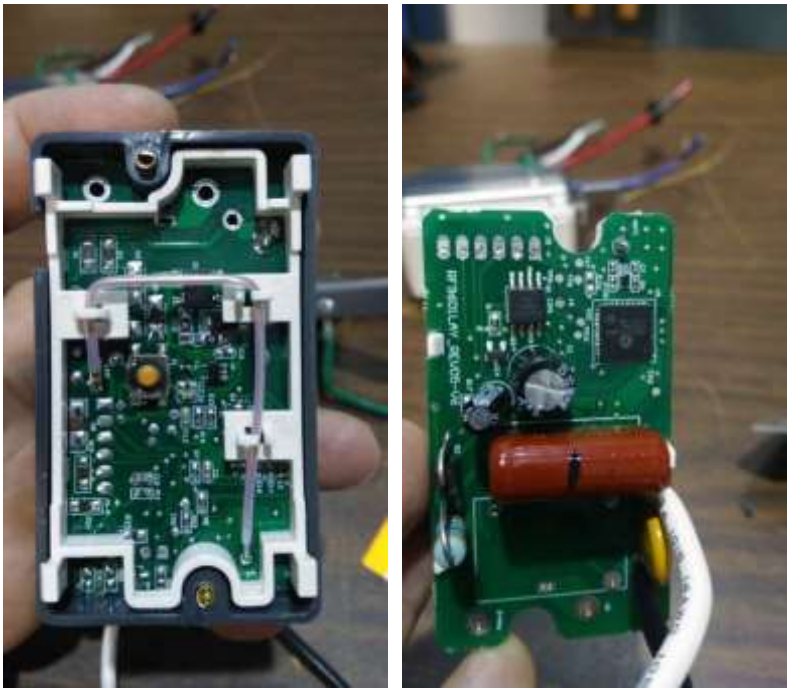
Internal Photo



Product Tested – Model: RF9617 Accessory Switch

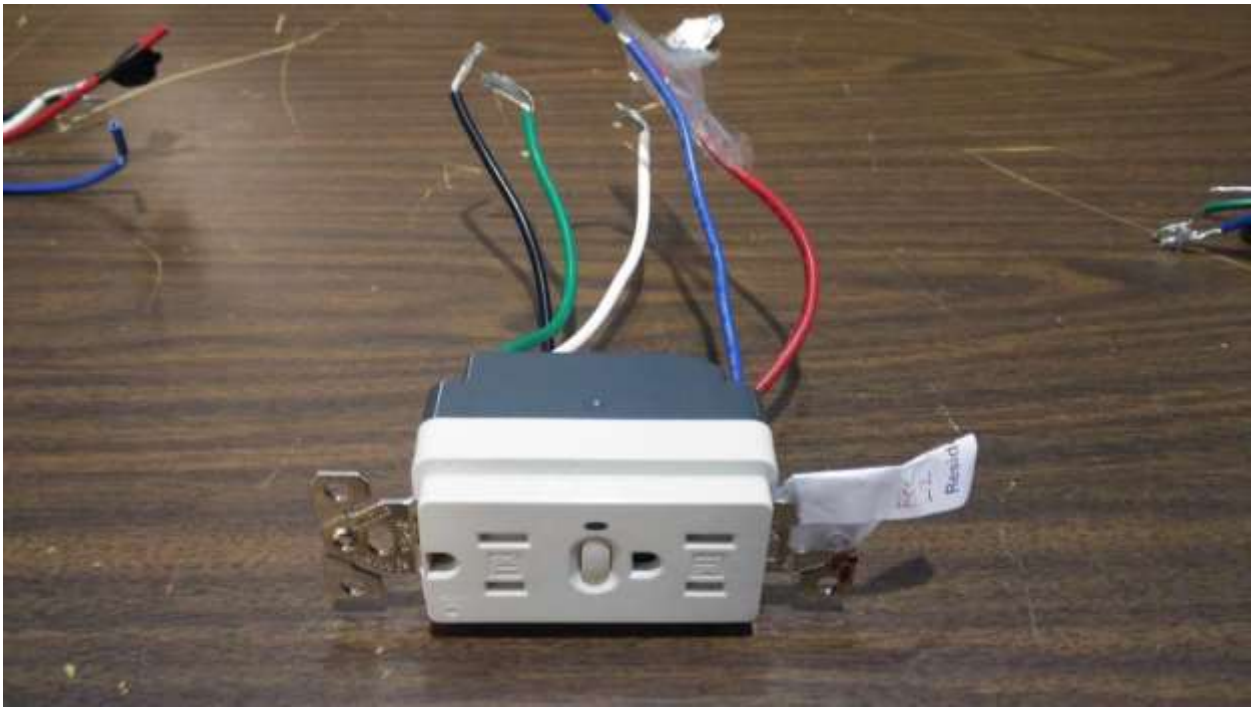
External Photo

Internal Photo

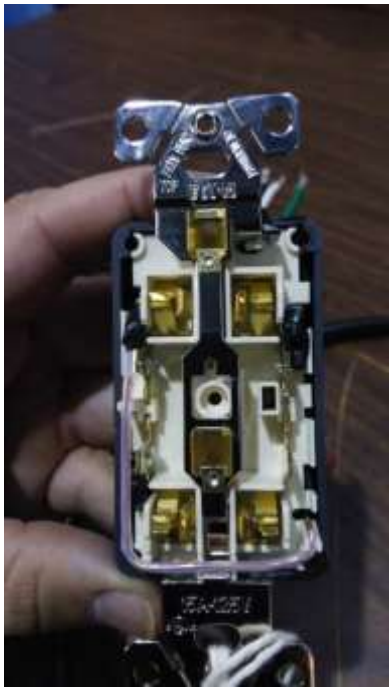


Product Tested – Model: RFTR9605 Receptacle

External Photo



Internal Photo



6 FCC 47CFR:15.109 Radiated Emissions

6.1 Method

Tests are performed in accordance with ANSI C63.4, FCC 47CFR:15.109 and ICES-005. Measurements from 30MHz to 1 GHz were performed at a 10m test distance. Measurements from 1-18 GHz were performed at a 3m test distance.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.1 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.8 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.1 dB	5.2 dB
Radiated Emissions, 3m	6-18 GHz	3.9 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.5 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
232944'	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
MM1'	RF Coax Cable 10KHz-18GHz	Maury Microwave	UC-N-MM36	161471	05/03/2017	05/03/2018
E212'	RF Coax Cable	Megaphase	TM18-N1N1-120	15055601002	06/22/2017	06/22/2018
ST-6'	RF Coax Cable - Rated 9 kHz to 18 GHz.	Teledyne Storm Micro	A81-0303-275	16-01-801	03/02/2018	03/02/2019
TW2 211411'	Cable TW2	Andrews	Cable TW2	TW2	05/03/2017	05/03/2018
200069'	Preamplifier, 10 MHz to 2000 MHz, 40 dB gain	Mini-Circuits	ZKL-2	D011105	04/19/2017	04/19/2018
213312'	Bilog antenna	Teseq	CBL 6112D	40527	05/25/2017	05/25/2018
25401'	Comparison Noise Emitter, broadband noise source	York EMC	CNE III	679	10/27/2007	Verified
212054'	Barometric Pressure/Humidity Datalogger	Extech	SD700	none	10/17/2017	10/17/2018
200108'	Preamplifier, 20 MHz to 18 GHz, 40 dB	A.H. Systems	PAM-0118	199	06/22/2017	06/22/2018
MP3'	Cable MP3, 18 GHz, N, 10m	Megaphase	G919-NKNK-394	MP3	05/03/2017	05/03/2018
213061'	Antenna, Horn, <18 GHz	EMCO	3115	9208-3919	09/14/2017	09/14/2018

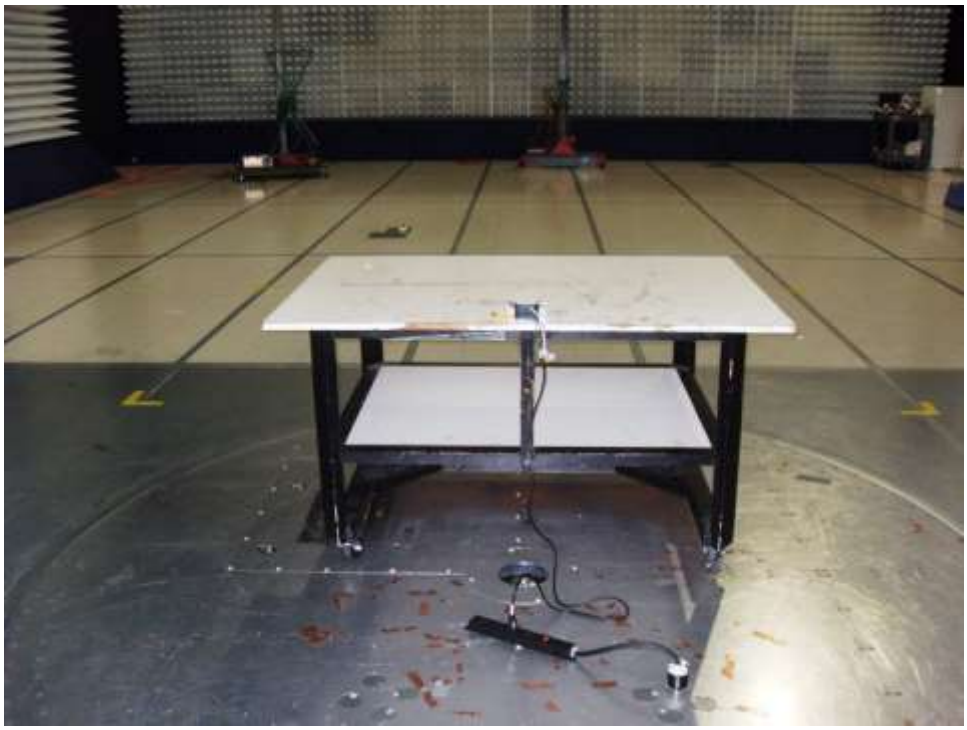
Software Utilized:

Name	Manufacturer	Version
Tile for Radiated Emissions	Quantum Change	3.4.k.29

6.3 Results:

The sample tested was found to Comply.

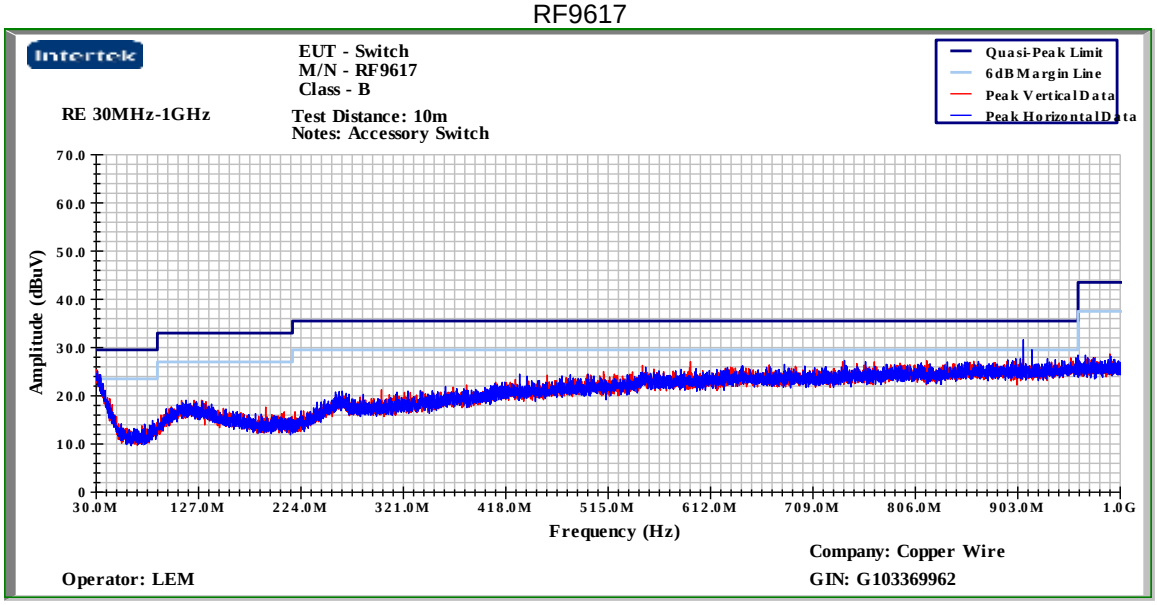
6.4 Setup Photographs:



6.5 Plots/Data:

Model: RF9617, FCC Part 15 Class B, 30M-1GHz Scan

RF9617



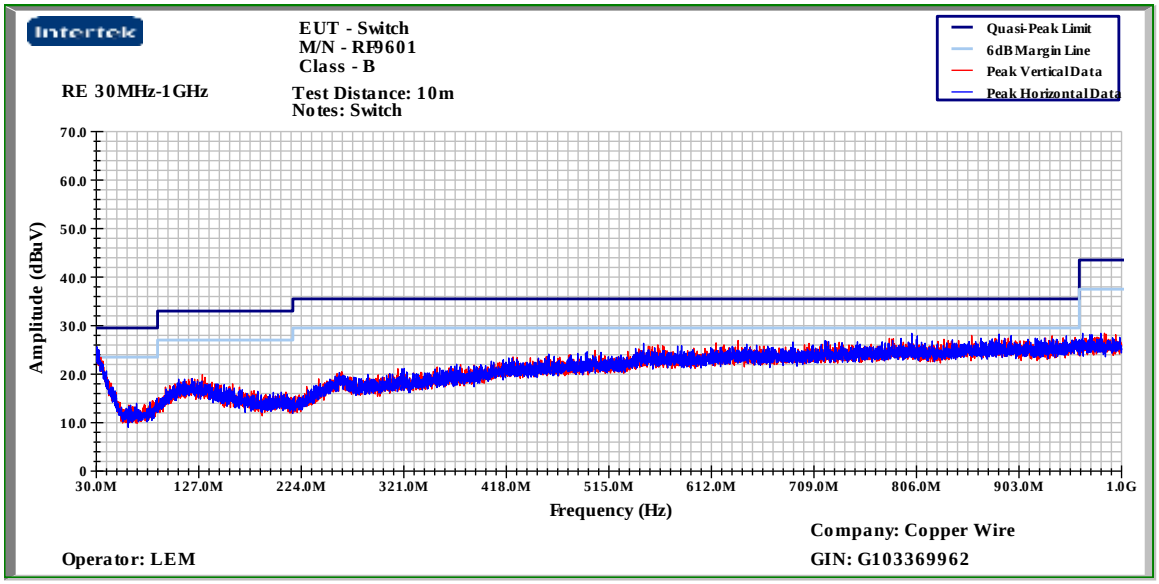
Client: Cooper Ind.
Model Number: RF9617
Project Number: G103369962
Tested By: LEM
Date: 2/28/18
Frequency Range (MHz): 30MHz-1000MHz
Input power: 120V/60Hz
Detector(s): QP

Receiver: MXE
Antenna: Teseq 40527
Cables: E-212+MM1 +ST-6+TW2+Weinschel 2000
Preamp: ZKL-2 200069
Bandwidths: RBW 120k / VBW 750k
Test Distance (m):
Limit: FCC15 Class B-10m
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)**	**10m Limit dB(uV/m)**	**Margin dB**	**Antenna Height / Table Azimuth Meters / Degrees**
H	908.200	37.9	26.6	8.0	39.8	32.7	35.5	-2.8	1.0m / 221d
H	916.300	36.3	26.4	8.1	39.8	31.0	35.5	-4.5	1.0m / 235d
H	738.600	28.5	25.4	7.6	39.5	22.0	35.5	-13.5	1.0m / 0d
H	591.000	28.6	24.5	7.1	39.4	20.7	35.5	-14.8	1.0m / 0d
V	547.700	28.8	24.7	6.9	39.4	21.0	35.5	-14.5	1.0m / 0d
V	30.600	32.3	24.7	3.9	39.7	21.2	29.5	-8.3	1.0m / 0d
Calculations		G=C+D+E-F		I=G-H					

Model: RF9601, FCC Part 15 Class B, 30M-1GHz Scan

RF9601



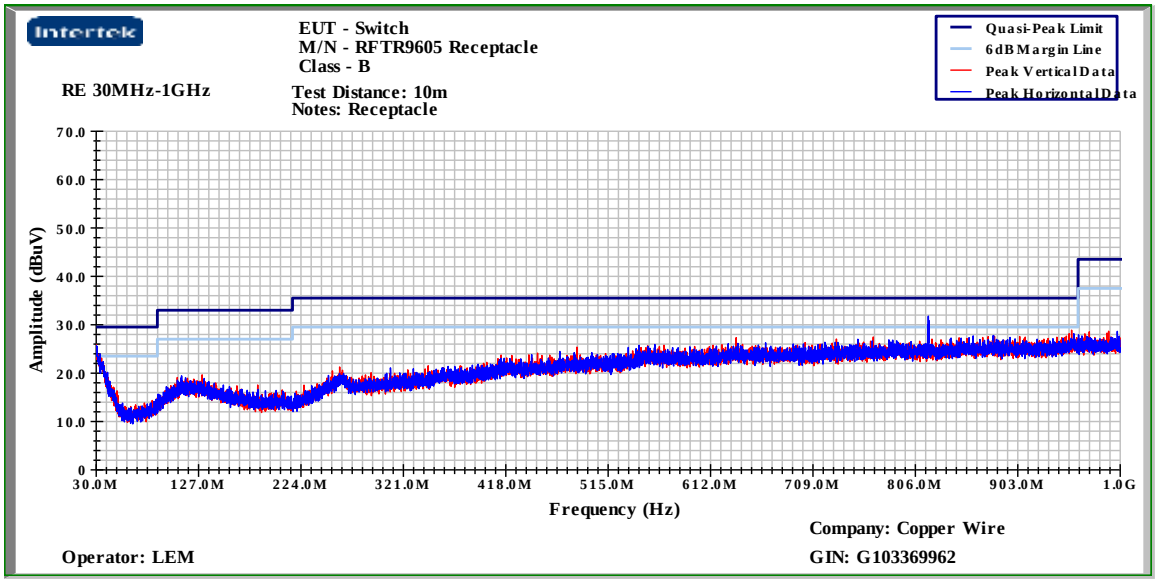
Client: Cooper Ind.
Model Number: RF9601
Project Number: G103369962
Tested By: LEM
Date: 2/28/18
Frequency Range (MHz): 30MHz-1000MHz
Input power: 120V/60Hz
Detector(s): QP

Receiver: MXE
Antenna: Teseq 40527
Cables: E-212+MM1 +ST-6+TW2+Weinschel 2000
Preamp: ZKL-2 200069
Bandwidths: RBW 120k / VBW 750k
Test Distance (m):
Limit: FCC15 Class B-10m
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)**	**10m Limit dB(uV/m)**	**Margin dB**	**Antenna Height / Table Azimuth Meters / Degrees**
H	800.900	28.4	25.9	7.8	39.6	22.5	35.5	-13.0	1.0m / 0d
H	547.200	28.7	24.6	6.9	39.4	20.8	35.5	-14.7	1.0m / 240d
H	39.500	32.5	19.2	4.0	39.7	16.1	29.5	-13.4	3.1m / 0d
H	907.200	28.2	26.6	8.0	39.8	23.1	35.5	-12.4	1.0m / 0d
V	780.300	28.4	25.8	7.7	39.6	22.3	35.5	-13.2	1.35m / 0d
V	635.100	28.6	25.0	7.2	39.4	21.4	35.5	-14.1	1.0m / 0d
Calculations		G=C+D+E-F		I=G-H					

Model: RFTR9605, FCC Part 15 Class B, 30M-1GHz Scan

RFTR9605



Client: Cooper Ind.
Model Number: RFTR9605
Project Number: G103369962
Tested By: LEM
Date: 2/28/18
Frequency Range (MHz): 30MHz-1000MHz
Input power: 120V/60Hz
Detector(s): QP

Receiver: MXE
Antenna: Teseq 40527
Cables: E-212+MM1 +ST-6+TW2+Weinschel 2000
Preamp: ZKL-2 200069
Bandwidths: RBW 120k / VBW 750k
Test Distance (m):
Limit: FCC15 Class B-10m
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)**	**10m Limit dB(uV/m)**	**Margin dB**	**Antenna Height / Table Azimuth Meters / Degrees**
H	818.300	36.3	25.7	7.8	39.6	30.2	35.5	-5.3	1.0m / 0d
V	765.600	28.3	25.6	7.7	39.6	22.0	35.5	-13.5	1.0m / 0d
V	950.700	28.1	27.0	8.2	39.8	23.4	35.5	-12.1	1.0m / 0d
V	636.600	28.6	25.0	7.2	39.4	21.4	35.5	-14.1	1.0m / 230d
V	260.200	29.7	20.0	5.7	39.4	16.0	35.5	-19.5	2.9m / 0d
V	129.200	30.2	18.0	4.9	39.5	13.6	33.0	-19.4	1.0m / 0d
Calculations		G=C+D+E-F		I=G-H					

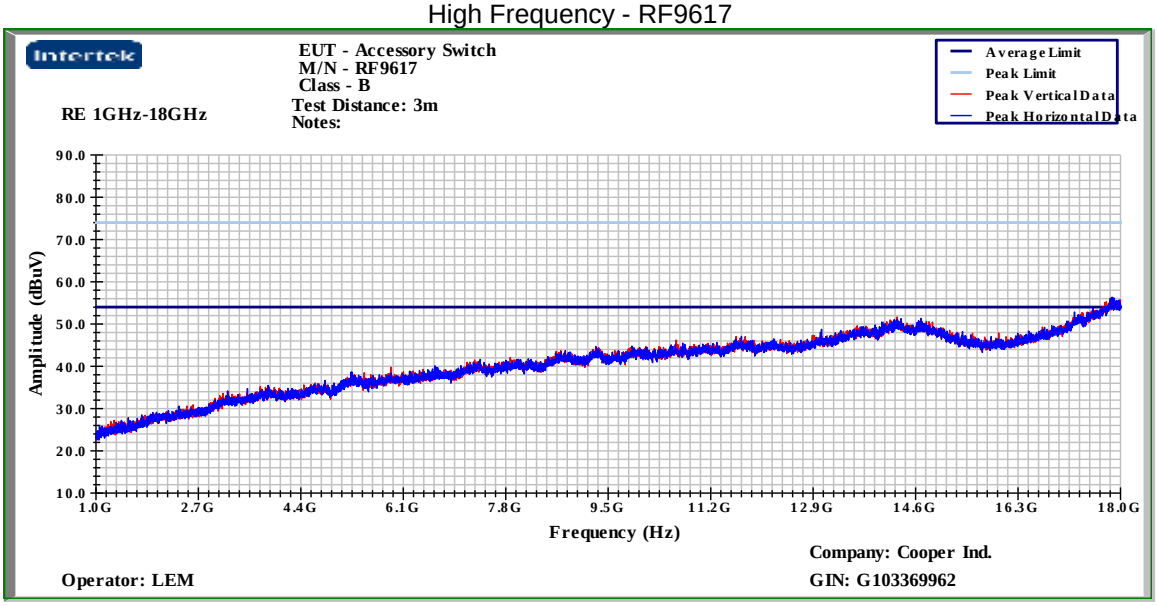
Test Personnel: LEM
Supervising/Reviewing Engineer: (Where Applicable) None
Product Standard: FCC 15.109 & 15.209
Input Voltage: 120V/60Hz
Pretest Verification w/ Ambient Signals or BB Source: BB Source

Test Date: 2/28/18
Limit Applied: FCC 15.109 & 15.209
Ambient Temperature: 22.4 ºC
Relative Humidity: 48.8 %
Atmospheric Pressure: 983 mbars

Deviations, Additions, or Exclusions: None

Model: RF9617, FCC Part 15 Class B, 1GHz-18GHz Scan

High Frequency - RF9617



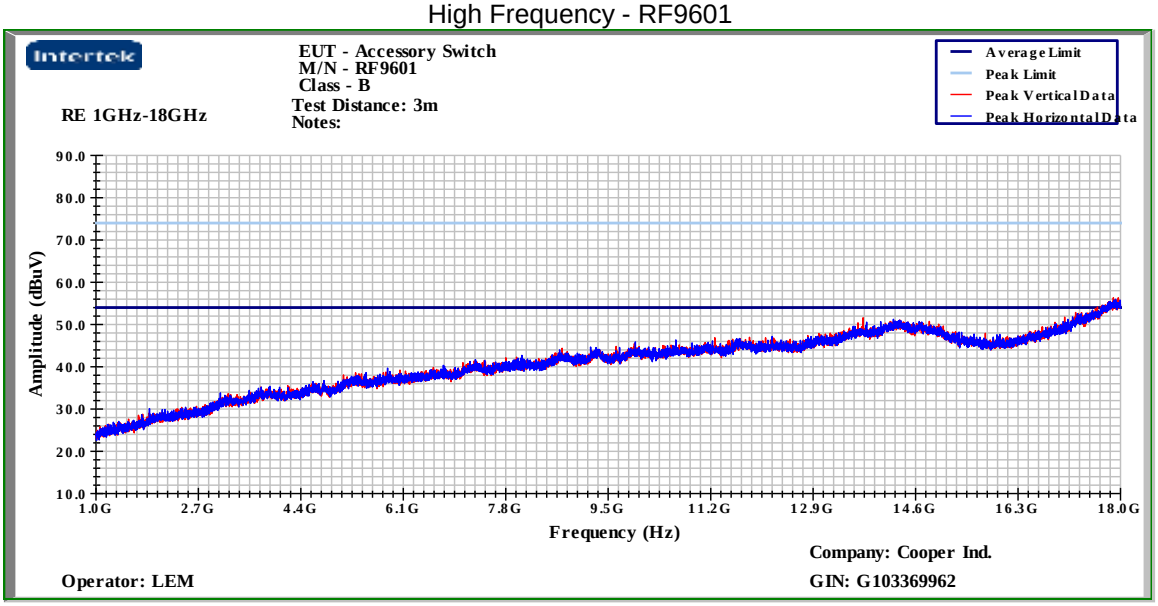
Client: Cooper Ind.
Model Number: RF9617
Project Number: G103369962
Tested By: LEM
Date: 3/1/18
Frequency Range (MHz): 1000MHz-18000MHz
Input power: 120V/60Hz
Detector(s): QP

Receiver: MXE
Antenna: EMCO 3115
Cables: MP3
Preamp: PAM-0118
Bandwidths: RBW 1m / VBW 3m
Test Distance (m):
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**
H	1780.000	44.4	26.5	3.7	35.6	39.1	74.0	-34.9	1.0m / 0d
H	1780.000	32.3	26.5	3.7	35.6	27.0	54.0	-27.0	1.0m / 0d
V	1420.000	42.0	25.8	3.3	35.5	35.5	74.0	-38.5	1.0m / 0d
V	1420.000	31.7	25.8	3.3	35.5	25.2	54.0	-28.8	1.0m / 0d
Calculations		G=C+D+E-F		I=G-H					

Model: RF9601, FCC Part 15 Class B, 1GHz-18GHz Scan

High Frequency - RF9601



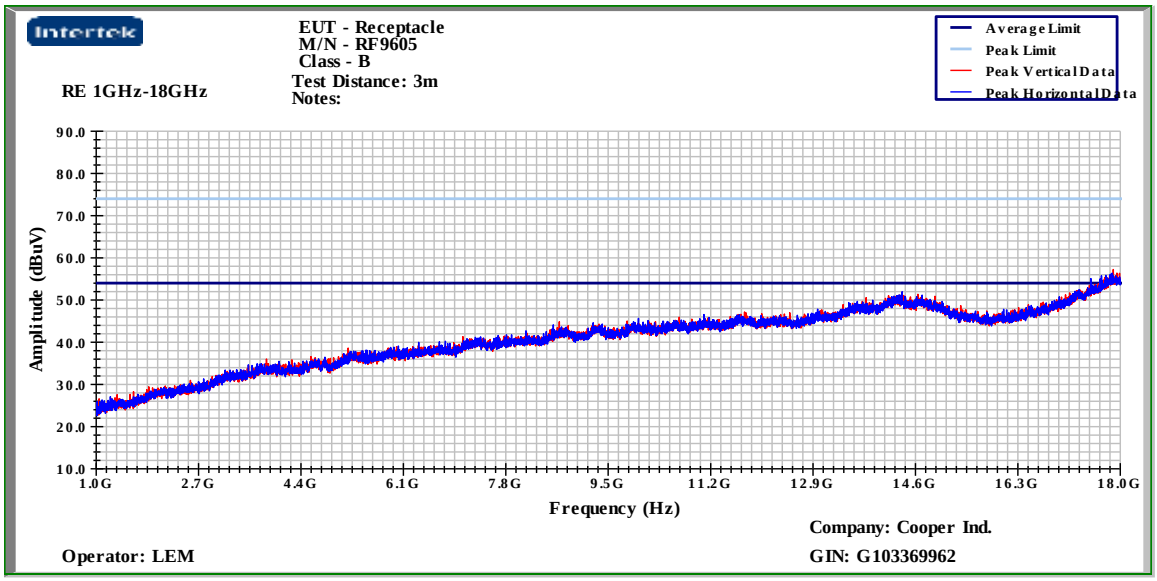
Client: Cooper Ind.
Model Number: RF9601
Project Number: G103369962
Tested By: LEM
Date: 3/1/18
Frequency Range (MHz): 1000MHz-18000MHz
Input power: 120V/60Hz
Detector(s): QP

Receiver: MXE
Antenna: EMCO 3115
Cables: MP3
Preamp: PAM-0118
Bandwidths: RBW 1m / VBW 3m
Test Distance (m):
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**
H	1730.000	44.0	26.3	3.7	35.5	38.4	74.0	-35.6	3.0m / 170d
H	1730.000	31.7	26.3	3.7	35.5	26.1	54.0	-27.9	3.0m / 170d
Calculations		G=C+D+E-F		I=G-H					

Model: RFTR9605, FCC Part 15 Class B, 1GHz-18GHz Scan

RFTR9605



Client: Cooper Ind. | **Receiver:** MXE
Model Number: RFTR9605 | **Antenna:** EMCO 3115
Project Number: G103369962 | **Cables:** MP3
Tested By: LEM | **Preamp:** PAM-0118
Date: 3/1/18 | **Bandwidths:** RBW 1m / VBW 3m
Frequency Range (MHz): 1000MHz-18000MHz | **Test Distance (m):**
Input power: 120V/60Hz | **Limit:** FCC15 Class B-3m
Detector(s): QP | **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**
H	1780.000	43.8	26.5	3.7	35.6	38.5	74.0	-35.5	3.4m / 0d
H	1780.000	31.9	26.5	3.7	35.6	26.6	54.0	-27.4	3.4m / 0d
V	1760.000	44.7	31.7	3.7	35.5	44.6	74.0	-29.4	2.38m / 240d
V	1760.000	31.7	26.5	3.7	35.5	26.4	54.0	-27.6	2.38m / 240d
Calculations		G=C+D+E-F		I=G-H					

Test Personnel: LEM
Supervising/Reviewing Engineer: (Where Applicable) None
Product Standard: FCC 15.109; ICES-005
Input Voltage: 120V/60Hz
Pretest Verification w/ Ambient Signals or BB Source: BB Source

Test Date: 3/01/18
Limit Applied: FCC 15.109; ICES-005
Ambient Temperature: 22.3 ºC
Relative Humidity: 48.2 %
Atmospheric Pressure: 982 mbars

Deviations, Additions, or Exclusions: None

7 FCC 47CFR:15.107 AC Mains Conducted Emissions

7.1 Method

Tests are performed in accordance with ANSI C63.4, FCC 47CFR:15.107 and ICES-005.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.8 dB	3.4dB
Telco Port Emissions	150 kHz - 30 MHz	2.8 dB	5.0dB

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
E211'	RF Coax Cable	Megaphase	TM18-N1N1-120	15055601001	06/22/2017	06/22/2018
232944'	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
MP4'	RF Coax Cable 9KHz-18GHz	Fairview Microwave	FMCA1282-394	MP4	08/22/2017	08/22/2018
MM9'	RF Coax Cable 9KHz-18GHz	Maury Microwave	UC-N-MM267	1635290	10/17/2017	10/17/2018
200076'	Conducted Emissions Site Source	Com-Power	CGC-255	311024	VBU	Verified
213149'	Line Input Stabilization Network (LISN)	Com-Power	LI-215A	191966	04/12/2018	04/12/2019
212054'	Barometric Pressure/Humidity Datalogger	Extech	SD700	none	10/17/2017	10/17/2018
213100'	Transient Limiter	Hewlett Packard	11947A	3107A01550	11/20/2017	11/20/2018

Software Utilized:

Name	Manufacturer	Version
Tile for Conducted Emissions	Quantum Change	3.4.k.29

7.3 Results:

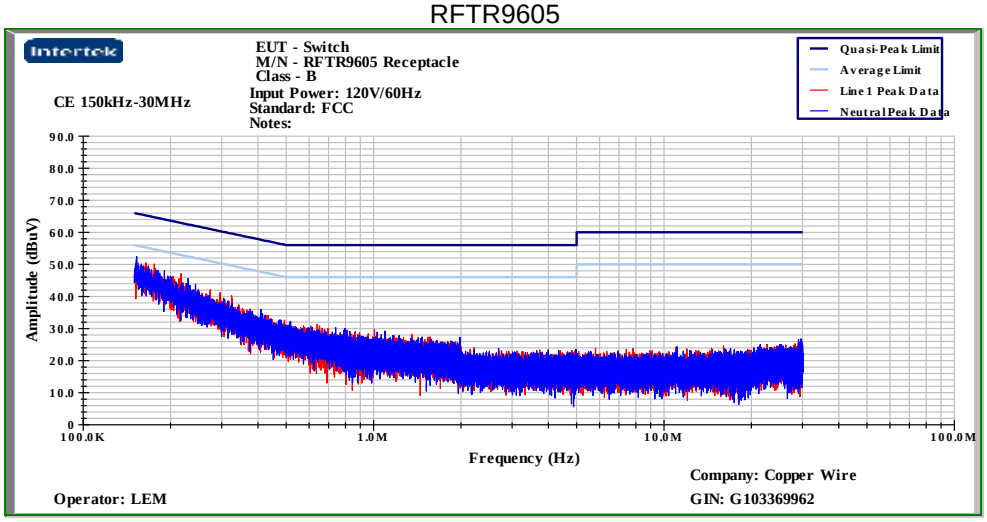
The sample tested was found to Comply.

7.4 Setup Photographs:

7.5 Plots/Data:

Model: RFTR9605, FCC Part 15 Class B, 150kHz-30MHz Scan

RFTR9605



Client: Cooper Ind.
Model Number: RFTR9605
Project Number: G103369962
Tested By: LEM
Date: 2/28/18
Frequency Range (MHz): .150-30
Input power: 120V/60Hz

Receiver: MXE
Cables: E-211+MM9 +MP4+Transie
LISN 1: 213149 Line 1
LISN 2: 213149 Line 2

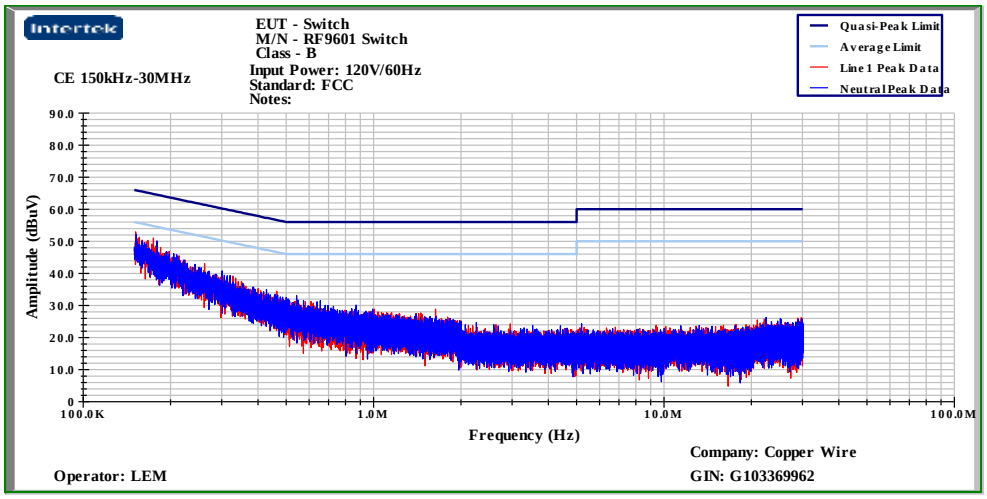
Limit: CISPR Class B
Modifications for compliance (y/n): n

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	0.150	17.9	9.9	0.1	27.8	66.0	-38.2
1	A	0.150	9.6	9.9	0.1	19.5	56.0	-36.5
1	QP	0.162	16.9	9.9	0.1	26.8	65.5	-38.7
1	A	0.162	8.9	9.9	0.1	18.8	55.5	-36.7
1	QP	0.178	16.4	9.9	0.1	26.3	64.7	-38.4
1	A	0.178	7.7	9.9	0.1	17.6	54.7	-37.1
1	QP	0.186	15.4	9.9	0.1	25.3	64.3	-39.0
1	A	0.186	7.9	9.9	0.1	17.8	54.3	-36.5
1	QP	0.214	14.1	9.9	0.1	24.0	63.2	-39.2
1	A	0.214	7.2	9.9	0.1	17.1	53.2	-36.1
1	QP	0.225	13.8	9.9	0.1	23.7	62.6	-38.9
1	A	0.225	6.8	9.9	0.1	16.7	52.6	-35.9
2	QP	0.150	19.0	9.9	0.1	28.9	66.0	-37.1
2	A	0.150	9.5	9.9	0.1	19.4	56.0	-36.6
2	QP	0.162	17.2	9.9	0.1	27.1	65.5	-38.4
2	A	0.162	8.9	9.9	0.1	18.8	55.5	-36.7
2	QP	0.178	15.6	9.9	0.1	25.5	64.7	-39.2
2	A	0.178	8.3	9.9	0.1	18.2	54.7	-36.5
2	QP	0.186	15.3	9.9	0.1	25.2	64.3	-39.1
2	A	0.186	8.0	9.9	0.1	17.9	54.3	-36.4
2	QP	0.214	14.1	9.9	0.0	24.0	63.2	-39.2
2	A	0.214	7.1	9.9	0.0	17.0	53.2	-36.2
2	QP	0.225	17.8	9.9	0.0	27.7	62.6	-34.9
2	A	0.225	10.9	9.9	0.0	20.8	52.6	-31.8
Calculations		G=D+E+F		I=G-H				

Note: Peak measurements are compared to the average limit.

Model: RF9601, FCC Part 15 Class B, 150kHz-30MHz Scan

RF9601



Client: Cooper Ind.
Model Number: RF9601
Project Number: G103369962
Tested By: LEM
Date: 2/28/18
Frequency Range (MHz): .150-30
Input power: 120V/60Hz

Receiver: FSEK-30
Cables: E-211+MM9 +MP4+Transie
LISN 1: 213149 Line 1
LISN 2: 213149 Line 2

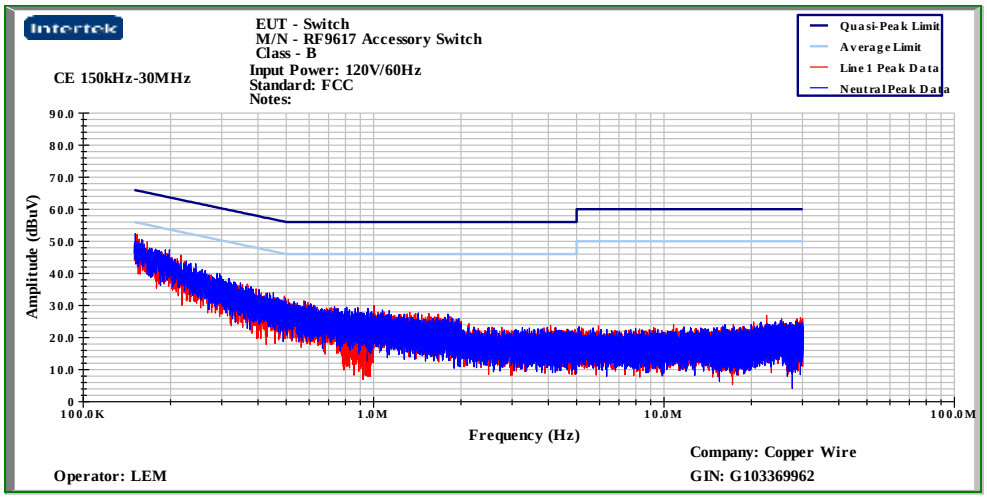
Limit: CISPR Class B
Modifications for compliance (y/n): n

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	0.150	20.4	9.9	0.1	30.3	66.0	-35.7
1	A	0.150	9.7	9.9	0.1	19.6	56.0	-36.4
1	QP	0.168	18.8	9.9	0.1	28.7	65.2	-36.5
1	A	0.168	8.9	9.9	0.1	18.8	55.2	-36.4
1	QP	0.175	17.8	9.9	0.1	27.7	64.7	-37.0
1	A	0.175	8.5	9.9	0.1	18.4	54.7	-36.3
1	QP	0.188	16.7	9.9	0.1	26.6	64.3	-37.7
1	A	0.188	8.1	9.9	0.1	18.0	54.3	-36.3
1	QP	0.207	15.2	9.9	0.1	25.1	63.4	-38.3
1	A	0.207	7.5	9.9	0.1	17.4	53.4	-36.0
1	QP	0.237	13.9	9.9	0.1	23.8	62.3	-38.5
1	A	0.237	6.9	9.9	0.1	16.8	52.3	-35.5
2	QP	0.188	21.1	9.9	0.1	31.0	64.3	-33.3
2	A	0.188	9.8	9.9	0.1	19.7	54.3	-34.6
2	QP	0.188	19.3	9.9	0.1	29.2	64.3	-35.1
2	A	0.188	8.9	9.9	0.1	18.8	54.3	-35.5
2	QP	0.188	18.2	9.9	0.1	28.1	64.3	-36.2
2	A	0.188	8.7	9.9	0.1	18.6	54.3	-35.7
2	QP	0.188	16.7	9.9	0.1	26.6	64.3	-37.7
2	A	0.188	8.1	9.9	0.1	18.0	54.3	-36.3
2	QP	0.188	15.2	9.9	0.1	25.1	64.3	-39.2
2	A	0.188	7.5	9.9	0.1	17.4	54.3	-36.9
2	QP	0.188	14.0	9.9	0.1	23.9	64.3	-40.4
2	A	0.188	6.8	9.9	0.1	16.7	54.3	-37.6
Calculations		G=D+E+F		I=G-H				

Note: Peak measurements are compared to the average limit.

Model: RF9617, FCC Part 15 Class B, 150kHz-30MHz Scan

RF9617



Client: Cooper Ind.
Model Number: RF9617
Project Number: G103369962
Tested By: LEM
Date: 2/28/18
Frequency Range (MHz): .150-30
Input power: 120V/60Hz

Receiver: MXE
Cables: E-211+MM9 +MP4+Transie
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	0.151	16.1	9.9	0.1	26.0	66.0	-40.0
1	A	0.151	9.3	9.9	0.1	19.2	56.0	-36.8
1	QP	0.161	15.7	9.9	0.1	25.6	65.5	-39.9
1	A	0.161	8.8	9.9	0.1	18.7	55.5	-36.8
1	QP	0.167	15.5	9.9	0.1	25.4	65.2	-39.8
1	A	0.167	8.7	9.9	0.1	18.6	55.2	-36.6
1	QP	0.181	15.0	9.9	0.1	24.9	64.5	-39.6
1	A	0.181	8.1	9.9	0.1	18.0	54.5	-36.5
1	QP	0.198	14.4	9.9	0.1	24.3	63.8	-39.5
1	A	0.198	7.6	9.9	0.1	17.5	53.8	-36.3
1	QP	0.215	14.0	9.9	0.1	23.9	63.0	-39.1
1	A	0.215	7.1	9.9	0.1	17.0	53.0	-36.0
2	QP	0.151	16.2	9.9	0.1	26.1	66.0	-39.9
2	A	0.151	9.3	9.9	0.1	19.2	56.0	-36.8
2	QP	0.161	15.6	9.9	0.1	25.5	65.5	-40.0
2	A	0.161	8.8	9.9	0.1	18.7	55.5	-36.8
2	QP	0.167	15.5	9.9	0.1	25.4	65.2	-39.8
2	A	0.167	8.6	9.9	0.1	18.5	55.2	-36.7
2	QP	0.181	14.9	9.9	0.1	24.8	64.5	-39.7
2	A	0.181	8.1	9.9	0.1	18.0	54.5	-36.5
2	QP	0.198	15.7	9.9	0.1	25.6	63.8	-38.2
2	A	0.198	7.8	9.9	0.1	17.7	53.8	-36.1
2	QP	0.215	13.9	9.9	0.0	23.8	63.0	-39.2
2	A	0.215	7.1	9.9	0.0	17.0	53.0	-36.0
Calculations		G=D+E+F		I=G-H				

Note: Peak measurements are compared to the average limit.

Test Personnel:	LEM	Test Date:	2/28/18
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	ICES-005; FCC 15.107;	Limit Applied:	FCC 15.107; ICES-005
Input Voltage:	120V/60Hz	Ambient Temperature:	22.4 ºC
Pretest Verification w/ Ambient Signals or BB Source:	BB Source	Relative Humidity:	48.8 %
		Atmospheric Pressure:	983 mbars

Deviations, Additions, or Exclusions: None

8 FCC 47CFR Part 15 Subpart C - Intentional Radiators - 15.249 Band Edge

8.1 Method

Tests are performed in accordance with FCC CFR47 Part 15 Subpart C and ANSI C63.10:2013. Measurements from 30MHz to 1 GHz were performed at a 10m test distance.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.1 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.8 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.1 dB	5.2 dB
Radiated Emissions, 3m	6-18 GHz	3.9 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.5 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

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
212054'	Barometric Pressure/Humidity/Temperature Datalogger	Extech	SD700	A.032434	10/17/2017	10/17/2018
232944'	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
200069'	Preamplifier, 10 MHz to 2000 MHz, 40 dB gain	Mini-Circuits	ZKL-2	D011105	04/19/2017	04/19/2018
ST-7'	RF Coax Cable - Rated 9 kHz to 18 GHz.	Teledyne Storm Micro	A81-0303-275	16-01-802	02/14/2018	02/14/2019
MM1'	RF Coax Cable 10KHz-18GHz	Maury Microwave	UC-N-MM36	161471	05/03/2017	05/03/2018
E211'	RF Coax Cable	Megaphase	TM18-N1N1-120	15055601001	06/22/2017	06/22/2018
TW2 211411'	RF Coax Cable 9KHz-18GHz	Fairview Microwave	FMCA1282-472	TW2	08/22/2017	08/22/2018
25401'	Comparison Noise Emitter, broadband noise source	York EMC	CNE III	679	10/27/2007	Verified
213312'	Bilog antenna	Teseq	CBL 6112D	40527	05/25/2017	05/25/2018

Software Utilized:

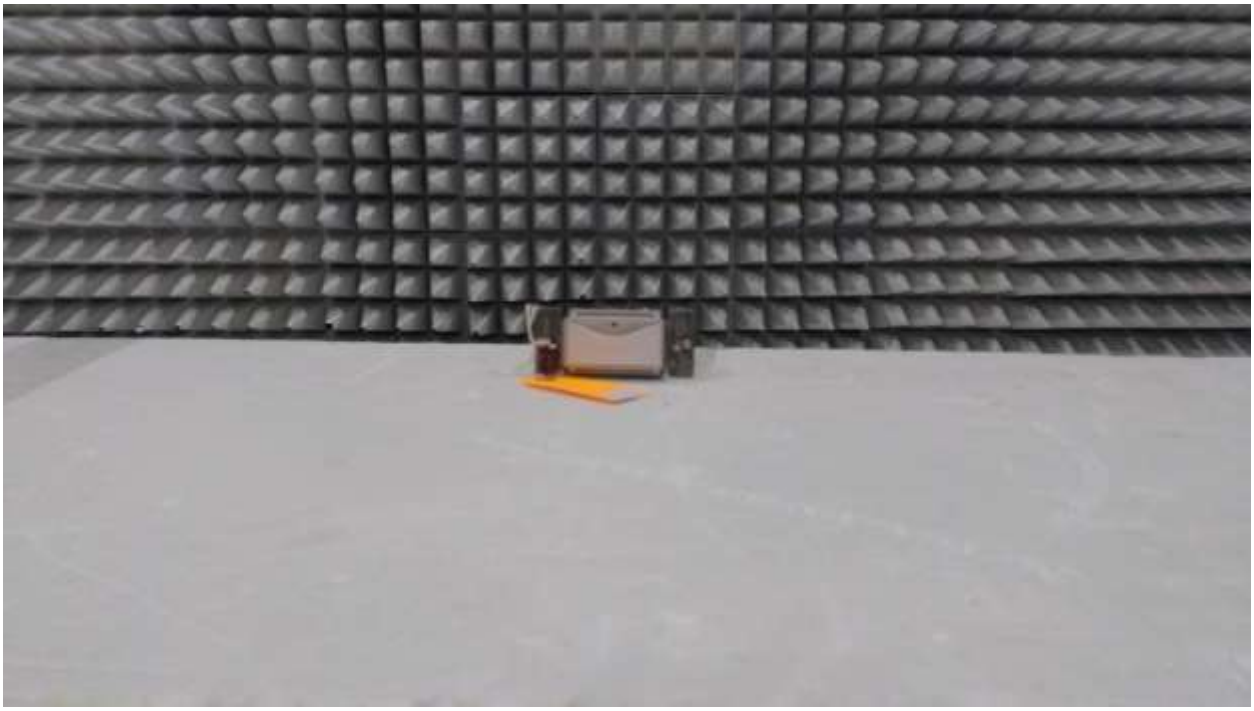
Name	Manufacturer	Version
BAT-EMC	Nexio	3.17.0.10

8.3 Results:

The sample tested was found to Comply.

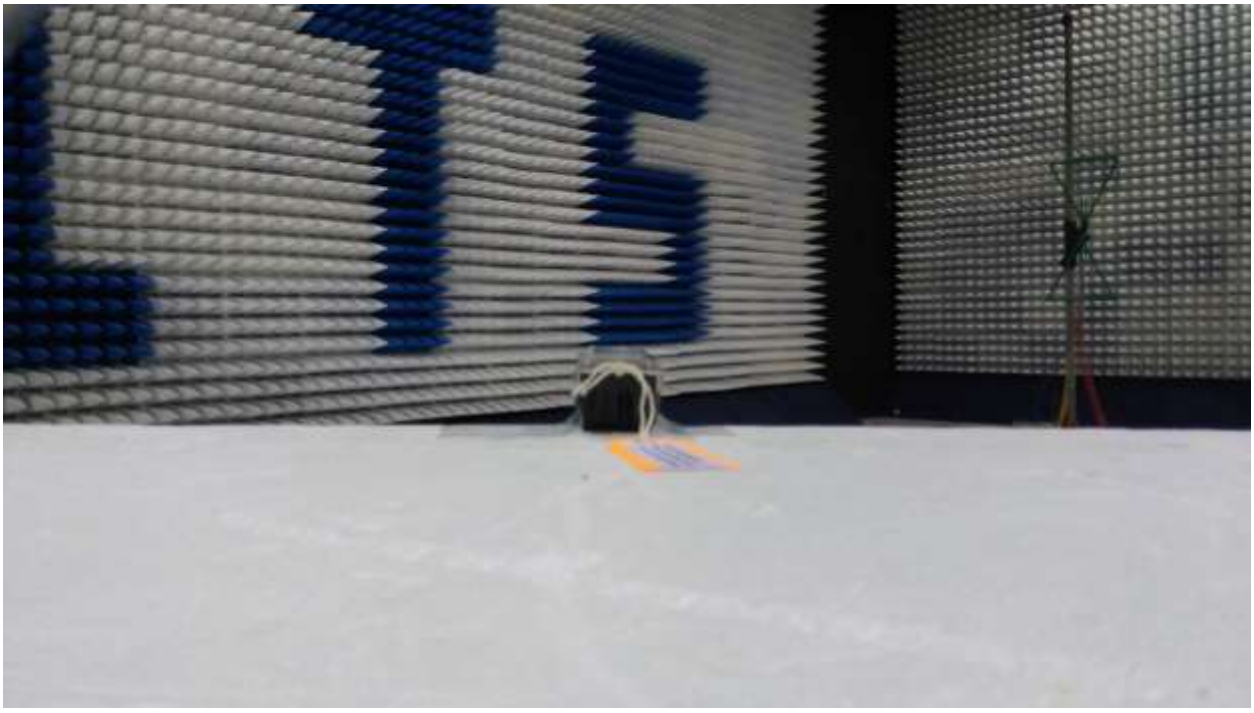
8.4 Setup Photographs:

X - Axis



Y - Axis

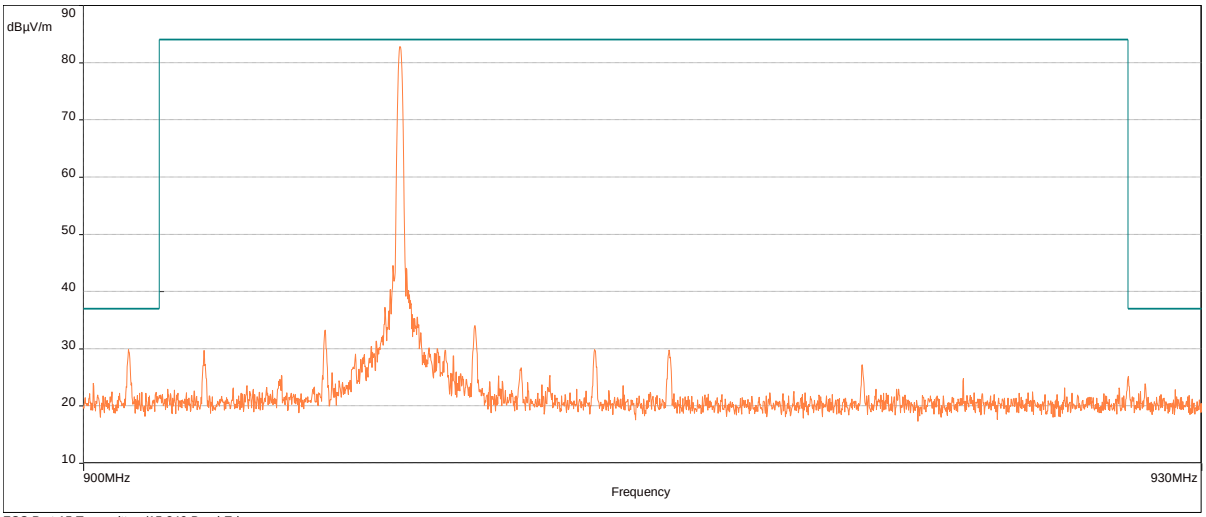
Z – Axis



8.5 Plots/Data:

Model: RF9601, FCC Part 15 Subpart C Section15.249, Band Edge (X-axis)

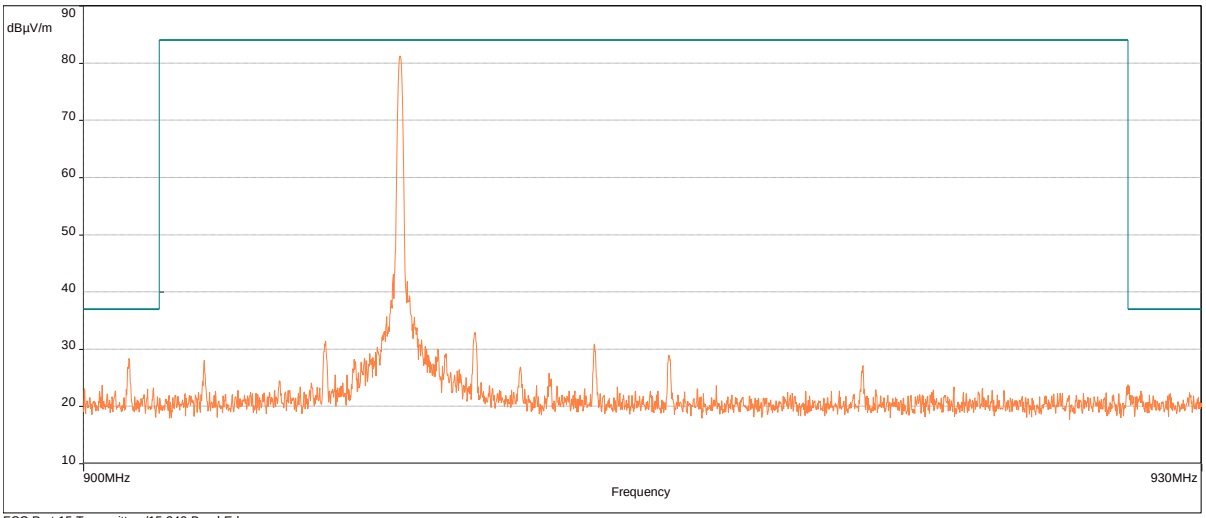
Emissions Graph: RF9601 - Band Edge RE 30MHz-1GHz_X-Axis -4



FCC Part 15 Transmitters/15.249 Band Edge

Model: RF9601, FCC Part 15 Subpart C Section15.249, Band Edge (Y-axis)

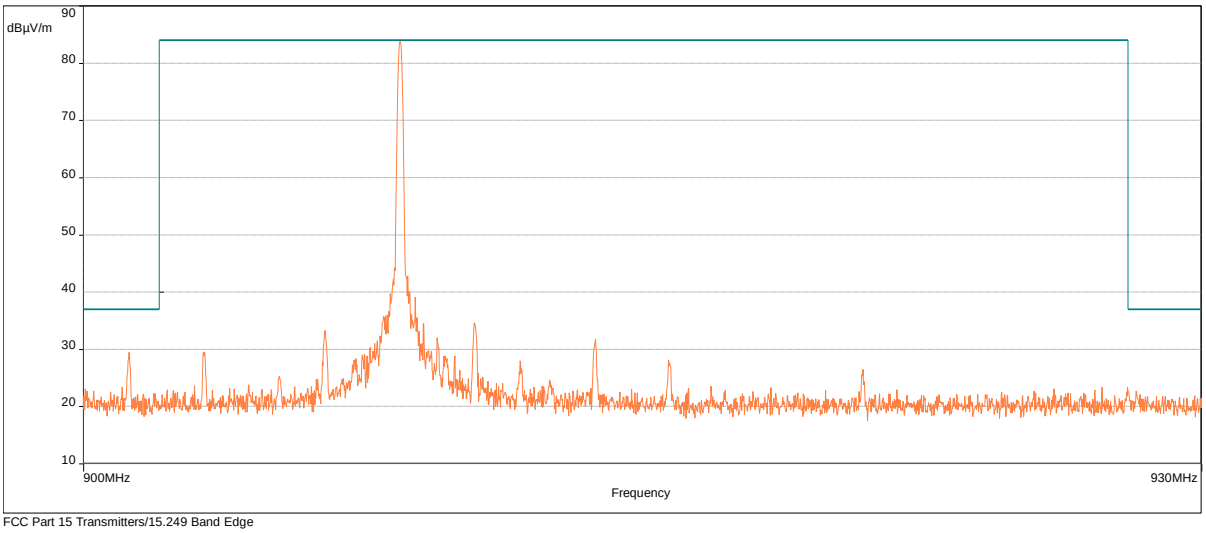
Emissions Graph: RF9601 - Band Edge RE 30MHz-1GHz_Y-Axis -4



FCC Part 15 Transmitters/15.249 Band Edge

Model: RF9601, FCC Part 15 Subpart C Section15.249, Band Edge (Z-axis)

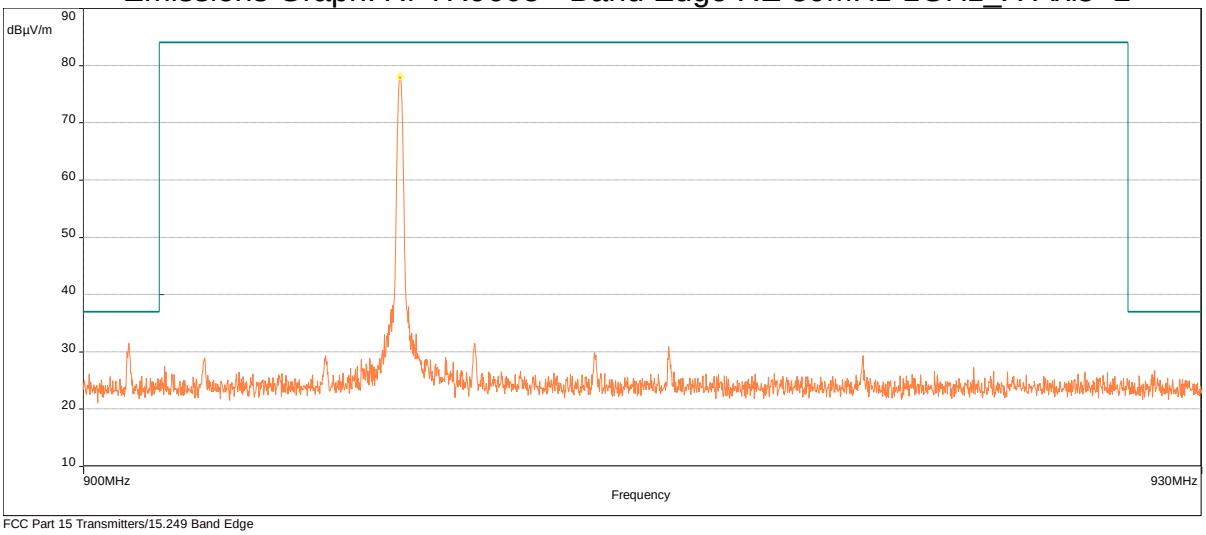
Emissions Graph: RF9601 - Band Edge RE 30MHz-1GHz_Z-Axis -4



FCC Part 15 Transmitters/15.249 Band Edge

Model: RFTR9605, FCC Part 15 Subpart C Section15.249, Band Edge (X-axis)

Emissions Graph: RFTR9605 - Band Edge RE 30MHz-1GHz_X-Axis -2



FCC Part 15 Transmitters/15.249 Band Edge

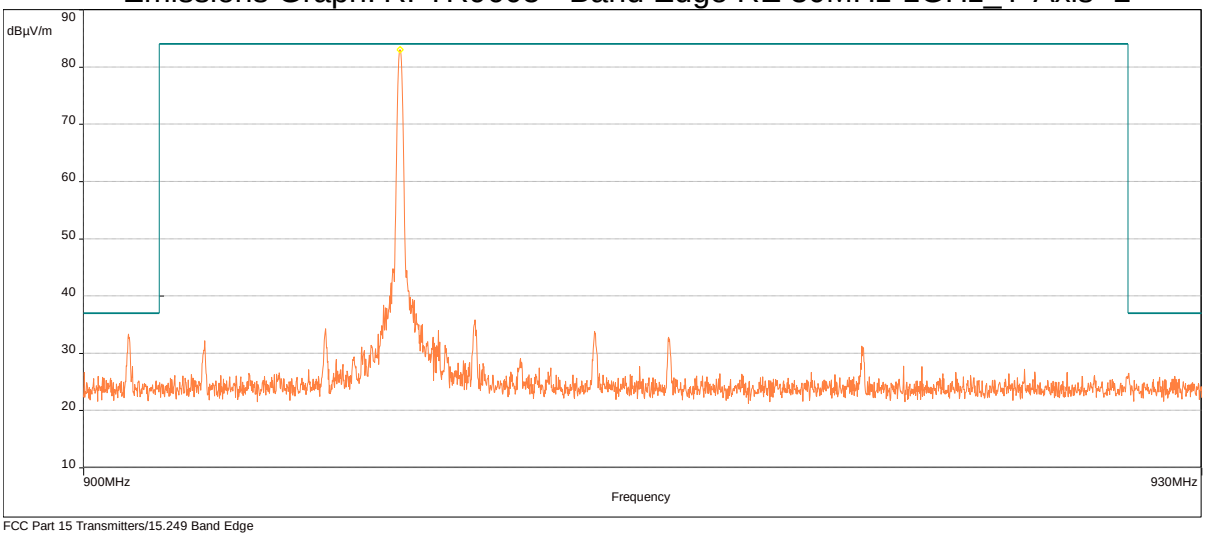
Data Results:

Manual suspects (1)

Frequency (MHz)	SR	Level (dBµV/m)	Height (m)	Angle (°)	Position
908.397	1	78.03	1.00	182.00	Horizontal

Model: RFTR9605, FCC Part 15 Subpart C Section15.249, Band Edge (Y-axis)

Emissions Graph: RFTR9605 - Band Edge RE 30MHz-1GHz_Y-Axis -2



FCC Part 15 Transmitters/15.249 Band Edge

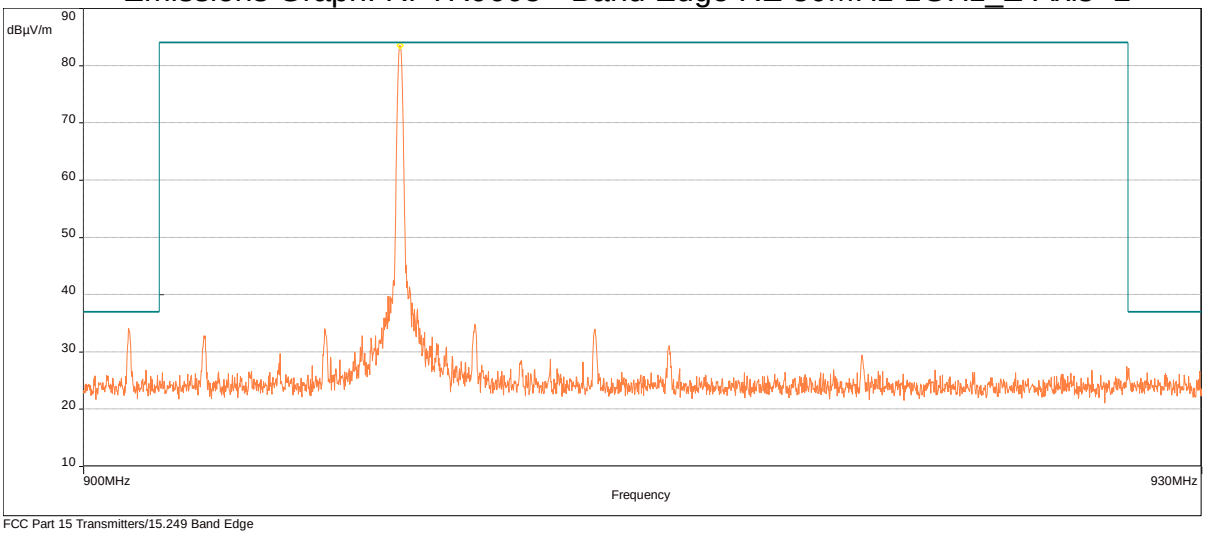
Data Results:

Manual suspects (1)

Frequency (MHz)	SR	Level (dBµV/m)	Height (m)	Angle (°)	Position
908.394	1	82.99	2.50	88.00	Vertical

Model: RFTR9605, FCC Part 15 Subpart C Section15.249, Band Edge (Z-axis)

Emissions Graph: RFTR9605 - Band Edge RE 30MHz-1GHz_Z-Axis -2



FCC Part 15 Transmitters/15.249 Band Edge

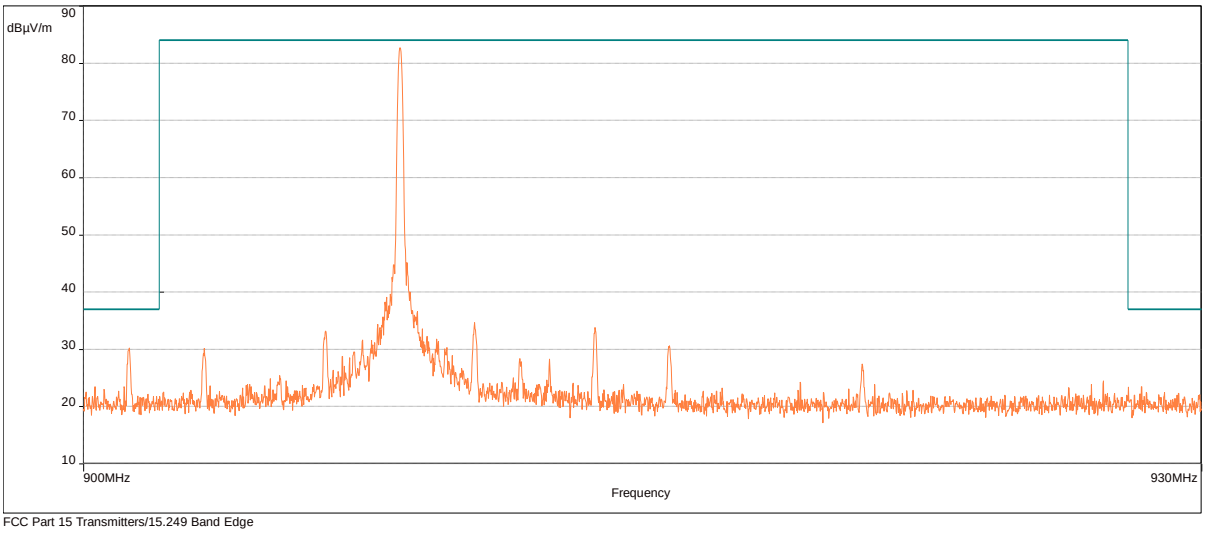
Data Results:

Manual suspects (1)

Frequency (MHz)	SR	Level (dBµV/m)	Height (m)	Angle (°)	Position
908.397	1	83.51	1.00	137.00	Horizontal

Model: RF9617, FCC Part 15 Subpart C Section15.249, Band Edge (X-axis)

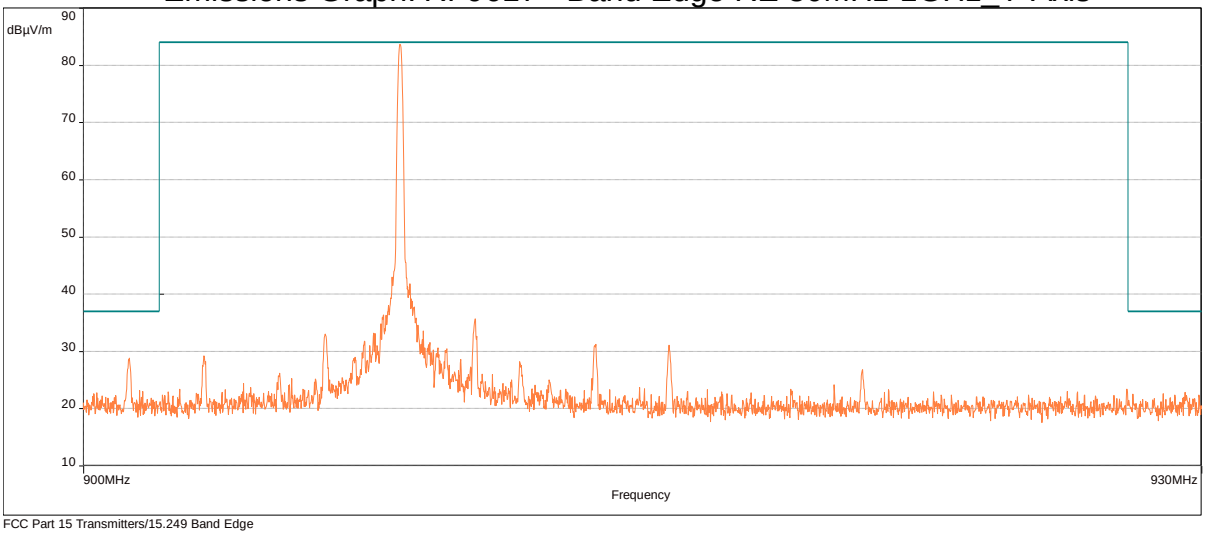
Emissions Graph: RF9617 - Band Edge RE 30MHz-1GHz_X-Axis



FCC Part 15 Transmitters/15.249 Band Edge

Model: RF9617, FCC Part 15 Subpart C Section15.249, Band Edge (Y-axis)

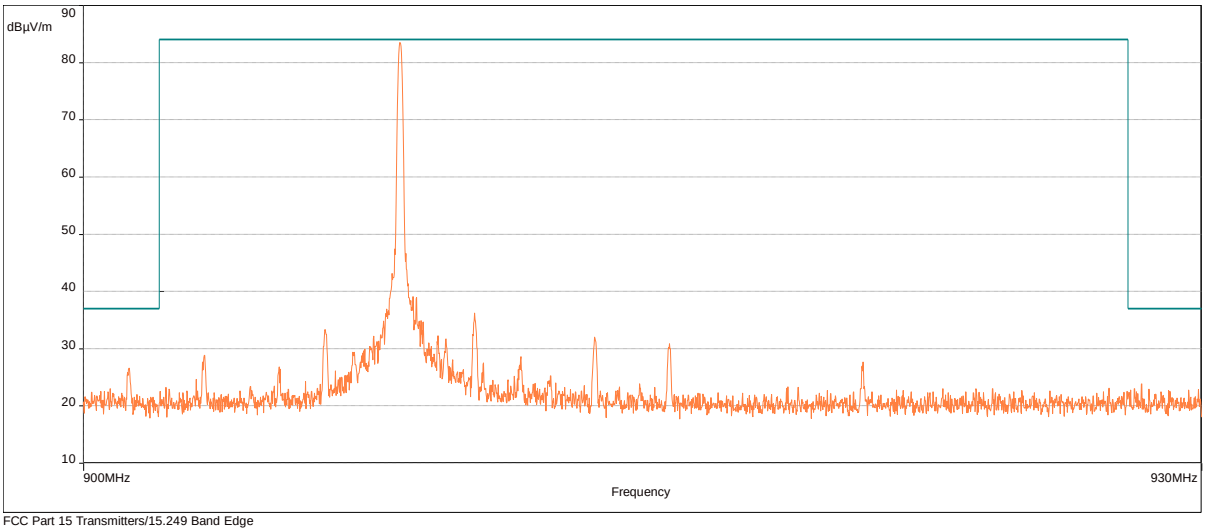
Emissions Graph: RF9617 - Band Edge RE 30MHz-1GHz_Y-Axis



FCC Part 15 Transmitters/15.249 Band Edge

Model: RF9617, FCC Part 15 Subpart C Section15.249, Band Edge (Z-axis)

Emissions Graph: RF9617 - Band Edge RE 30MHz-1GHz_Z-Axis



FCC Part 15 Transmitters/15.249 Band Edge

Test Personnel:	Dan Alvarez	Test Date:	04/26/2018
Supervising/Reviewing Engineer: (Where Applicable)	None		
Product Standard:	47 CFR Part 15 Subpart C and RSS-GEN	Limit Applied:	See Section 8.3
Input Voltage:	120Vac/60Hz	Ambient Temperature:	23 ºC
		Relative Humidity:	45.4 %
Pretest Verification:	N/A	Atmospheric Pressure:	979 mbars

9 FCC 47CFR Part 15 Subpart C - Intentional Radiators - 15.249 Spurious Emissions

9.1 Method

Tests are performed in accordance with FCC CFR47 Part 15 Subpart C and ANSI C63.10:2013. Measurements from 1-10 GHz were performed at a 3m test distance.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.1 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.8 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.1 dB	5.2 dB
Radiated Emissions, 3m	6-18 GHz	3.9 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.5 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

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
212054'	Barometric Pressure/Humidity/Temperature Datalogger	Extech	SD700	A.032434	10/17/2017	10/17/2018
232944'	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
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	09/14/2017	09/14/2018
MP3'	Cable MP3, 18 GHz, N, 10m	Megaphase	G919-NKNK-394	MP3	05/03/2017	05/03/2018
20010'8	Preamplifier, 20 MHz to 18 GHz, 40 dB	A.H. Systems	PAM-0118	199	06/22/2017	06/22/2018

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.17.0.10

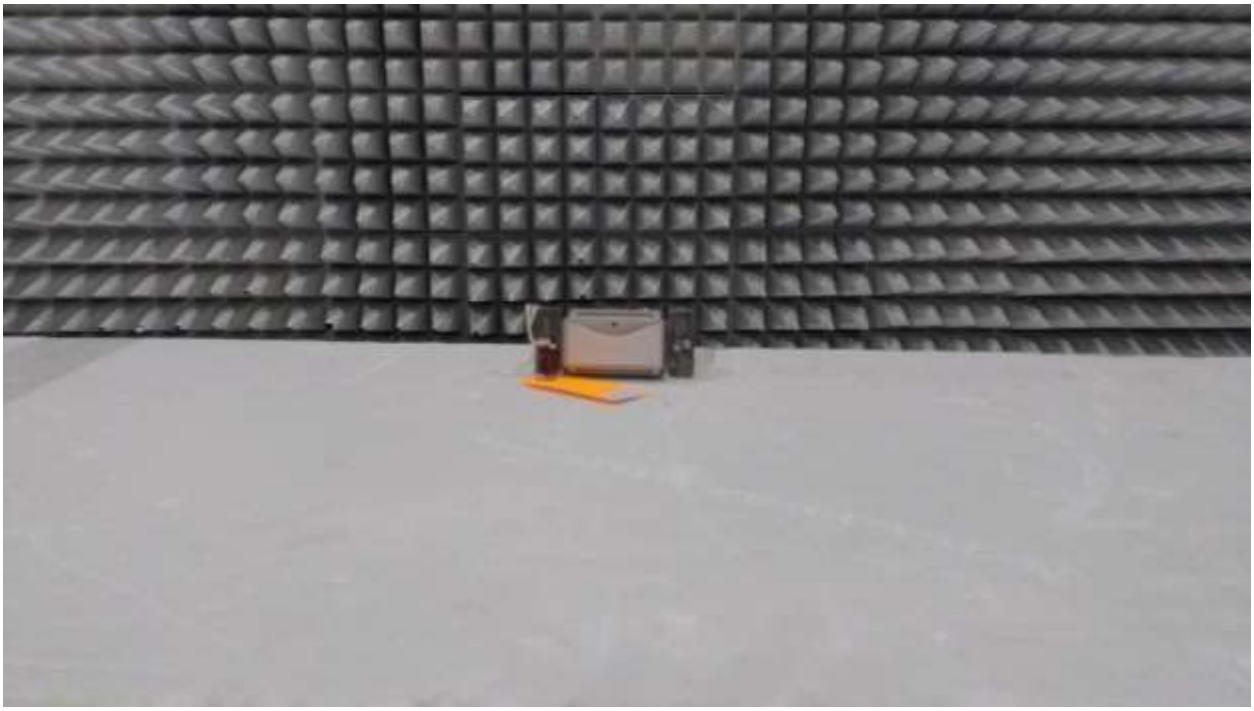
9.3 Results:

The sample tested was found to Comply.

Note: No spurious emissions found below 900 MHz.

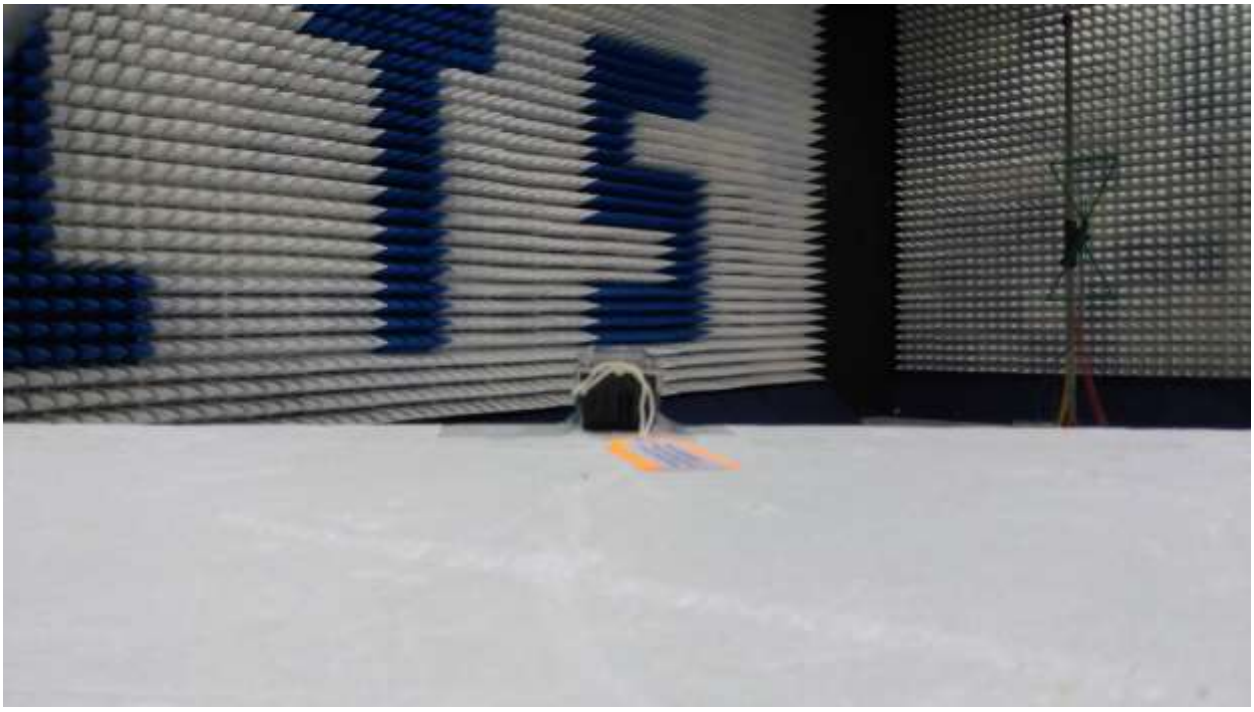
9.4 Setup Photographs:

X - Axis



Y - Axis

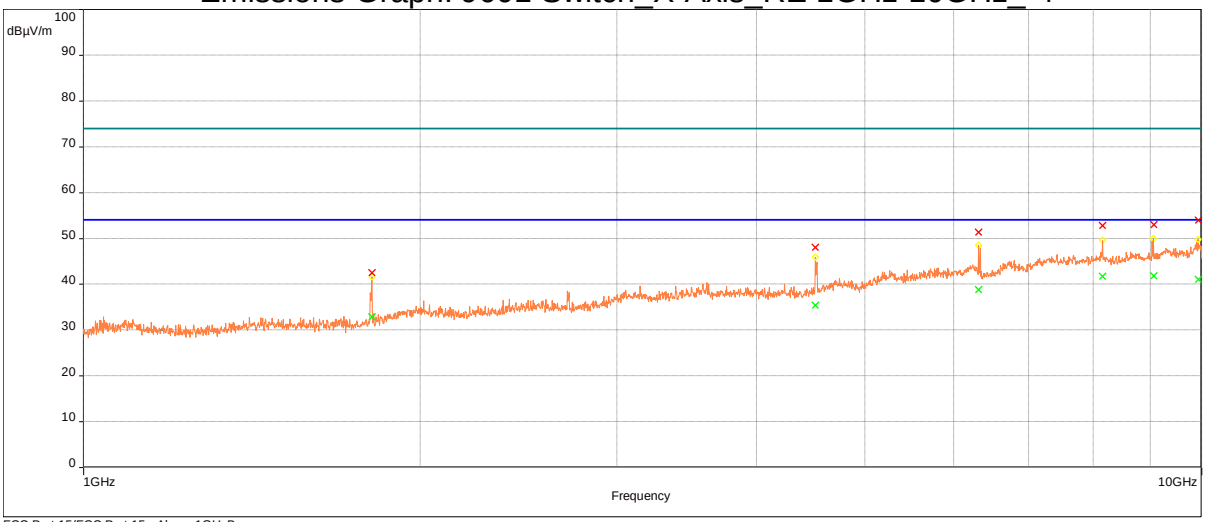
Z – Axis



9.5 Plots/Data:

Model: RF9601, FCC Part Subpart C Section 15.249, Spurious Emissions, X-axis, 1-10 GHz

Emissions Graph: 9601 Switch_X-Axis_RE 1GHz-10GHz_-4



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

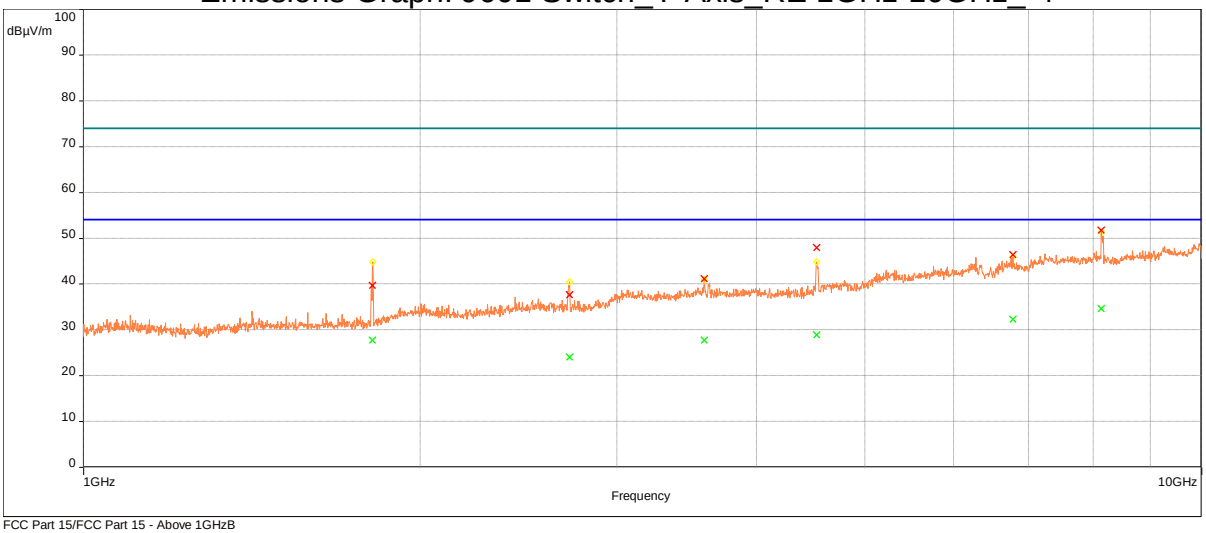
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1812.004	1	32.83	54.00	-21.17	164.00	1.02	Vertical	0.10	-2.24
4514.673	1	35.43	54.00	-18.57	12.00	1.05	Vertical	0.10	5.92
6320.470	1	38.81	54.00	-15.19	307.00	1.40	Horizontal	0.10	9.21
8153.974	1	41.71	54.00	-12.29	0.00	1.00	Horizontal	0.10	13.14
9060.160	1	41.75	54.00	-12.25	189.00	2.86	Vertical	0.10	14.29
9931.994	1	40.98	54.00	-13.02	191.00	1.02	Vertical	0.10	15.53

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1812.004	1	42.49	74.00	-31.51	164.00	1.02	Vertical	0.10	-2.24
4514.673	1	48.00	74.00	-26.00	12.00	1.05	Vertical	0.10	5.92
6320.470	1	51.31	74.00	-22.69	307.00	1.40	Horizontal	0.10	9.21
8153.974	1	52.76	74.00	-21.24	0.00	1.00	Horizontal	0.10	13.14
9060.160	1	53.02	74.00	-20.98	189.00	2.86	Vertical	0.10	14.29
9931.994	1	53.92	74.00	-20.08	191.00	1.02	Vertical	0.10	15.53

Model: RF9601, FCC Part Subpart C Section 15.249, Spurious Emissions, Y-axis, 1-10 GHz

Emissions Graph: 9601 Switch_Y-Axis_RE 1GHz-10GHz_-4



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

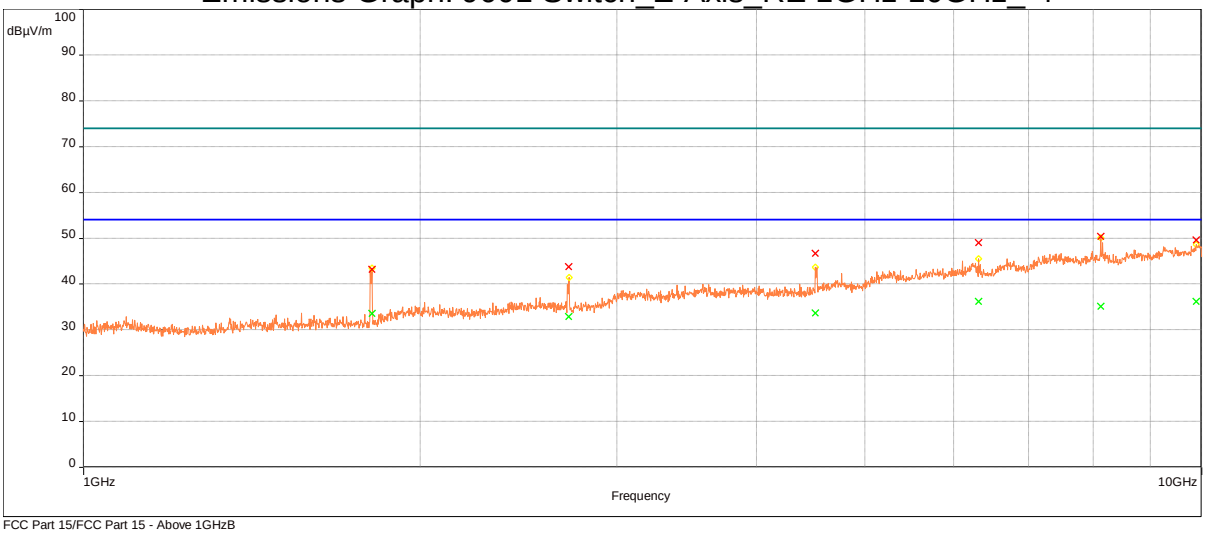
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1813.533	1	27.68	54.00	-26.32	327.00	1.43	Horizontal	0.10	-2.21
2721.721	1	24.00	54.00	-30.00	43.00	1.24	Horizontal	0.10	0.72
3590.898	1	27.72	54.00	-26.28	106.00	2.69	Vertical	0.10	4.26
4526.075	1	28.90	54.00	-25.10	325.00	1.08	Horizontal	0.10	5.94
6782.200	1	32.32	54.00	-21.68	266.00	3.81	Vertical	0.10	10.40
8136.181	1	34.61	54.00	-19.39	87.00	1.00	Horizontal	0.10	13.13

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1813.533	1	39.70	74.00	-34.30	327.00	1.43	Horizontal	0.10	-2.21
2721.721	1	37.58	74.00	-36.42	43.00	1.24	Horizontal	0.10	0.72
3590.898	1	41.16	74.00	-32.84	106.00	2.69	Vertical	0.10	4.26
4526.075	1	47.92	74.00	-26.08	325.00	1.08	Horizontal	0.10	5.94
6782.200	1	46.41	74.00	-27.59	266.00	3.81	Vertical	0.10	10.40
8136.181	1	51.71	74.00	-22.29	87.00	1.00	Horizontal	0.10	13.13

Model: RF9601, FCC Part Subpart C Section 15.249, Spurious Emissions, Z-axis, 1-10 GHz

Emissions Graph: 9601 Switch_Z-Axis_RE 1GHz-10GHz_-4



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

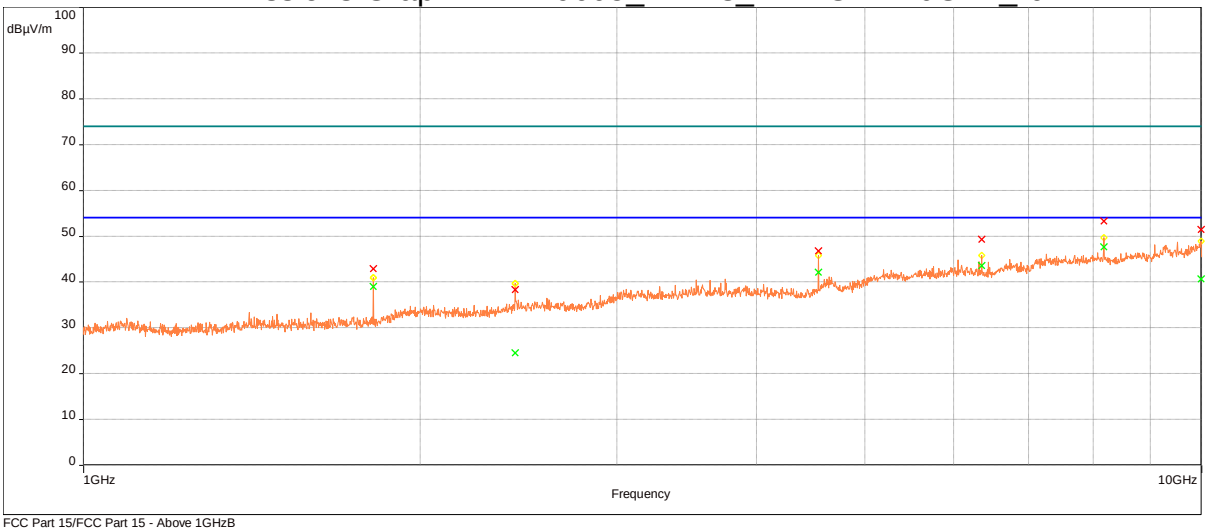
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1811.741	1	33.51	54.00	-20.49	309.00	1.13	Horizontal	0.10	-2.24
2717.53	1	32.86	54.00	-21.14	125.00	2.88	Horizontal	0.10	0.70
4513.904	1	33.65	54.00	-20.35	45.00	1.32	Vertical	0.10	5.92
6319.220	1	36.15	54.00	-17.85	216.00	3.68	Vertical	0.10	9.21
8125.238	1	35.13	54.00	-18.87	266.00	2.75	Vertical	0.10	13.12
9890.754	1	36.12	54.00	-17.88	89.00	2.63	Horizontal	0.10	15.40

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1811.741	1	43.16	74.00	-30.84	309.00	1.13	Horizontal	0.10	-2.24
2717.53	1	43.73	74.00	-30.27	125.00	2.88	Horizontal	0.10	0.70
4513.904	1	46.66	74.00	-27.34	45.00	1.32	Vertical	0.10	5.92
6319.220	1	49.00	74.00	-25.00	216.00	3.68	Vertical	0.10	9.21
8125.238	1	50.31	74.00	-23.69	266.00	2.75	Vertical	0.10	13.12
9890.754	1	49.60	74.00	-24.40	89.00	2.63	Horizontal	0.10	15.40

Model: RFTR9605, FCC Part Subpart C Section 15.249, Spurious Emissions, X-axis, 1-10 GHz

Emissions Graph: RFTR9605_X-Axis_RE 1GHz-10GHz_-6



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

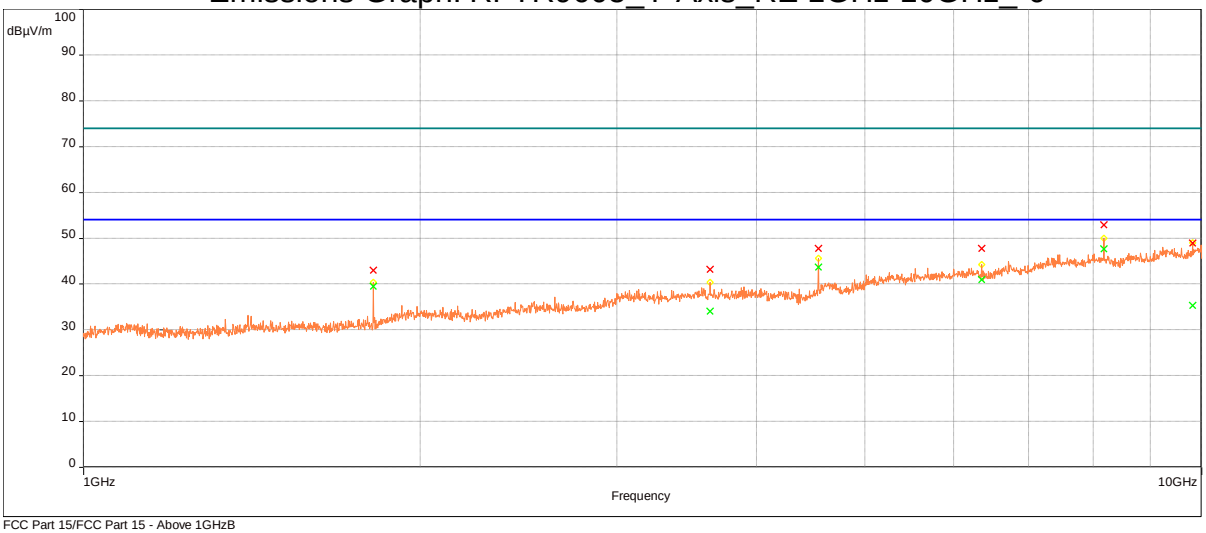
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.7802	1	39.01	54.00	-14.99	219.00	1.01	Horizontal	0.10	-2.37
2432.4438	1	24.53	54.00	-29.47	208.00	3.59	Vertical	0.10	-0.08
4541.9292	1	42.09	54.00	-11.91	224.00	3.54	Horizontal	0.10	5.50
6358.6328	1	43.53	54.00	-10.47	214.00	2.89	Vertical	0.10	8.69
8175.6404	1	47.66	54.00	-6.34	231.00	1.21	Vertical	0.10	12.72
9992.2356	1	40.64	54.00	-13.36	274.00	3.75	Horizontal	0.10	15.13

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.7802	1	42.83	74.00	-31.17	219.00	1.01	Horizontal	0.10	-2.37
2432.4438	1	38.33	74.00	-35.67	208.00	3.59	Vertical	0.10	-0.08
4541.9292	1	46.76	74.00	-27.24	224.00	3.54	Horizontal	0.10	5.50
6358.6328	1	49.32	74.00	-24.68	214.00	2.89	Vertical	0.10	8.69
8175.6404	1	53.23	74.00	-20.77	231.00	1.21	Vertical	0.10	12.72
9992.2356	1	51.42	74.00	-22.58	274.00	3.75	Horizontal	0.10	15.13

Model: RFTR9605, FCC Part Subpart C Section 15.249, Spurious Emissions, Y-axis, 1-10 GHz

Emissions Graph: RFTR9605_Y-Axis_RE 1GHz-10GHz_-6



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

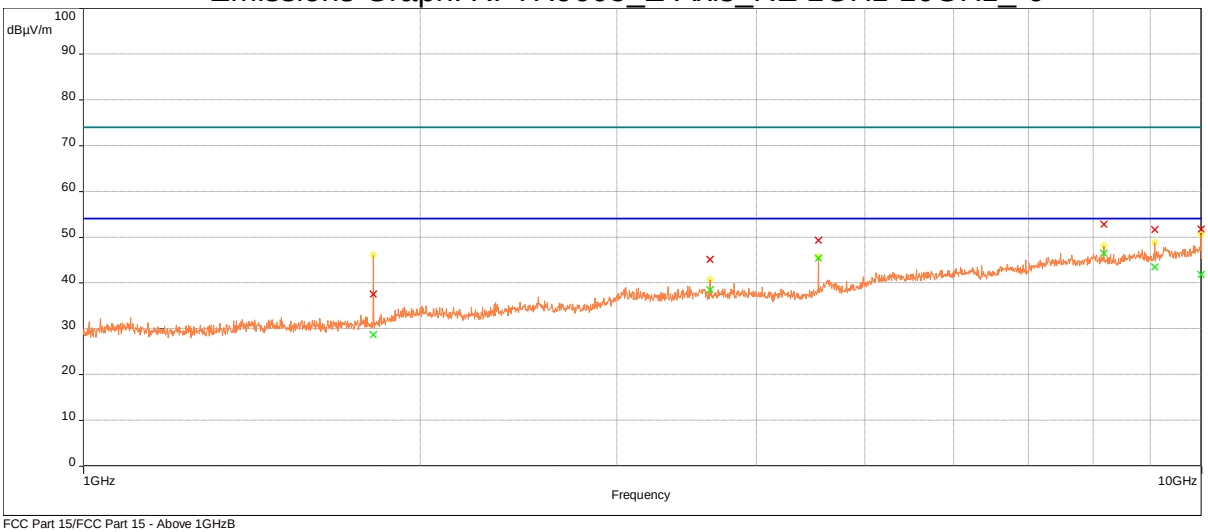
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.8178	1	39.46	54.00	-14.54	182.00	1.01	Vertical	0.10	-2.37
3633.6576	1	34.02	54.00	-19.98	181.00	3.78	Horizontal	0.10	4.22
4542.0178	1	43.63	54.00	-10.37	126.00	1.29	Vertical	0.10	5.50
6358.7962	1	40.91	54.00	-13.09	136.00	1.10	Vertical	0.10	8.69
8175.5146	1	47.59	54.00	-6.41	183.00	3.89	Vertical	0.10	12.72
9821.6248	1	35.28	54.00	-18.72	90.00	1.18	Vertical	0.10	14.68

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.8178	1	42.94	74.00	-31.06	182.00	1.01	Vertical	0.10	-2.37
3633.6576	1	43.17	74.00	-30.83	181.00	3.78	Horizontal	0.10	4.22
4542.0178	1	47.77	74.00	-26.23	126.00	1.29	Vertical	0.10	5.50
6358.7962	1	47.68	74.00	-26.32	136.00	1.10	Vertical	0.10	8.69
8175.5146	1	52.91	74.00	-21.09	183.00	3.89	Vertical	0.10	12.72
9821.6248	1	48.87	74.00	-25.13	90.00	1.18	Vertical	0.10	14.68

Model: RFTR9605, FCC Part Subpart C Section 15.249, Spurious Emissions, Z-axis, 1-10 GHz

Emissions Graph: RFTR9605_Z-Axis_RE 1GHz-10GHz_-6



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

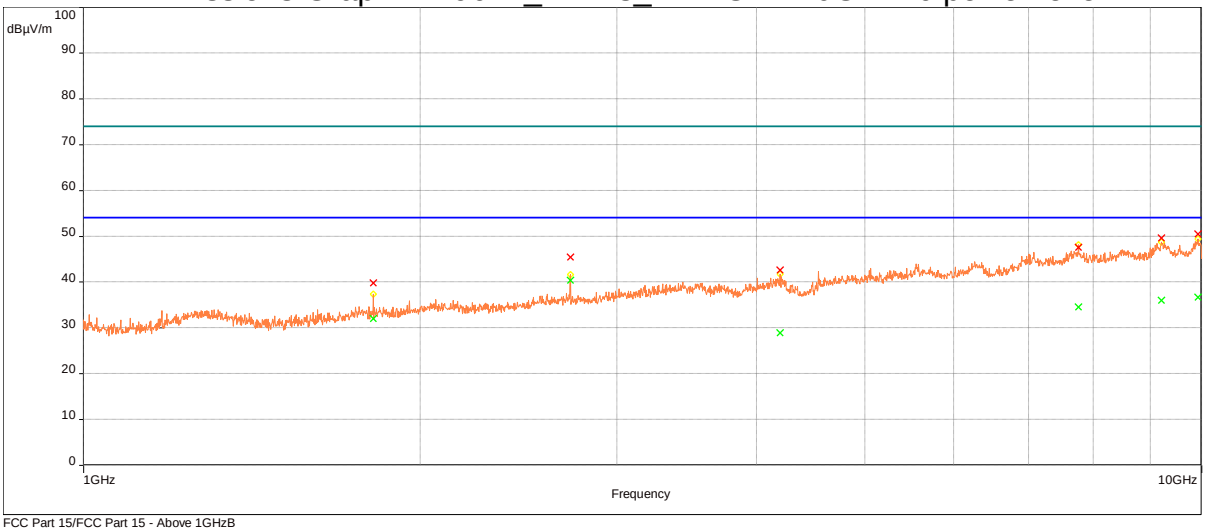
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.9464	1	28.69	54.00	-25.31	84.00	2.91	Horizontal	0.10	-2.37
3633.6572	1	38.47	54.00	-15.53	0.00	1.32	Horizontal	0.10	4.22
4542.064	1	45.43	54.00	-8.57	119.00	2.03	Horizontal	0.10	5.50
8175.5642	1	46.49	54.00	-7.51	95.00	1.05	Vertical	0.10	12.72
9083.8944	1	43.41	54.00	-10.59	98.00	2.34	Vertical	0.10	13.85
9992.0232	1	41.76	54.00	-12.24	88.00	1.13	Vertical	0.10	15.13

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.9464	1	37.50	74.00	-36.50	84.00	2.91	Horizontal	0.10	-2.37
3633.6572	1	45.10	74.00	-28.90	0.00	1.32	Horizontal	0.10	4.22
4542.064	1	49.28	74.00	-24.72	119.00	2.03	Horizontal	0.10	5.50
8175.5642	1	52.80	74.00	-21.20	95.00	1.05	Vertical	0.10	12.72
9083.8944	1	51.60	74.00	-22.40	98.00	2.34	Vertical	0.10	13.85
9992.0232	1	51.70	74.00	-22.30	88.00	1.13	Vertical	0.10	15.13

Model: RF9617, FCC Part Subpart C Section 15.249, Spurious Emissions, X-axis, 1-10 GHz

Emissions Graph: RF9617_X-Axis_RE 1GHz-10GHz -6 power level



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

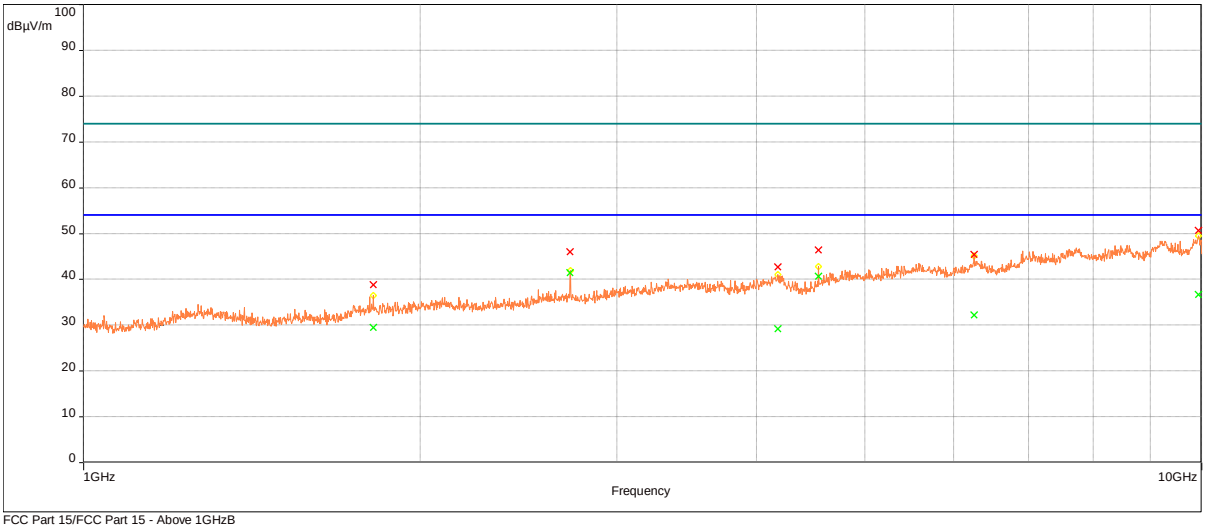
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.764	1	31.96	54.00	-22.04	79.00	2.96	Vertical	0.10	-2.28
2725.244	1	40.32	54.00	-13.68	4.00	1.38	Vertical	0.10	0.63
4197.641	1	28.86	54.00	-25.14	274.00	1.39	Vertical	0.10	5.44
7762.145	1	34.47	54.00	-19.53	117.00	1.02	Vertical	0.10	12.00
9207.049	1	35.98	54.00	-18.02	232.00	2.39	Vertical	0.10	14.09
9928.224	1	36.64	54.00	-17.36	314.00	1.21	Vertical	0.10	15.00

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.764	1	39.75	74.00	-34.25	79.00	2.96	Vertical	0.10	-2.28
2725.244	1	45.35	74.00	-28.65	4.00	1.38	Vertical	0.10	0.63
4197.641	1	42.62	74.00	-31.38	274.00	1.39	Vertical	0.10	5.44
7762.145	1	47.51	74.00	-26.49	117.00	1.02	Vertical	0.10	12.00
9207.049	1	49.58	74.00	-24.42	232.00	2.39	Vertical	0.10	14.09
9928.224	1	50.46	74.00	-23.54	314.00	1.21	Vertical	0.10	15.00

Model: RF9617, FCC Part Subpart C Section 15.249, Spurious Emissions, Y-axis, 1-10 GHz

Emissions Graph: RF9617_Y-Axis_RE 1GHz-10GHz -6 power level



FCC Part 15/FCC Part 15 - Above 1GHzB

Data Results:

Avg (PASS) (6)

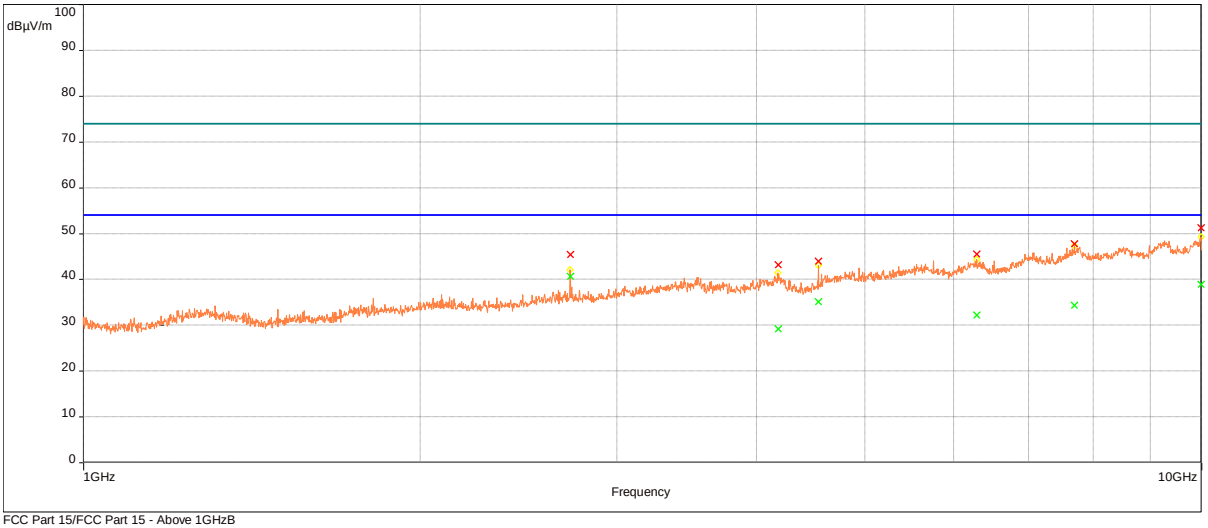
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.823	1	29.50	54.00	-24.50	261.00	3.92	Vertical	0.10	-2.28
2725.096	1	41.40	54.00	-12.60	34.00	1.04	Horizontal	0.10	0.63
4177461	1	29.14	54.00	-24.86	311.00	2.66	Horizontal	0.10	5.47
4541.931	1	40.63	54.00	-13.37	13.00	1.40	Horizontal	0.10	5.93
6258.825	1	32.19	54.00	-21.81	1.00	2.99	Horizontal	0.10	8.29
9937.794	1	36.67	54.00	-17.33	121.00	3.49	Vertical	0.10	15.02

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
1816.823	1	38.74	74.00	-35.26	261.00	3.92	Vertical	0.10	-2.28
2725.096	1	46.00	74.00	-28.00	34.00	1.04	Horizontal	0.10	0.63
4177.461	1	42.70	74.00	-31.30	311.00	2.66	Horizontal	0.10	5.47
4541.931	1	46.39	74.00	-27.61	13.00	1.40	Horizontal	0.10	5.93
6258.825	1	45.38	74.00	-28.62	1.00	2.99	Horizontal	0.10	8.29
9937.379	1	50.68	74.00	-23.32	121.00	3.49	Vertical	0.10	15.02

Model: RF9617, FCC Part Subpart C Section 15.249, Spurious Emissions, Z-axis, 1-10 GHz

Emissions Graph: RF9617_Z-Axis_RE 1GHz-10GHz -6 power level



Data Results:

Avg (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
2725.229	1	40.62	54.00	-13.38	44.00	3.51	Horizontal	0.10	0.63
4181.438	1	29.19	54.00	-24.81	311.00	2.22	Horizontal	0.10	5.46
4541.821	1	35.12	54.00	-18.88	10.00	3.68	Horizontal	0.10	5.93
6293.883	1	32.13	54.00	-21.87	216.00	2.87	Vertical	0.10	8.35
7697.483	1	34.34	54.00	-19.66	323.00	2.14	Horizontal	0.10	11.85
9992.134	1	38.89	54.00	-15.11	229.00	3.49	Vertical	0.10	15.15

Peak (PASS) (6)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Meas. time (s)	Correction (dB)
2725.229	1	45.38	74.00	-28.62	44.00	3.51	Horizontal	0.10	0.63
4181.438	1	43.18	74.00	-30.82	311.00	2.22	Horizontal	0.10	5.46
4541.821	1	43.91	74.00	-30.09	10.00	3.68	Horizontal	0.10	5.93
63.8838	1	45.53	74.00	-28.47	216.00	2.87	Vertical	0.10	8.35
7697.483	1	47.76	74.00	-26.24	323.00	2.14	Horizontal	0.10	11.85
9992.134	1	51.23	74.00	-22.77	229.00	3.49	Vertical	0.10	15.15

Test Personnel:	Dan Alvarez	Test Date:	03/23/2018 – 06/06/2018
Supervising/Reviewing Engineer: (Where Applicable)	None		
Product Standard:	FCC 15.249 & RSS-GEN	Limit Applied:	15.249 & RSS-GEN
Input Voltage:	120VAC,60Hz	Ambient Temperature:	23 ºC
Pretest Verification:	**Yes**	Relative Humidity:	31 %
		Atmospheric Pressure:	985 mbars

Deviations, Additions, or Exclusions: None

Note: No spurious emissions found below 900 MHz.

10 FCC 47CFR Part 15 Subpart C - Intentional Radiators - 15.249 Duty Cycle

10.1 Method

Tests are performed in accordance with Tests are performed in accordance with 47 CFR Part 15 Subpart C and RSS-GEN. Measurements from 30MHz – 1GHz were performed at a 10m test distance.

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.

10.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
232944'	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
MM1'	RF Coax Cable 10KHz-18GHz	Maury Microwave	UC-N-MM36	161471	05/03/2017	05/03/2018
E212'	RF Coax Cable	Megaphase	TM18-N1N1-120	15055601002	06/22/2017	06/22/2018
ST-6'	RF Coax Cable - Rated 9 kHz to 18 GHz.	Teledyne Storm Micro	A81-0303-275	16-01-801	03/02/2018	03/02/2019
TW2 211411'	Cable TW2	Andrews	Cable TW2	TW2	05/03/2017	05/03/2018
200069'	Preamplifier, 10 MHz to 2000 MHz, 40 dB gain	Mini-Circuits	ZKL-2	D011105	04/19/2017	04/19/2018
213312'	Bilog antenna	Teseq	CBL 6112D	40527	05/25/2017	05/25/2018
25401'	Comparison Noise Emitter, broadband noise source	York EMC	CNE III	679	10/27/2007	Verified
212054'	Barometric Pressure/Humidity Datalogger	Extech	SD700	none	10/17/2017	10/17/2018

Software Utilized:

Name	Manufacturer	Version
None (Receiver Firmware used)	--	--

10.3 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.

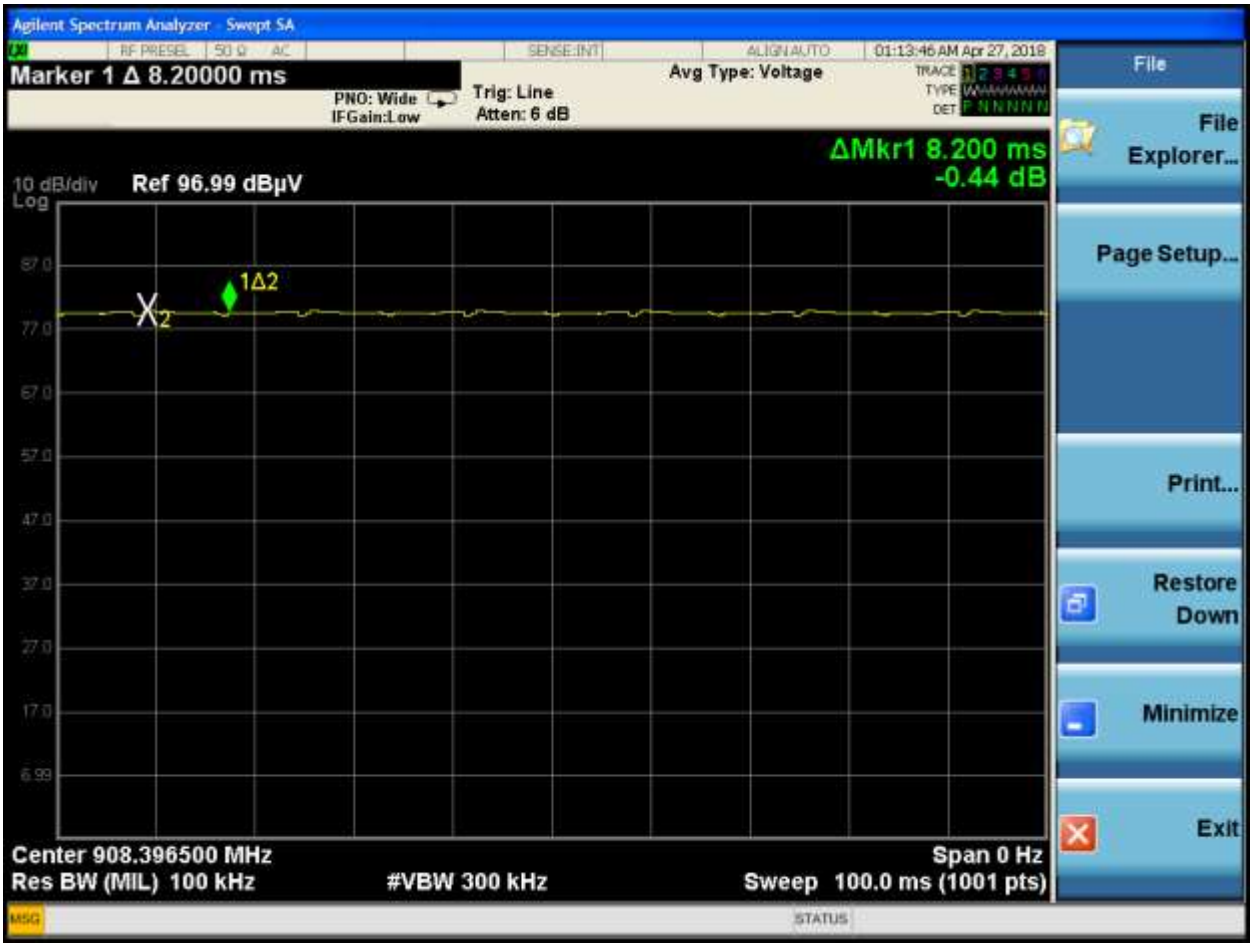
RSS-GEN Section 6.10

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.

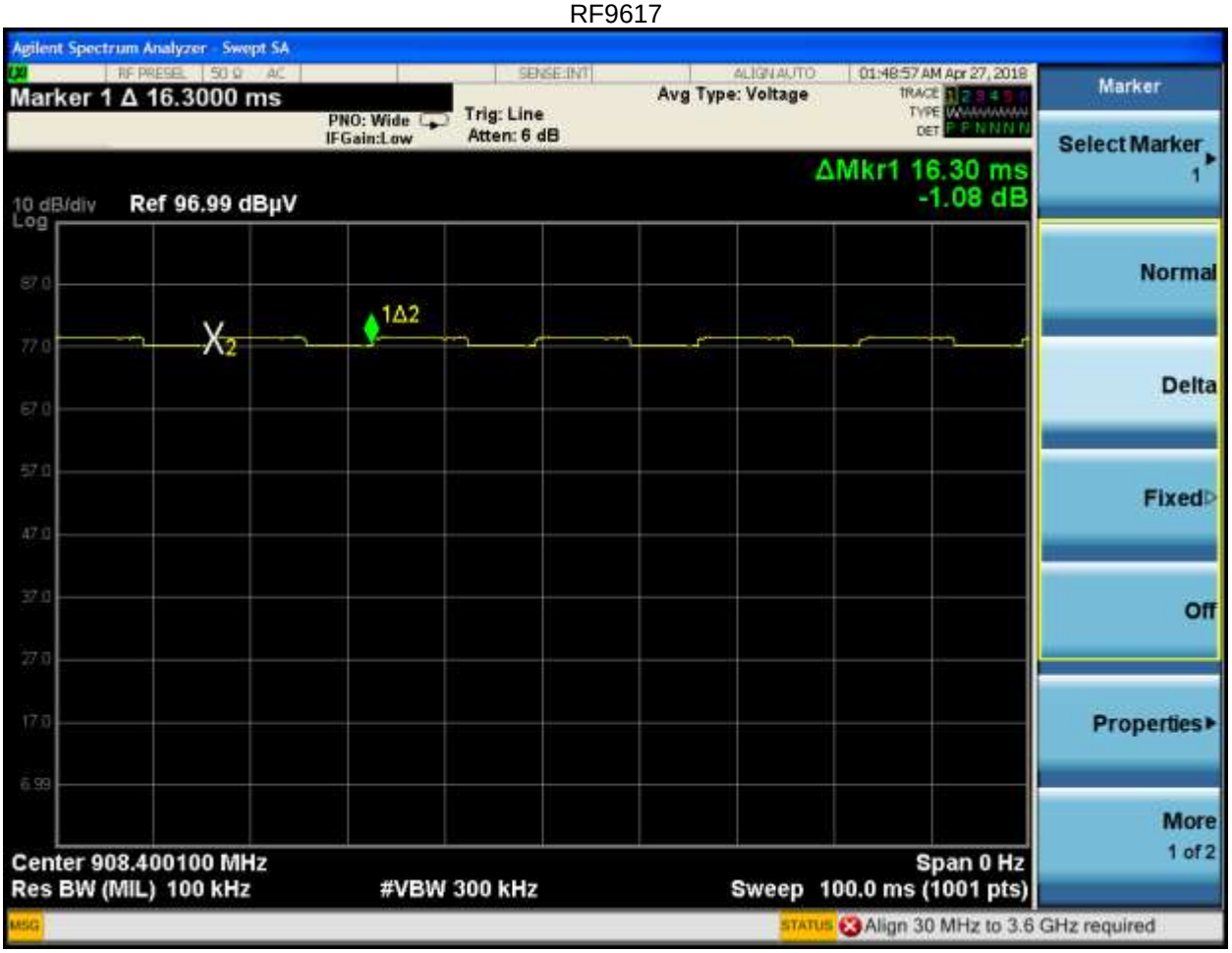
10.4 Plots/Data:

RF9601



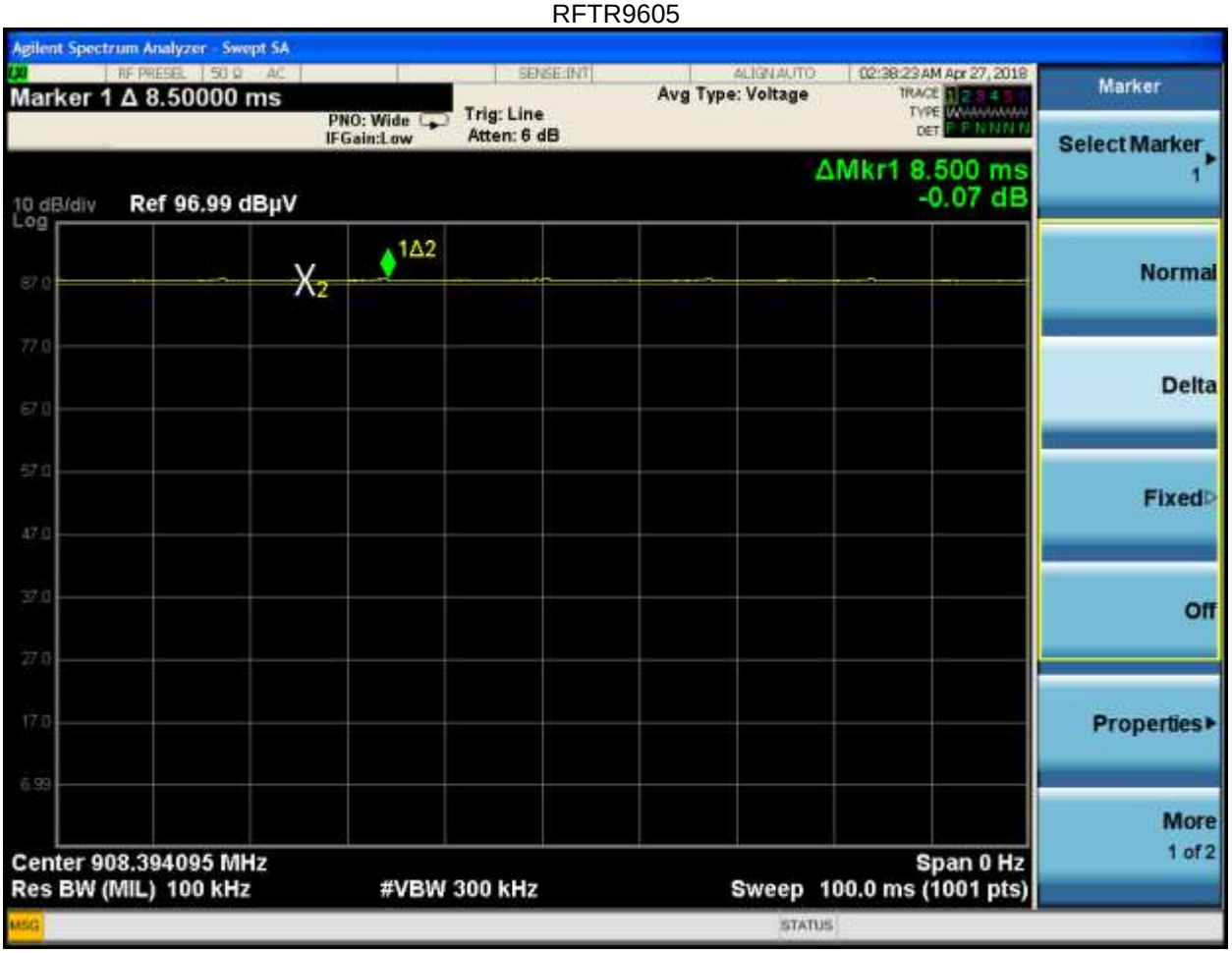
The duty cycle = 100ms/100ms = 1
Average factor = 20*LOG(1) = 0 dB

RF9617



The duty cycle = 100ms/100ms = 1
Average factor = 20*LOG(1) = 0 dB

RFTR9605



The duty cycle = 100ms/100ms = 1
Average factor = 20*LOG(1) = 0 dB

Test Personnel:	Dan Alvarez	Test Date:	04/26/2018
Supervising/Reviewing Engineer: (Where Applicable)	None		
Product Standard:	47 CFR Part 15 Subpart C and RSS-GEN	Limit Applied:	See Section 8.3
Input Voltage:	120Vac/60Hz		
		Ambient Temperature:	23 ºC
Pretest Verification:	N/A	Relative Humidity:	45.4 %
		Atmospheric Pressure:	979 mbars

Deviations, Additions, or Exclusions: None

11 FCC 47CFR Part 15 Subpart C - Intentional Radiators - 15.249 20 dB and Occupied Bandwidth

11.1 Method

Tests are performed in accordance with CFR47 FCC Part 15 Subpart C and RSS-GEN. Measurements from 30MHz – 1GHz were performed at a 3m test distance.

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.

11.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
232944'	EMI Receiver 10Hz-26.5GHz	Agilent	MXE-9038A	MY51210135	08/01/2017	08/01/2018
MM1'	RF Coax Cable 10KHz-18GHz	Maury Microwave	UC-N-MM36	161471	05/03/2017	05/03/2018
E212'	RF Coax Cable	Megaphase	TM18-N1N1-120	15055601002	06/22/2017	06/22/2018
ST-6'	RF Coax Cable - Rated 9 kHz to 18 GHz.	Teledyne Storm Micro	A81-0303-275	16-01-801	03/02/2018	03/02/2019
TW2 211411'	Cable TW2	Andrews	Cable TW2	TW2	05/03/2017	05/03/2018
200069'	Preamplifier, 10 MHz to 2000 MHz, 40 dB gain	Mini-Circuits	ZKL-2	D011105	04/19/2017	04/19/2018
213312'	Bilog antenna	Teseq	CBL 6112D	40527	05/25/2017	05/25/2018
25401'	Comparison Noise Emitter, broadband noise source	York EMC	CNE III	679	10/27/2007	Verified
212054'	Barometric Pressure/Humidity Datalogger	Extech	SD700	none	10/17/2017	10/17/2018

Software Utilized:

Name	Manufacturer	Version
None (Receiver Firmware used)	--	--

11.3 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 (20 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 20 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.

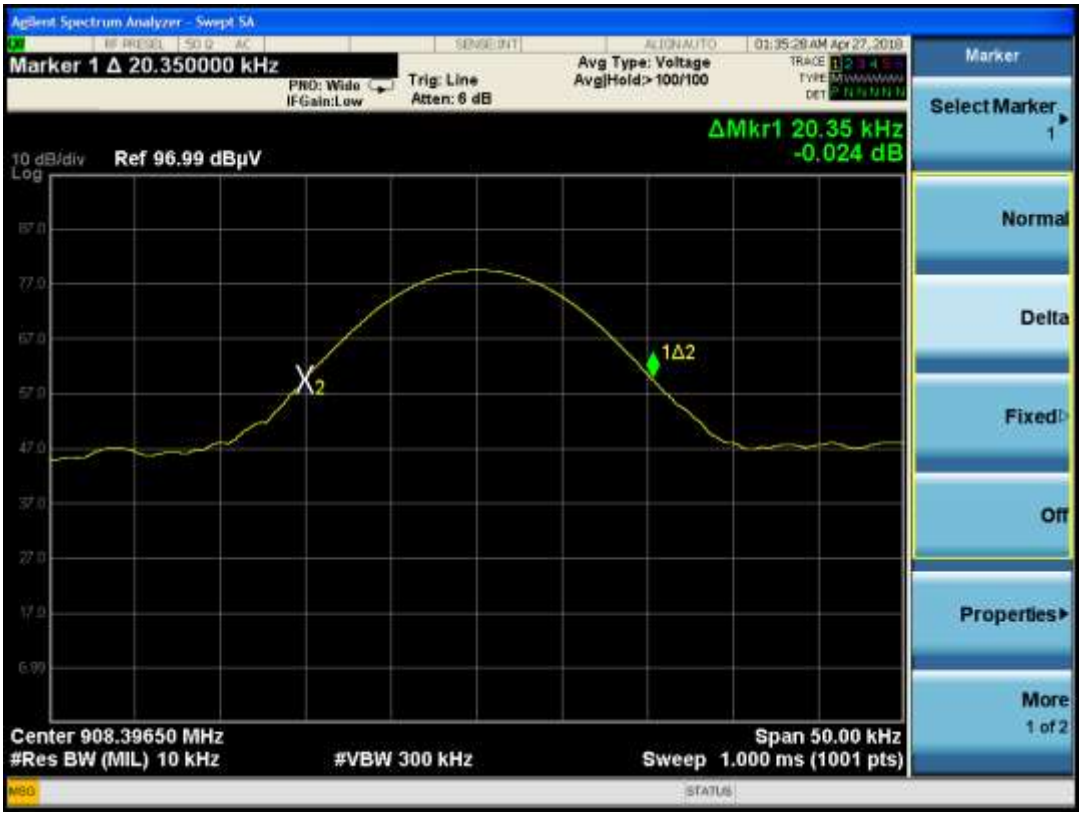
A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

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.

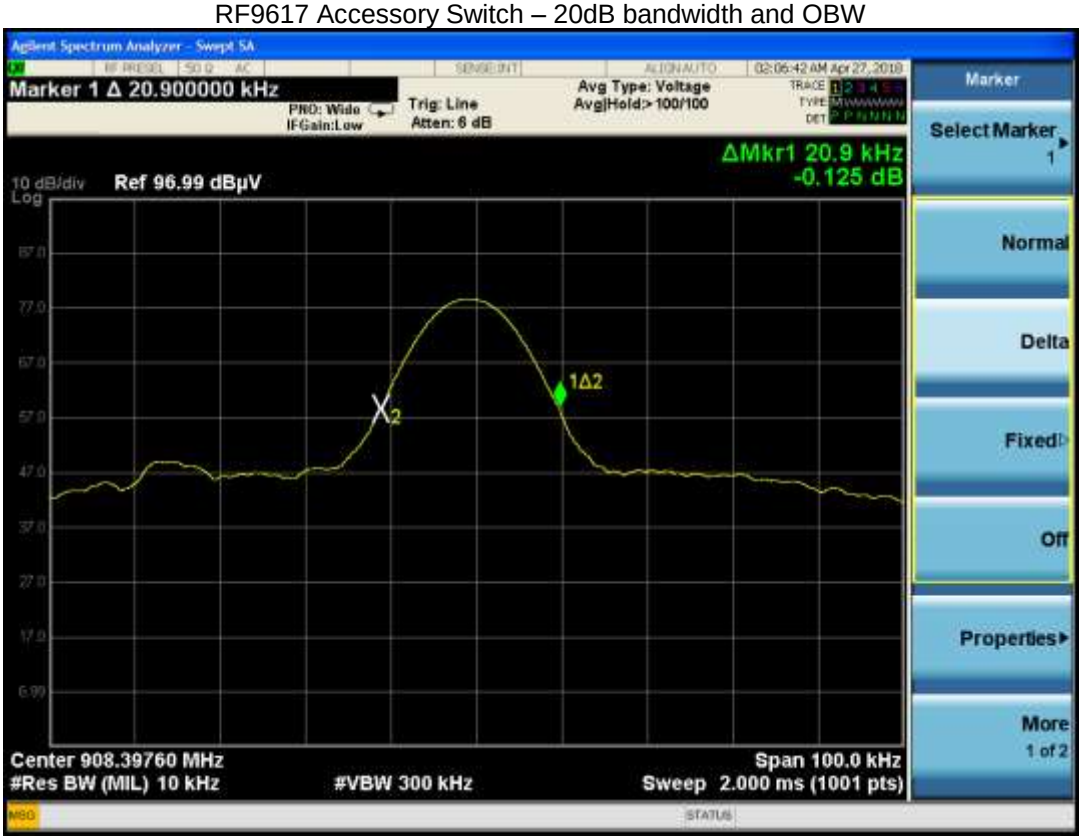
The difference between the two recorded frequencies is the 99% occupied bandwidth.

11.4 Test Data:

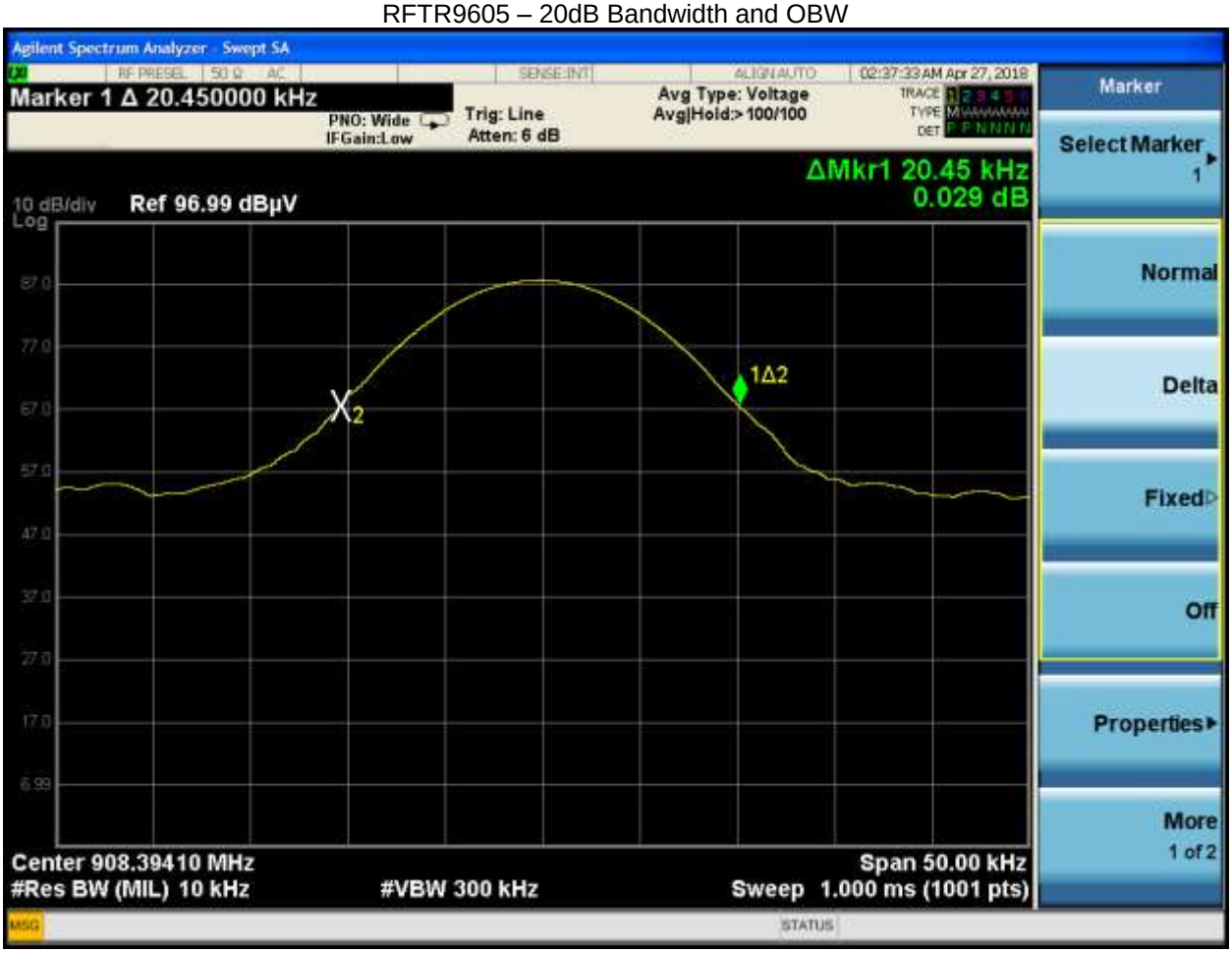
RF9601 Switch – 20dB bandwidth and OBW



RF9617 Accessory Switch – 20dB bandwidth and OBW



RFTR9605 – 20dB Bandwidth and OBW



Test Personnel:	Dan Alvarez	Test Date:	04/27/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	47 CFR Part 15 Subpart C and RSS-GEN	Limit Applied:	See Section 9.3
Input Voltage:	120Vac/60Hz	Ambient Temperature:	23 ºC
		Relative Humidity:	45.4 %
Pretest Verification:	**Yes**	Atmospheric Pressure:	979 mbars

Deviations, Additions, or Exclusions: None

12 FCC 47CFR Part 15 Subpart C - Intentional Radiators - 15.249 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

12.1 Results:

The sample tested was found to Comply.

RF9601
The maximum measured radiated power is 0.817 mW (-0.88 dBm). The worst case antenna gain, G is 0.0 dBi (0.0 numerical). Therefore, the conducted power (P) is 0.000817 W.

At 5mm distance the condition for SAR exclusion threshold is:
EIRP = -0.88 dBm
0.81616646 × 0.9084 ÷ 5 = 0.148281122 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.

RF9617
The maximum measured radiated power is 0.817 mW (-0.88 dBm). The worst case antenna gain, G is 0.0 dBi (0.0 numerical). Therefore, the conducted power (P) is 0.000817 W.

At 5mm distance the condition for SAR exclusion threshold is
EIRP = -0.88 dBm
0.81616646 × 0.9084 ÷ 5 = 0.148281122 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.

RFTR9605
The maximum measured radiated power is 0.817 mW (-0.88 dBm). The worst case antenna gain, G is 0.0 dBi (0.0 numerical). Therefore, the conducted power (P) is 0.000817 W.

At 5mm distance the condition for SAR exclusion threshold is
EIRP = -0.88 dBm
0.81616646 × 0.9084 ÷ 5 = 0.148281122 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.

13 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	06/06/2018	103369962ATL-003	DH	KPS	Original Issue
1	08/08/2018	103369962ATL-003a	DH	KPS	Model Number RFTR9605 was updated to reflect new model number RFTR9605-T in all sections except the test data sections of the report.
2	08/22/2018	103369962ATL-003b	DH	KPS	Updated EIRP Calculation with Pathloss. HF setup photo.
3	08/24/2018	103369962ATL-00c	DH	KPS	Corrected power calculation on page 64 / Added comment to section 8 – No spurious found below 900 MHz / Removed references to 15.207 and 15.209.