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Walter Kidde Portable Equipment TEST REPORT

SCOPE OF WORK
FCC 15.231 & ISED RSS-210 TESTING – SDX-135Z-433 AND HDX-135Z-433

REPORT NUMBER
103485229LAX-001

ISSUE DATE
April 25, 2018

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30

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

EMC TEST REPORT

(FULL COMPLIANCE)

Report Number: 103485229LAX-001
Project Number: G103485229

Report Issue Date: April 25, 2018

Model(s) Tested: SDX-135Z-433, HDX-135Z-433

Standards: **FCC CFR47 Part 15 Subpart C, April 2018**
Intentional Radiator
§15.231 Periodic operation in the band 40.66-40.70 MHz and above 70 MHz

ISED RSS-210 Issue 9, August 2016 (Amendment November 2017
Licence-Exempt Radio Apparatus: Category I Equipment

ISED RSS-Gen Issue 4, Amendment 1, March 15, 2018
General Requirements for Compliance of Radio Apparatus

Tested by:
Intertek
25791 Commercentre Drive
Lake Forest, CA 92630
USA

Client:
Walter Kidde Portable Equipment Inc.
1016 Corporate Park Drive
Mebane, NC 27302
USA

Report prepared by

Grace Lin
EMC Staff Engineer

Report reviewed by

Norman Shpilsher
Sr. 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
6	Transmitter Deactivation Time (FCC §15.231(a)(1) and ISED RSS-210 Issue 9 §A.1.1(a))	Compliant
7	Occupied Bandwidths (FCC §15.215(c); ISED RSS-Gen Issue 4 §6.6)	Compliant
8	Field Strength of Fundamental (FCC §15.231(b); ISED RSS-210 Issue 9 §A.1.2(a))	Compliant
9	Radiated Spurious Emissions (FCC §15.231(b); ISED RSS-210 Issue 9 §A.1.2(a))	Compliant
10	AC Power Line Conducted Emissions (FCC §15.207, FCC §15.107; ISED RSS-Gen Issue 4 §8.8, ISED ICES-003 §6.1)	Not Applicable *

*: The EUT is battery powered

3 Client Information

This EUT was tested at the request of:

Client: Walter Kidde Portable Equipment Inc.
1016 Corporate Park Drive
Mebane, NC 27302
USA

Contact: Mirandi Gomez
Telephone: 719-533-2304
Email: Mirandi.Gomez@kiddeUS.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Walter Kidde Portable Equipment Inc.
1016 Corporate Park Drive
Mebane, NC 27302
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Wireless Interconnected Smoke/Heat/Freeze Sensor	Walter Kidde Portable Equipment	SDX-135Z-433	410 (Test Mode) 440 (Normal Mode)
Wireless Interconnected Heat/Freeze Sensor	Walter Kidde Portable Equipment	HDX-135Z-433	6 (Test Mode)

Receive Date:	04/17/2018	Test Started	04/17/2018
Received Condition:	Good	Test Ended	04/24/2018
Type:	Production		

Description of Equipment Under Test (provided by client)

The equipment under test (EUT) are SDX-135Z-433 and HDX-135Z-433 which use the same transmitter module operating at 433.92 MHz and 918.2 MHz. HDX-135Z-433 is a depopulated version of SDX-135Z-433. This test report covers for the 433.92 MHz transmitter.

The EUT is used for security and safety applications. System integrity is maintained by sending supervision transmissions. The duration of supervision transmissions is 20 milliseconds repeated 6 times every 65±3 minutes. The supervision transmissions duration, including data does not exceed 2 seconds per hour.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
3 Vdc Battery (x2)	-	-	-

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Test Mode – Continuously Transmitting normal modulated signal (OOK modulation)
2	Normal Mode – the normal operation mode the end user would use

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	Under test mode, the EUT was programmed to transmit continuously (OOK modulation) during testing.
2	Normal Mode – the software version used in the production units

Radio/Receiver Characteristics	
Frequency Band(s)	433.92 MHz
Modulation Type(s)	OOK
Maximum Field Strength at Fundamental	66.17 dBuV/m (AV)
Test Channels	433.92 MHz
Occupied Bandwidth	25.1 kHz (20 dB), 40.9 kHz (99%)
Equipment Type	Standalone
Antenna Type and Gain	Permanent Attached Wire Antenna, Antenna Gain < 6 dBi

Variant Models:

None.

5 System Setup and Method

Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
-	None	-	-	-	-

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
None	-	-	-

5.1 Method:

Configuration as required by ANSI C63.10-2013.

5.2 Test Setup Block Diagram:

6 Transmitter Deactivation Time

6.1 Performance Requirement(s)

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

6.2 Method

Tests are performed in accordance with ANSI C63.10-2013.

TEST SITE:

The test is performed in the 3 meter semi-anechoic chamber located at 25791 Commercentre Drive, Lake Forest, California 92630 USA. This test facility meets the requirements of CISPR 16-1-4 and has been accredited by A2LA.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 3m	30-1000 MHz	4.2	6.3 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.

6.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
1669	EMI Test Receiver	R&S	ESW44	101636	07/14/2017	07/14/2018
1147	Bilog Antenna	TESEQ Gmbh	CBL 6112D	32852	11/16/2017	11/16/2018
1014	Barometer Temp/Humidity	Omega	IBTHX-W	0480395	12/20/2017	12/20/2018

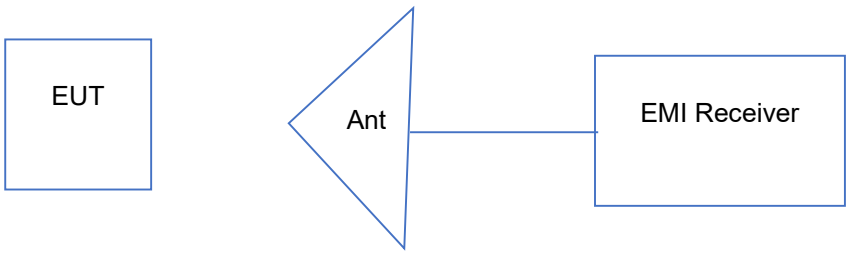
Software Utilized:

Name	Manufacturer	Version	Profile
N/A	N/A	N/A	N/A

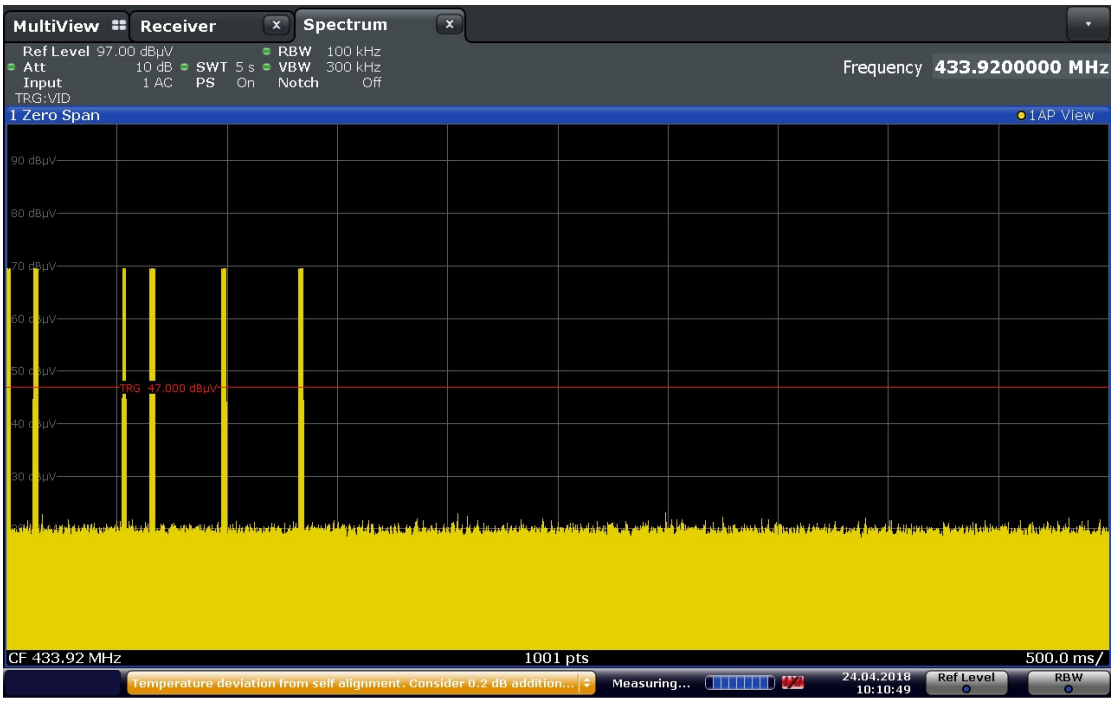
6.4 Results:

The sample tested was found to comply. Plot showing the transmitting duration is less than 5 seconds.

6.5 Setup Diagram:



6.6 Plots/Data:



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Test Personnel:	Grace Lin	Test Date:	04/24/2018
Product Standard:	FCC 15.231, ISED RSS-210	Limit Applied:	FCC 15.231(a), ISED RSS-210
Input Voltage:	3 Vdc Battery (x2)	Ambient Temperature:	24.2 ºC
Pretest Verification w/		Relative Humidity:	47 %
BB Source:	-	Atmospheric Pressure:	991.7 mbars

Deviations, Additions, or Exclusions: None

7 Occupied Bandwidth

7.1 Performance Requirement(s)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

The transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured. (ISED RSS-Gen Issue 4 §6.6)

7.2 Method

Tests are performed in accordance with ANSI C63.10-2013.

TEST SITE:

The test is performed in the 3 meter semi-anechoic chamber located at 25791 Commercentre Drive, Lake Forest, California 92630 USA. This test facility meets the requirements of CISPR 16-1-4 and has been accredited by A2LA.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 3m	30-1000 MHz	4.2	6.3 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.

7.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
1669	EMI Test Receiver	R&S	ESW44	101636	07/14/2017	07/14/2018
1147	Bilog Antenna	TESEQ Gmbh	CBL 6112D	32852	11/16/2017	11/16/2018
1014	Barometer Temp/Humidity	Omega	IBTHX-W	0480395	12/20/2017	12/20/2018

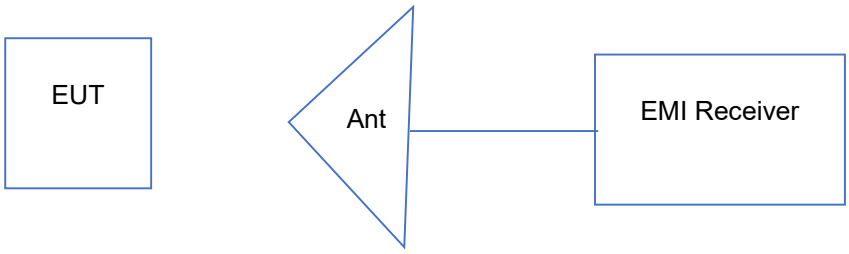
Software Utilized:

Name	Manufacturer	Version	Profile
N/A	N/A	N/A	N/A

7.4 Results:

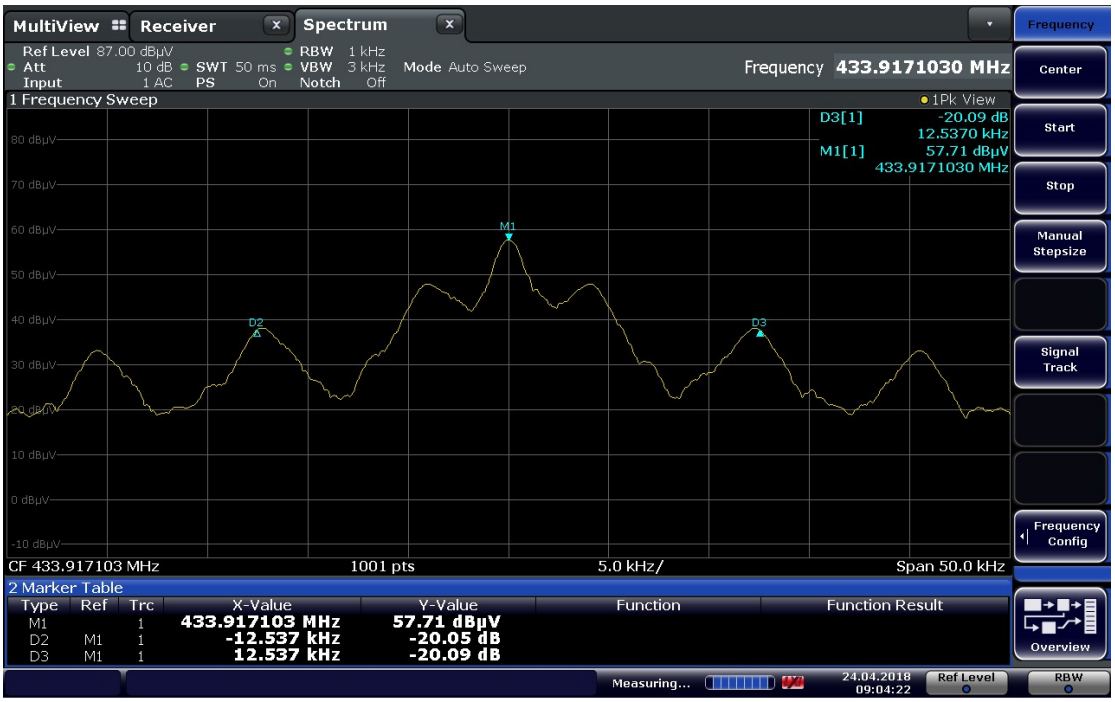
The sample tested was found to comply. The 20 dB bandwidth is no wider than 0.25% of the center frequency of 433.92 MHz.

7.5 Setup Diagram:



7.6 Plots/Data:

20 dB Bandwidth:



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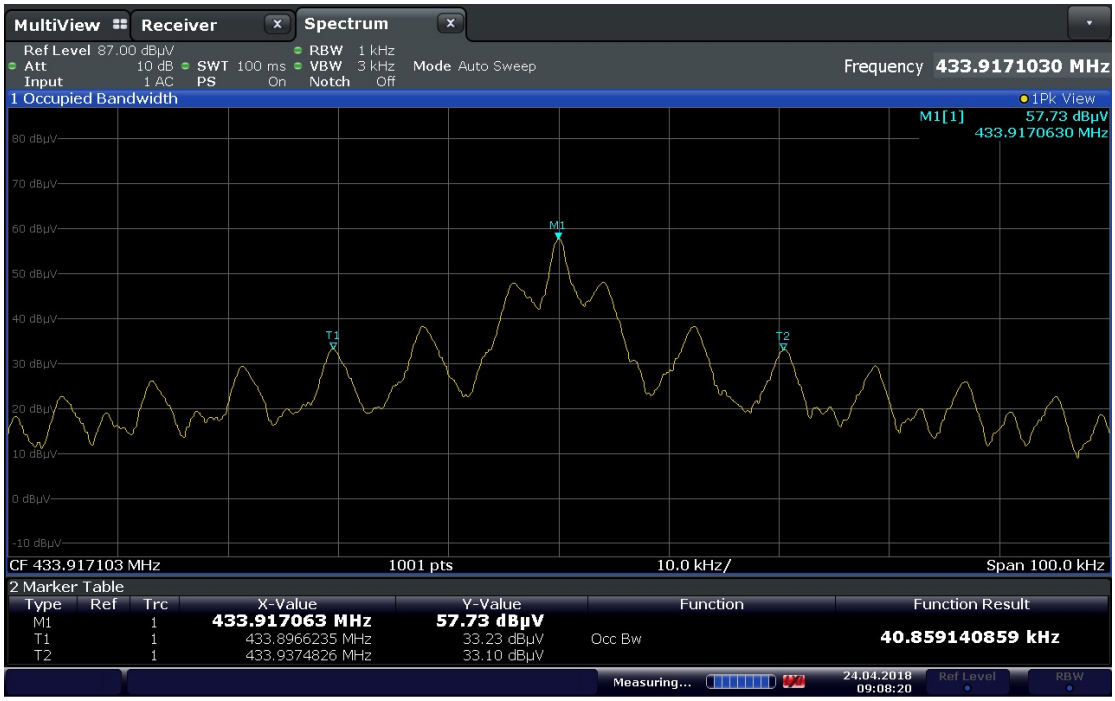
99% Bandwidth:



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Test Personnel:	Grace Lin	Test Date:	04/24/2018
Product Standard:	FCC 15.231, ISED RSS-210	Limit Applied:	FCC 15.231(c), ISED RSS-Gen
Input Voltage:	3 Vdc Battery (x2)	Ambient Temperature:	24.2 ºC
Pretest Verification w/		Relative Humidity:	47 %
BB Source:	-	Atmospheric Pressure:	991.7 mbars

Deviations, Additions, or Exclusions: None

8 Fundamental Field Strength

8.1 Performance Requirement(s)

The field strength of emissions, measured at 3 meters, from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

[1]Linear interpolations.

8.2 Method

Tests are performed in accordance with ANSI C63.10-2013.

The EUT was placed on a non-conducting table 80 cm (below 1 GHz) or 1.5 meters (above 1 GHz) above the ground plane (turntable). The antenna to EUT distance was 3 meters.

The transmitter configured to transmit continuously. The turntable containing the EUT was rotated through 360 degrees and the receive antenna height was varied from 1 to 4 meters to locate the worst-case emissions levels. Measurements were made with the antenna in both the horizontal and vertical polarizations. EUT was tested at horizontal and vertical orientations, the possible orientations used by the end users. The worst-case data is recorded in this report.

New or fully charged batteries were used during measurement.

TEST SITE:

The test is performed in the 3 meter semi-anechoic chamber located at 25791 Commercentre Drive, Lake Forest, California 92630 USA. This test facility meets the requirements of CISPR 16-1-4 and has been accredited by A2LA.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 3m	30-1000 MHz	4.2	6.3 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.

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

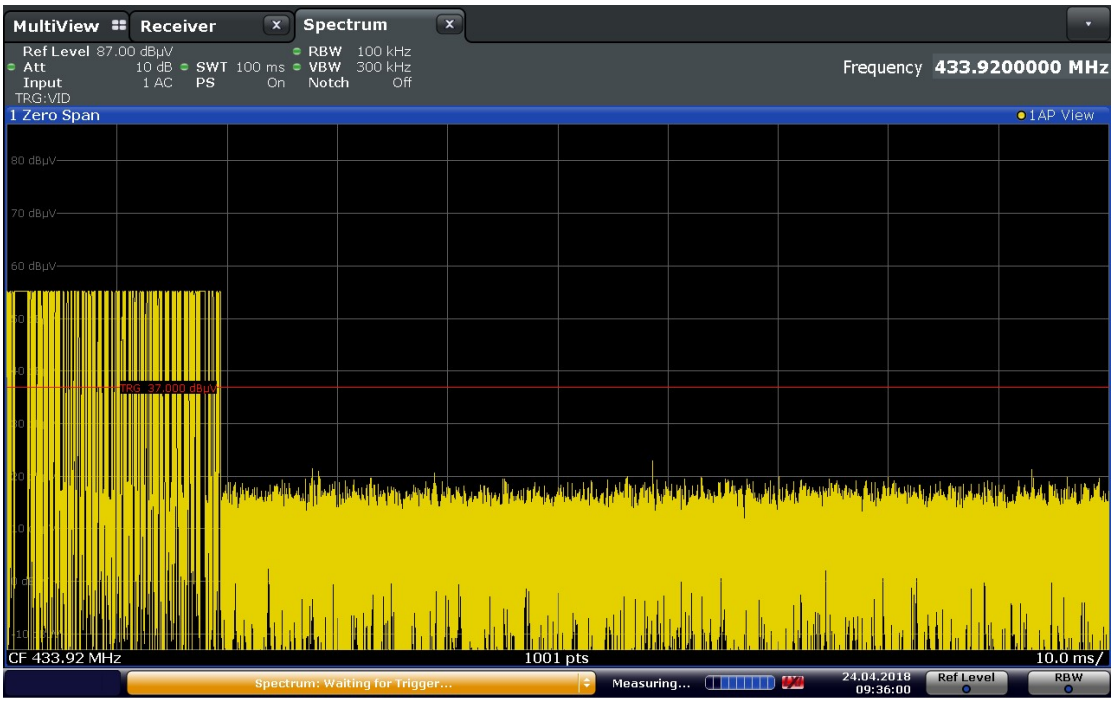
Example:

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

Calculation of Duty Cycle Correction Factor (DCCF):

[3 x160 us + 1 x 1.28 ms + 54 x 160 us +1 x 520 us + 4 x 160 us] / 100 ms = 0.1156

20 x Log (0.1156) = **-18.74**



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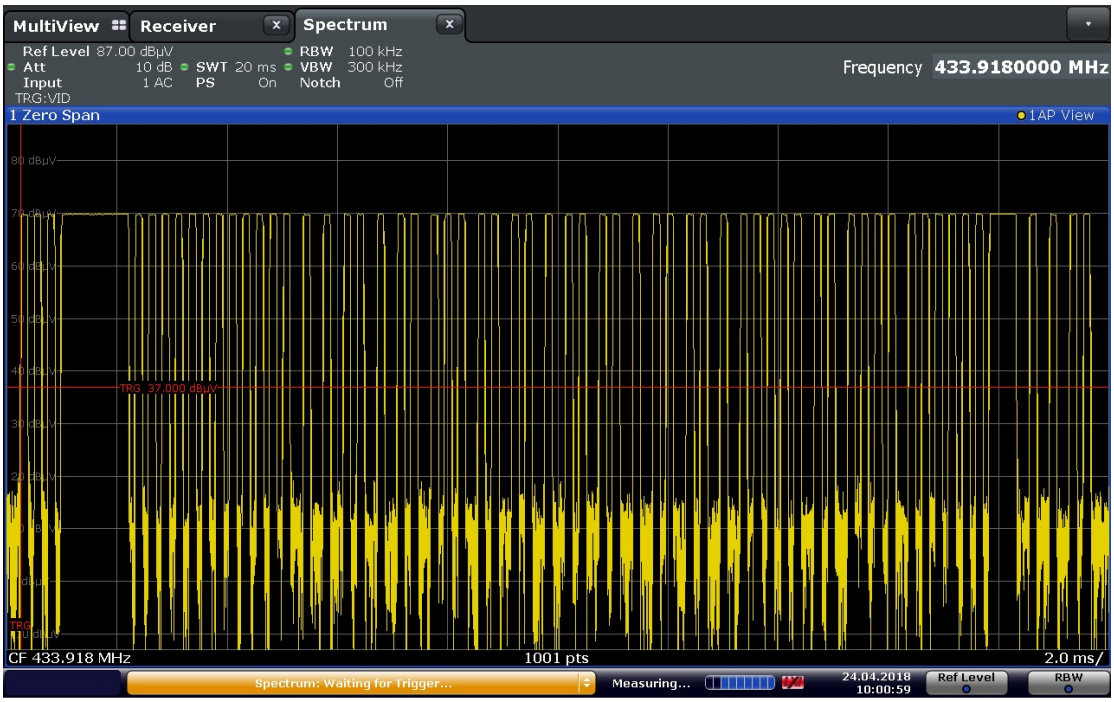

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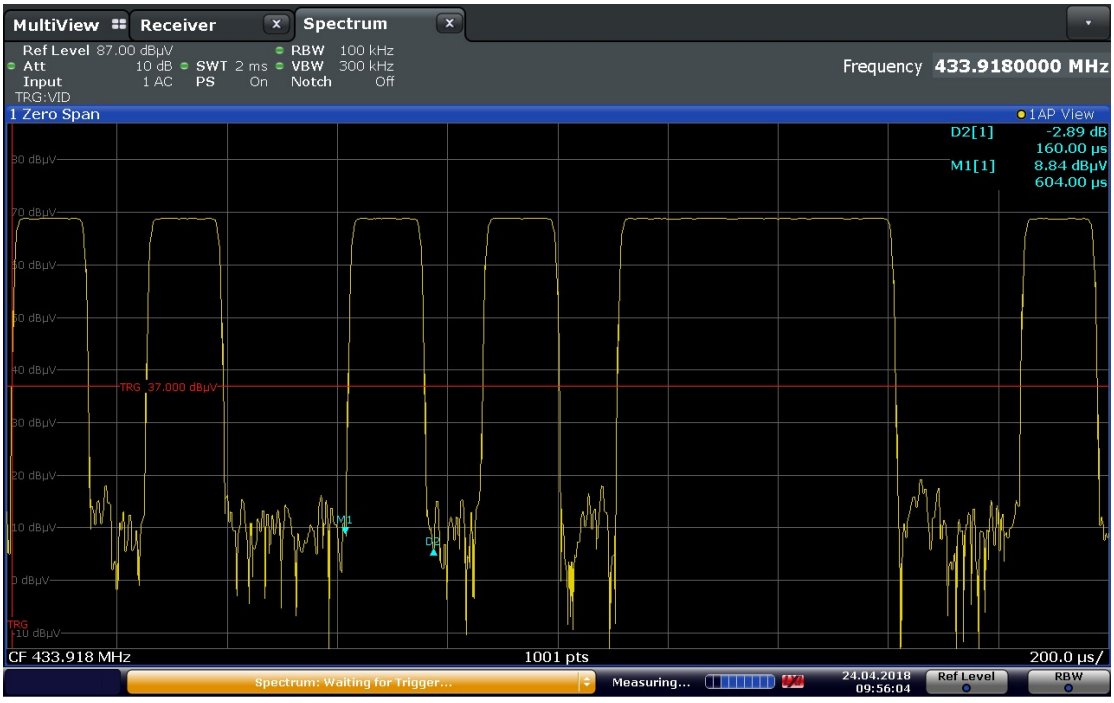

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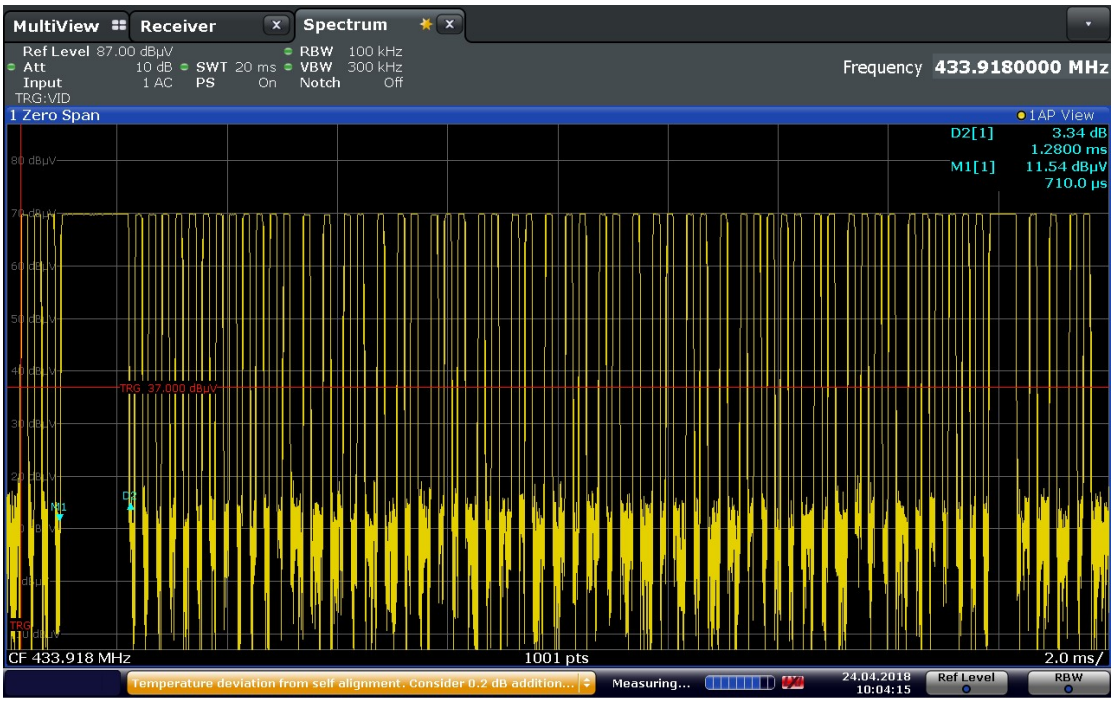

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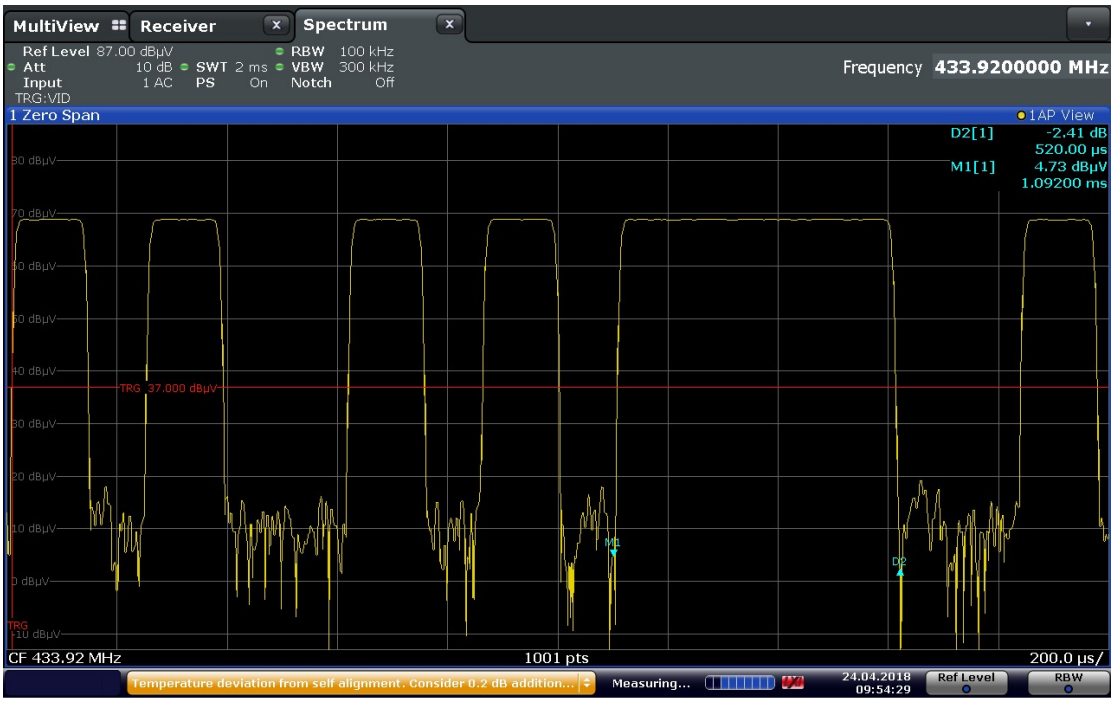

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8.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
637	3m Semi-anechoic Chamber	Panashield	3 meter	25 331-D-Z	August 2017	August 2018
1669	EMI Test Receiver	R&S	ESW44	101636	07/14/2017	07/14/2018
1140	EMI Test Receiver	R&S	ESCI7	100825	02/28/2018	02/28/2019
1147	Bilog Antenna	TESEQ Gmbh	CBL 6112D	32852	11/16/2017	11/16/2018
1518	Cable	R&S	TSPR-B7	101529	07/13/2017	07/13/2018
1014	Barometer Temp/Humidity	Omega	IBTHX-W	0480395	12/20/2017	12/20/2018

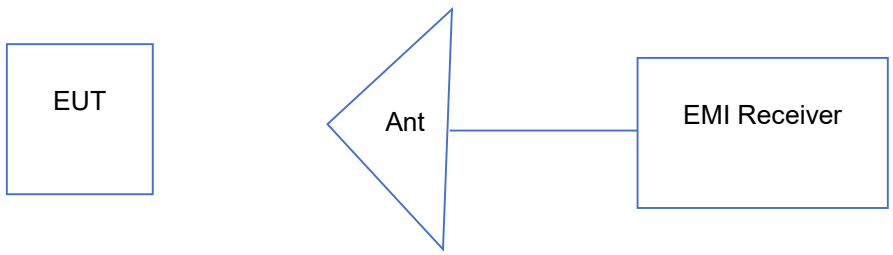
Software Utilized:

Name	Manufacturer	Version	Profile
N/A	N/A	N/A	N/A

8.4 Results:

The sample tested was found to comply.

8.5 Setup Diagram:



8.6 Plots/Data:

Field Strength at Fundamental, 433.92 MHz

SDX-135Z-433:

Antenna Polarization	Frequency (MHz)	EUT Power Setting	Measured Field Strength (dBuV/m)	Duty Cycle Correction Factor	Final Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Turntable Degree	Antenna Height (cm)	Detection
V	433.92	12	84.91	0.00	84.91	100.83	-15.92	309	116	PK
V	433.92	12	84.91	18.74	66.17	80.83	-14.66	309	116	AV

HDX-135Z-433:

Antenna Polarization	Frequency (MHz)	EUT Power Setting	Measured Field Strength (dBuV/m)	Duty Cycle Correction Factor	Final Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Turntable Degree	Antenna Height (cm)	Detection
V	433.92	12	84.01	0.00	84.91	100.83	-16.82	0	163	PK
V	433.92	12	84.01	18.74	65.27	80.83	-15.56	0	163	AV

Test Personnel:	Grace Lin	Test Date:	04/17/2018, 04/24/2018
Product Standard:	FCC 15.231	Limit Applied:	FCC 15.231(b)
Input Voltage:	3 Vdc Battery (x2)	Ambient Temperature:	24.2 ºC
Pretest Verification w/ BB Source:	Yes	Relative Humidity:	47 %
		Atmospheric Pressure:	991.7 mbars

Deviations, Additions, or Exclusions: None

9 Radiated Spurious Emissions

9.1 Performance Requirement(s)

The field strength of emissions, measured at 3 meters, from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

[1]Linear interpolations.

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

9.2 Method

Tests are performed according to the procedures in ANSI C63.10-2013.

The EUT was placed on a non-conducting table 80 cm (below 1 GHz) or 1.5 meters (above 1 GHz) above the ground plane (turntable). Radiated test was performed at an antenna to EUT distance of 3 meters.

The spectrum from 30 MHz to the 10th harmonic was investigated with the transmitter configured to continuously transmit. The turntable containing the EUT was rotated through 360 degrees and the receive antenna height was varied from 1 to 4 meters to locate the worst-case emissions levels. Measurements were made with the antenna in both the horizontal and vertical polarizations. EUT was tested at horizontal and vertical orientations, the possible orientations used by the end users. The worst-case data is recorded in this report.

New or fully charged batteries were used during measurement.

TEST SITE:

The test is performed in the 3 meter semi-anechoic chamber located at 25791 Commercentre Drive, Lake Forest, California 92630 USA. This test facility meets the requirements of CISPR 16-1-4 and has been accredited by A2LA.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 3m	30-1000 MHz	4.3	6.3 dB
Radiated Emissions, 3m	1-18 GHz	5.5	5.2 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.

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
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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

9.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
637	3m Semi-anechoic Chamber	Panashield	3 meter	25 331-D-Z	December 2015	December 2018
1669	EMI Test Receiver	R&S	ESW44	101636	07/14/2017	07/14/2018
1140	EMI Test Receiver	R&S	ESCI7	100825	02/28/2018	02/28/2019
1147	Bilog Antenna	TESEQ Gmbh	CBL 6112D	32852	11/16/2017	11/16/2018
692	Horn Antenna	ETS-Lindgren	3115	00031626	07/25/2017	07/25/2018
1576	Pre-amp	R&S	TS-PR1	102068	06/20/2017	06/20/2018
1556	Pre-amp	R&S	TS-PR18	102144	07/29/2017	07/29/2018
1517	Cable	R&S	TSPR-B7	101528	07/13/2017	07/13/2018
1518	Cable	R&S	TSPR-B7	101529	07/13/2017	07/13/2018
1014	Barometer Temp/Humidity	Omega	IBTHX-W	0480395	12/20/2017	12/20/2018

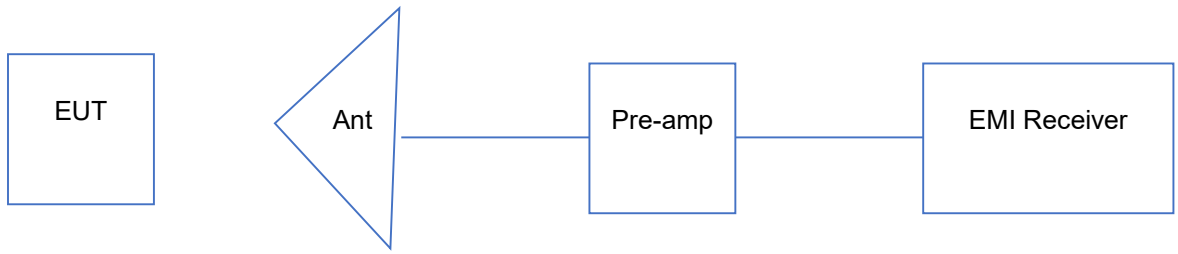
Software Utilized:

Name	Manufacturer	Version	Profile
N/A	N/A	N/A	N/A

9.4 Results:

The sample tested was found to comply.

9.5 Setup Diagram:



9.6 Plots/Data:

SDX-135Z-433:

Antenna Polarization	Frequency (MHz)	EUT Power Setting	Measured Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Turntable Degree	Antenna Height (cm)	Detector
V	1301.76	12	38.7	74.0	-35.4	360	176	PK
V	1301.76	12	24.3	54.0	-29.7	360	176	AV
V	1735.68	12	40.2	80.8	-40.7	92	185	PK
V	1735.68	12	26.1	60.8	-34.7	92	185	AV
H	2169.60	12	47.5	80.8	-33.4	203	206	PK
H	2169.60	12	33.2	60.8	-27.6	203	206	AV
V	3037.44	12	45.9	80.8	-34.9	0	160	PK
V	3037.44	12	31.8	60.8	-29.0	0	160	AV
V	3471.36	12	50.4	80.8	-30.4	360	155	PK
V	3471.36	12	38.2	60.8	-22.7	360	155	AV
V	3905.28	12	52.1	74.0	-21.9	44	175	PK
V	3905.28	12	37.8	54.0	-16.2	44	175	AV
V	4339.20	12	43.4	80.8	-37.4	207	146	PK
V	4339.20	12	29.4	60.8	-31.5	207	146	AV

Note: Radiated spurious emissions measurements were performed from 30 MHz to 4.5 GHz.

HDX-135Z-433:

Antenna Polarization	Frequency (MHz)	EUT Power Setting	Measured Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Turntable Degree	Antenna Height (cm)	Detector
H	1301.76	12	42.0	74.0	-32.0	28	181	PK
H	1301.76	12	28.0	54.0	-26.0	28	181	AV
V	1735.68	12	43.1	80.8	-37.7	296	198	PK
V	1735.68	12	28.9	60.8	-31.9	296	198	AV
H	2169.60	12	50.3	80.8	-30.6	316	249	PK
H	2169.60	12	35.9	60.8	-24.9	316	249	AV
V	3037.44	12	45.7	80.8	-35.2	237	199	PK
V	3037.44	12	31.6	60.8	-29.3	237	199	AV
V	3471.36	12	52.4	80.8	-28.4	258	158	PK
V	3471.36	12	40.3	60.8	-20.5	258	158	AV
H	3905.28	12	50.2	74.0	-23.8	87	203	PK
H	3905.28	12	36.0	54.0	-18.0	87	203	AV
V	4339.20	12	45.7	80.8	-35.2	97	170	PK
V	4339.20	12	31.6	60.8	-29.3	97	170	AV

Note: Radiated spurious emissions measurements were performed from 30 MHz to 4.5 GHz.

Test Personnel:	Grace Lin	Test Date:	04/17/2018, 04/18/2018, 04/19/2018
Product Standard:	FCC 15.231, ISED RSS-210	Limit Applied:	FCC 15.231(b), ISED RSS-210
Input Voltage:	3 Vdc Battery (x2)	Ambient Temperature:	21.3 ºC
Pretest Verification w/		Relative Humidity:	53.2 %
BB Source:	Yes	Atmospheric Pressure:	993.9 mbars

Deviations, Additions, or Exclusions: None

10 AC Mains Conducted Emissions

10.1 Performance Criterion

Frequency Band MHz	ConductedLimit dB(μV)	
	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *
0.50-5.00	56	46
5.00-30.00	60	50

*Note: *Decreases linearly with the logarithm of the frequency*
At the transition frequency the lower limit applies.

10.2 Method

Tests are performed in accordance with ANSI C63.4.

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4.

TEST SITE:

The test is performed in the 3 meter semi-anechoic chamber located at 25791 Commercentre Drive, Lake Forest, California 92630 USA. This test facility meets the requirements of CISPR 16-1-4 and has been accredited by A2LA.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.1 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.

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

10.3 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
-	-	-	-	-	-	-

Software Utilized:

Name	Manufacturer	Version	Profile
N/A	N/A	N/A	N/A

10.4 Results:

This test is not applicable as the equipment under test is battery powered.

11 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	04/25/2018	103485229LAX-001	GL	NS	Original Issue