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RiskBand LLC TEST REPORT

SCOPE OF WORK

EMC TESTING – RISKBAND CLIP

REPORT NUMBER

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EMC TEST REPORT

(FULL COMPLIANCE)

Report Number: 103515110LEX-001

Project Number: G103515110

Report Issue Date: 1/21/2019

Model(s) Tested: RiskBand Clip

Standards: FCC Part 15B
ICES-003 Issue 6
FCC Part 22
(Radiated Spurious Emissions)
FCC Part 24
(Radiated Spurious Emissions)

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Dr.
Lexington, KY 40510
USA

Client:
RiskBand LLC
1036B Wall Street
Mount Pleasant, SC 29464
USA

Report prepared by



Bryan Taylor, Team Leader

Report reviewed by



Brian Daffin, Engineer

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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	Radiated Emissions (Transmitters Idle) (ANSI C63.4:2014)	Pass
6	Radiated Emissions (Transmitters Active) (ANSI C63.26:2015)	Pass
7	Conducted Emissions (ANSI C63.4:2014)	Pass

Note that additional conducted measurements (occupied bandwidth, frequency stability, conducted spurious emissions, and band edge compliance) are re-used from the module report.



3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	RiskBand LLC
Address:	1036B Wall Street Mount Pleasant, SC 29464 USA
Contact:	Doug Kent
Telephone:	843-501-0905
Email:	dkent@riskband.com
Manufacturer Information	
Manufacturer Name:	RiskBand LLC
Manufacturer Address:	1036B Wall Street Mount Pleasant, SC 29464 USA



4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	RiskBand Clip
Model Number	RBD10060
Serial Number	Test Sample 1
Receive Date	11/20/2018
Test Start Date	11/20/2018
Test End Date	11/27/2018
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	3.7VDC battery
Rated Current	800mAh
Rated Frequency	DC
Number of Phases	DC
Description of Equipment Under Test (provided by client)	
<p>The RiskBand Clip is a wearable security device that provides the user with a “panic” button to press when they encounter a dangerous situation. RiskBand Clip is worn by the user on a clip case with a carabiner. RiskBand Clip is cellular enabled to provide standalone connectivity to emergency response providers without the requirement for connection to a smartphone. If the user finds themselves in the presence of threatening or actively dangerous company, they can activate the device which instantly triggers a voice and data uplink to RiskBand Clip partnered emergency response team to provide GPS location, the audio stream from the onboard microphone, photos from an onboard image sensor, and if necessary, an audio path to the onboard speaker if the operator deems it necessary to communicate back to the customer. RiskBand Clip incorporates the Ublox SARA U-201 3G module to facilitate cellular communication.</p>	

4.1 Variant Models:

There were no variant models covered by this evaluation.



5 System Setup and Method

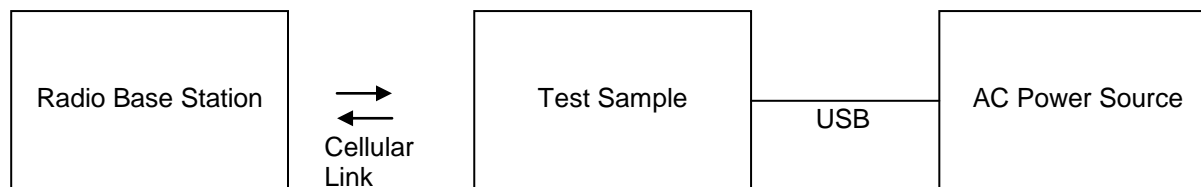
5.1 Method:

Configuration as required by ANSI C63.4:2014.

No.	Descriptions of EUT Exercising
1	For FCC Part 15B measurements the radios onboard the device were in idle mode and battery powered as it is in normal day to day use.
2	For FCC Part 22 / 24 measurements the radios were connected wirelessly to a base station simulator which was used to force them to transmit at maximum output power.
3	For conducted emission measurements the device was connected to a USB charging adapter and the conducted emissions test was performed at the AC mains connection point.

Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	USB Charging Cable	1.5	Yes	None	USB Charging Adapter

5.2 EUT Block Diagram:





5.3 EUT Photo (Front):



5.4 EUT Photo (Back):





6 Radiated Emissions

6.1 Method

Tests are performed in accordance with ANSI C63.4:2014. And ANSI C63.26

TEST SITE: 10m ALSE

Site Designation: 10m Chamber

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	U _{cispr}
Radiated Emissions, 10m	30-1000 MHz	3.9dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.0dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.7dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7dB	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.



6.2 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 dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- 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 dB μ V 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 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

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

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

NF = Net Reading in dB μ V

Example:

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

6.3 Field Strength to Power Calculation

As allowable by ANSI C63.26: 2015 section 5.2.7, the output power of unwanted emissions can be calculated from a field strength measurement. The transmitter measurements that follow in this report have applied the following calculation to the -13dBm limit to arrive an equivalent field strength limit at 3 meters as follows:

$E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20\log(D) + 104.8$; where D is the measurement distance (in the far field region) in m.

Example:

$$\text{Limit (dB}\mu\text{V/m)} = -13 - 20\log(3) + 104.8 = 82.25\text{dB}\mu\text{V/m}$$

**6.4 Test Equipment Used:**

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	3900	Rohde & Schwarz	ESU40	9/18/2018	9/18/2019
Bilog Antenna	7088	SunAR	JB6	7/24/2018	7/24/2019
Horn Antenna	3780	ETS Lindgren	3117	6/11/2018	6/11/2019
System Controller	4096	ETS Lindgren	2090	Verify at Time of Use	Verify at Time of Use
System Controller	3957	Sunol Sciences	SC99V	Verify at Time of Use	Verify at Time of Use
3m Cable Antenna→Preamp	3074			11/29/2017	11/29/2018
3m Cable Preamplifier	3918	Rohde & Schwarz	TS-PR18	11/29/2017	11/29/2018
3m Cable Preamp→Chamber	2588			11/29/2017	11/29/2018
3m Cable Chamber→Control Room	2593			11/29/2017	11/29/2018
3m Cable Control Room→Receiver	2592			11/29/2017	11/29/2018

6.5 Software Utilized:

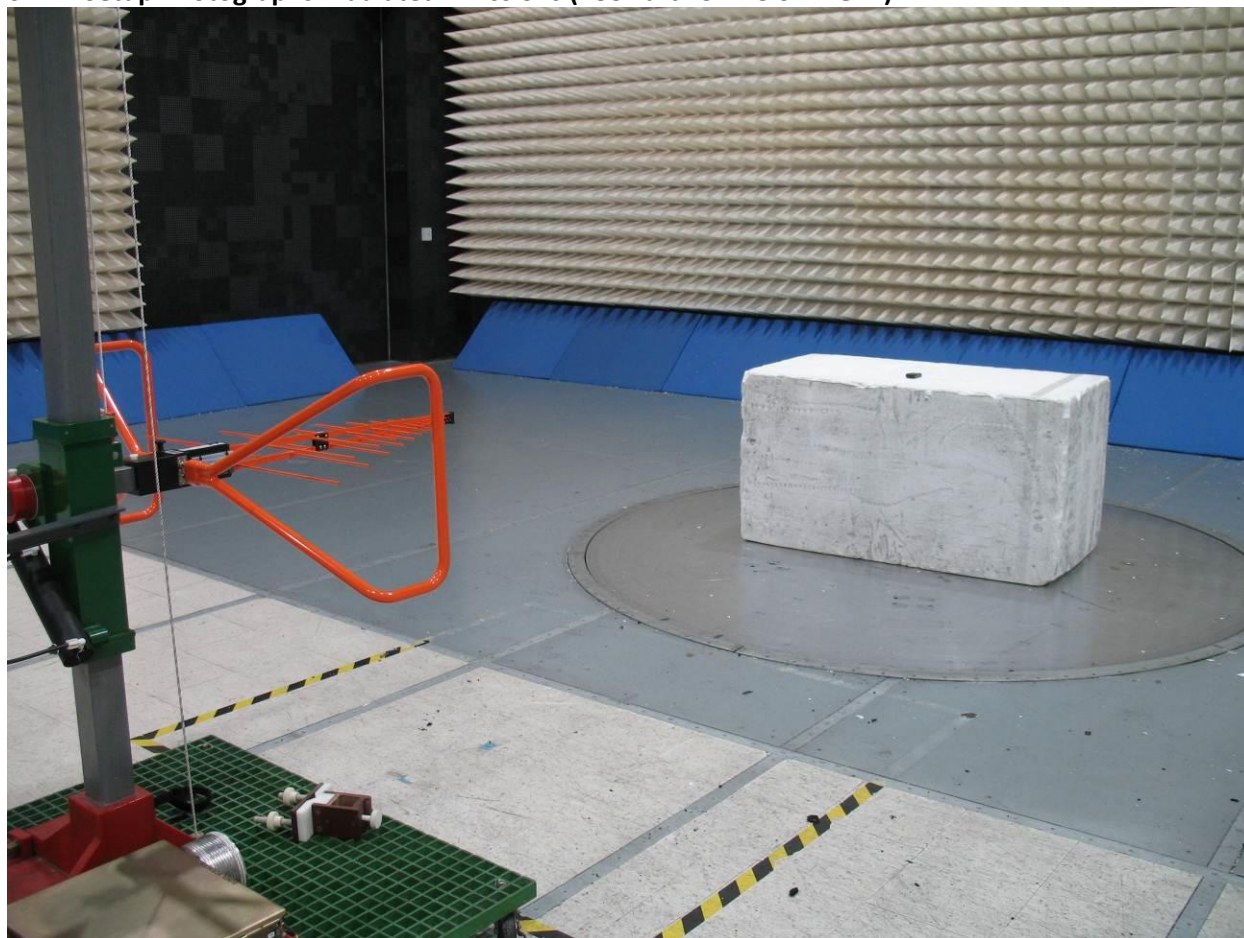
Name	Manufacturer	Version
EMC32	Rohde & Schwarz	Version 9.15.02

6.6 Results:

The sample tested was found to Comply.

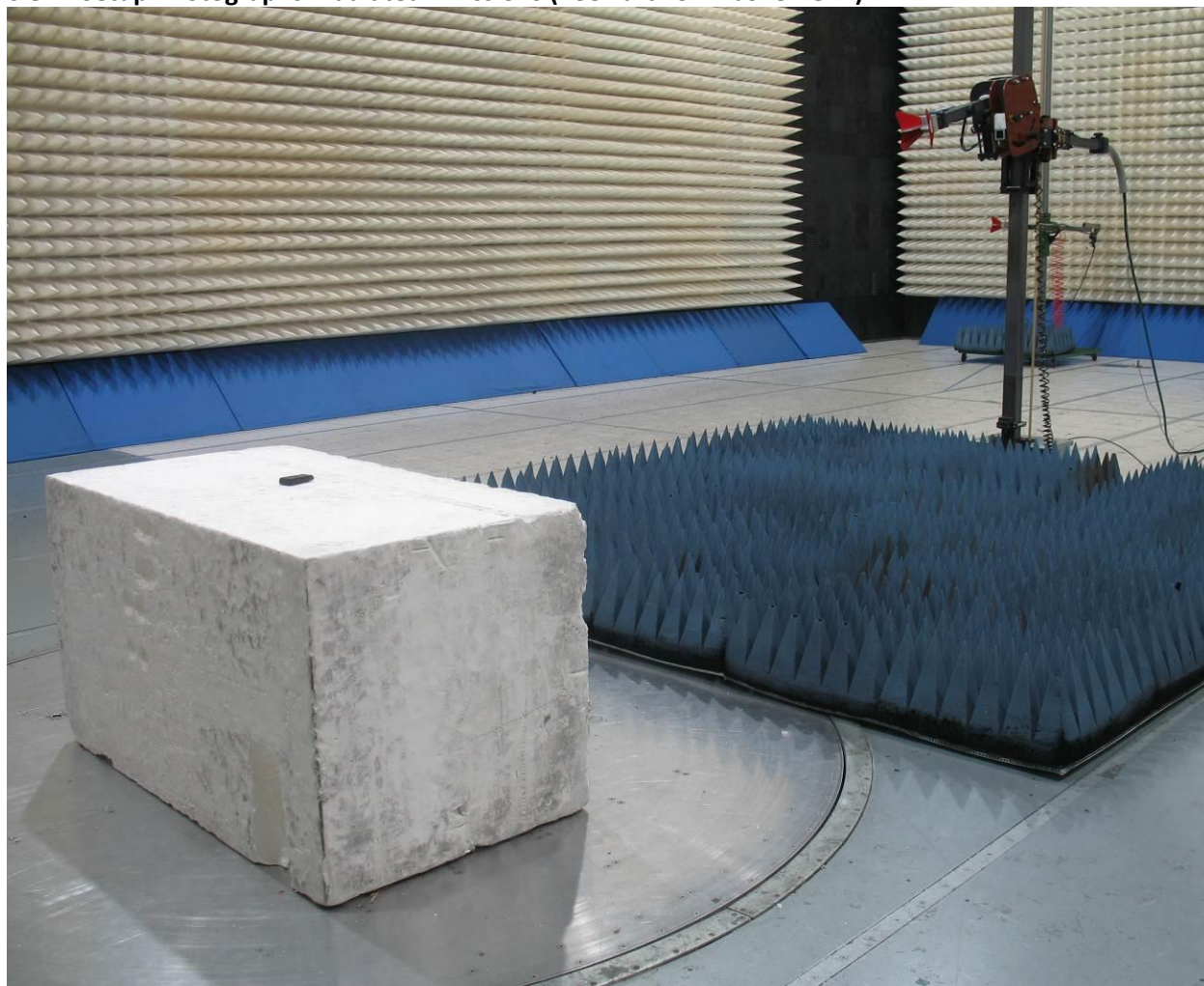


6.7 Setup Photographs: Radiated Emissions (FCC Part 15B Below 1GHz)

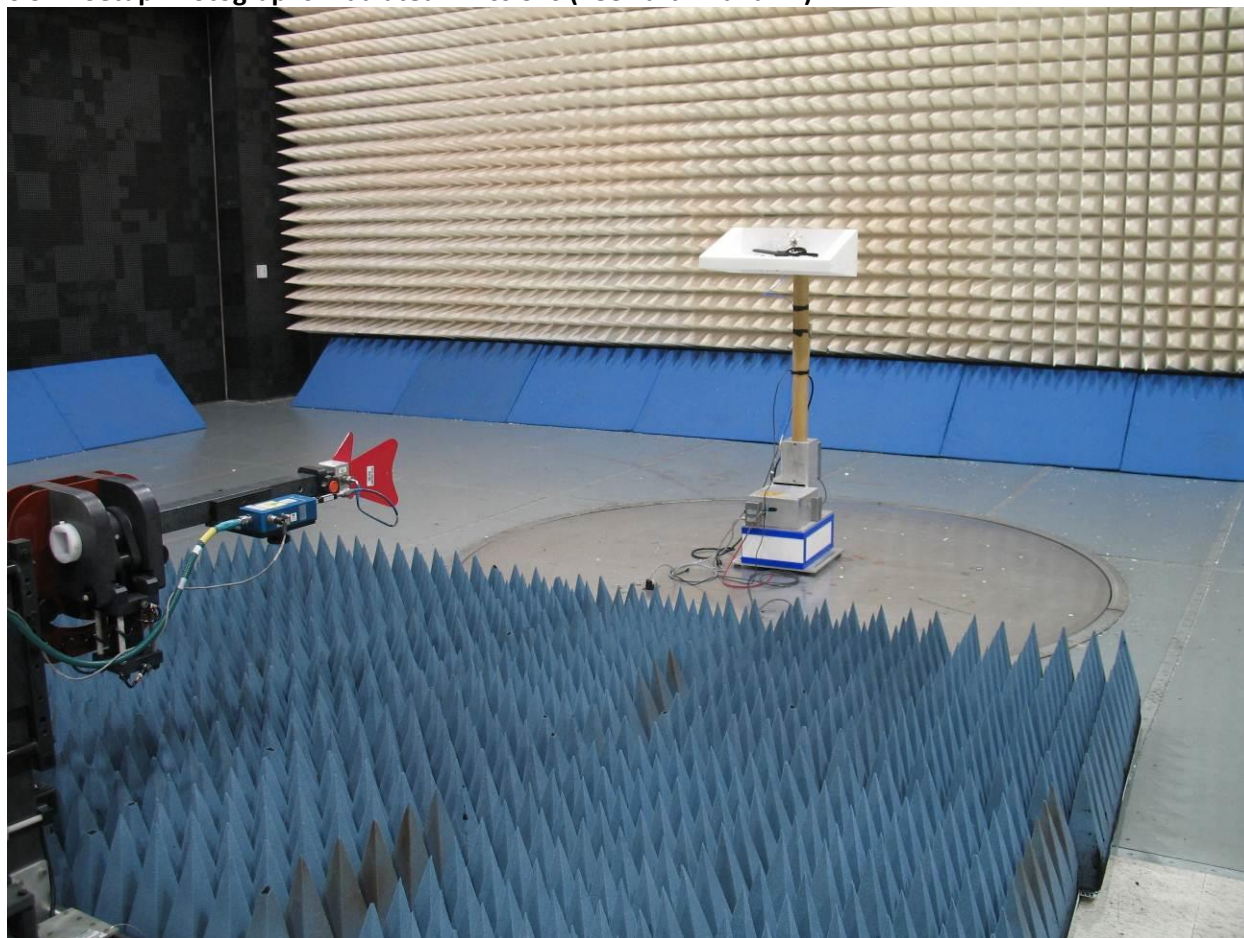


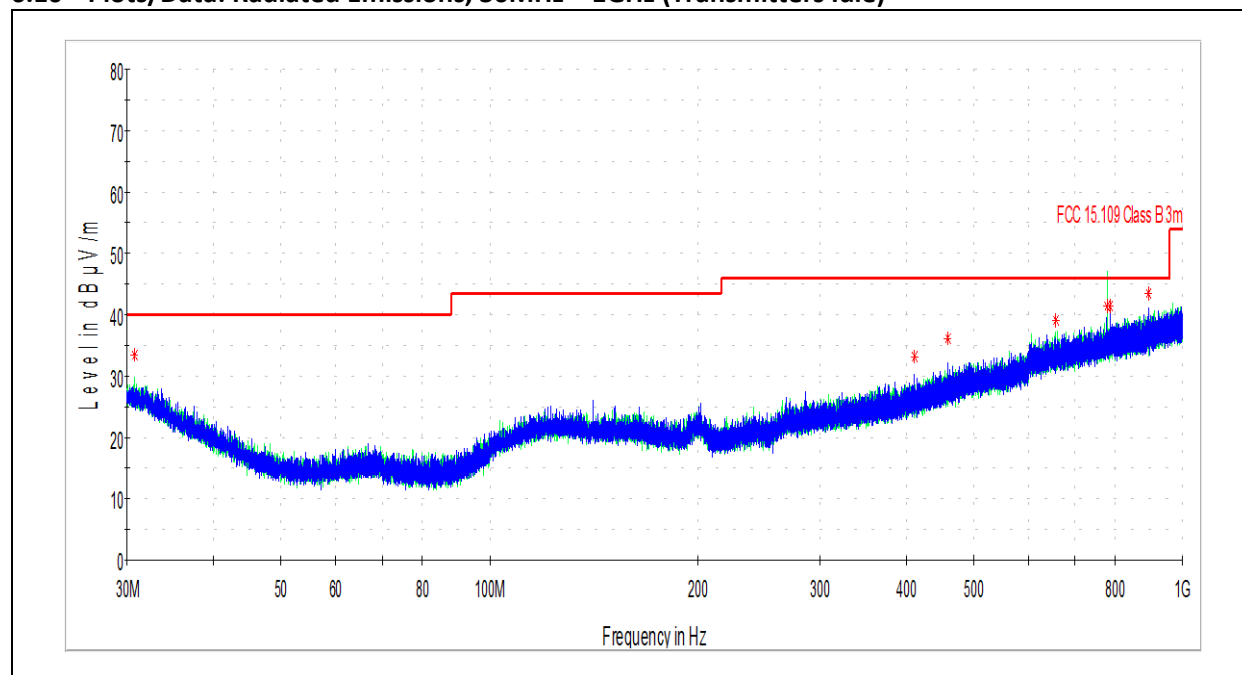


6.8 Setup Photographs: Radiated Emissions (FCC Part 15B Above 1GHz)



6.9 Setup Photographs: Radiated Emissions (FCC Part 22 and 24)



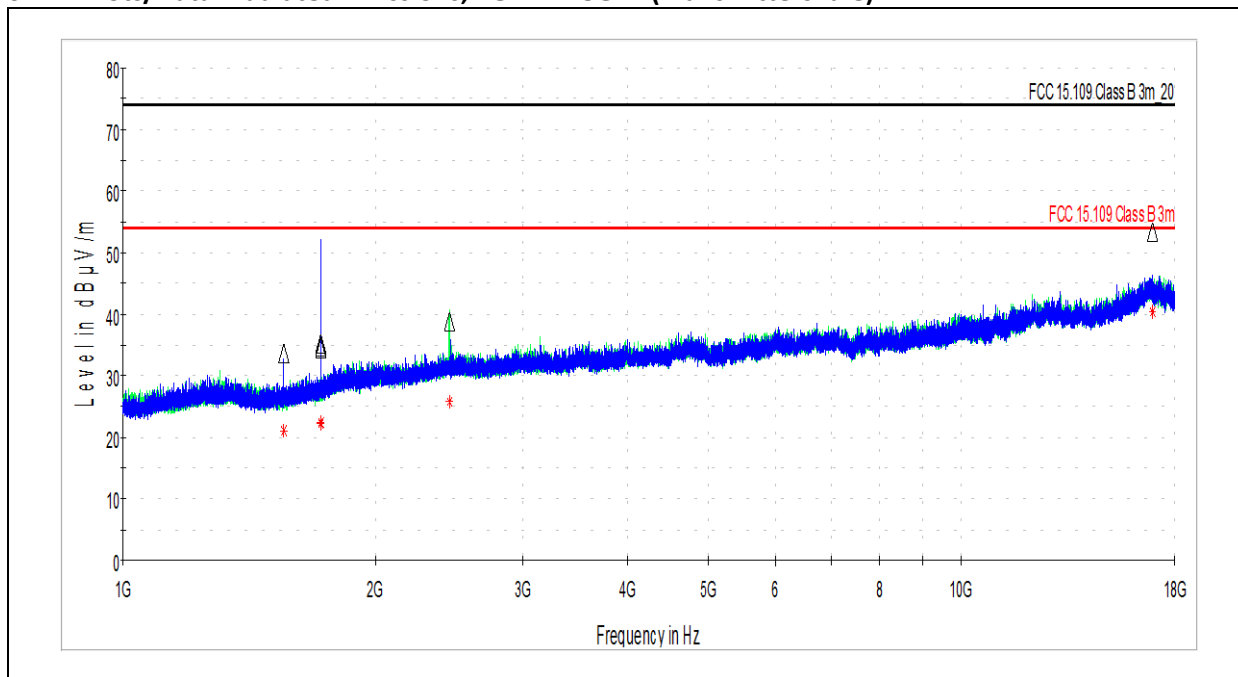
**6.10 Plots/Data: Radiated Emissions, 30MHz – 1GHz (Transmitters Idle)**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.763000	33.36	40.00	6.64	120.000	106.7	H	285.0	26.5
410.800000	33.13	46.02	12.89	120.000	176.9	V	237.0	26.1
458.200000	36.02	46.02	10.00	120.000	251.4	V	174.0	27.6
656.030000	39.02	46.02	7.00	120.000	236.6	H	90.0	31.2
778.010000	41.28	46.02	4.74	120.000	343.5	H	319.0	33.2
785.930000	41.28	46.02	4.74	120.000	165.9	V	220.0	33.3
893.680000	43.34	46.02	2.68	120.000	106.2	V	64.0	34.9

Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: NA
(Where Applicable) FCC Part 15B
Product Standard: ICES-003 Issue 6
Input Voltage: Battery
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/20/2018
Limit Applied: Class B
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None

**6.11 Plots/Data: Radiated Emissions, 1GHz – 18GHz (Transmitters Idle)**

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1555.800000	33.57	74.00	40.43	1000.000	410.0	V	215.0	-1.9
1720.600000	35.11	74.00	38.89	1000.000	100.0	V	345.0	-0.4
1720.900000	34.82	74.00	39.18	1000.000	308.0	V	236.0	-0.4
1721.300000	34.51	74.00	39.49	1000.000	305.0	V	242.0	-0.4
2450.400000	38.68	74.00	35.32	1000.000	308.0	H	156.0	3.5
16947.600000	53.23	74.00	20.77	1000.000	387.0	V	275.0	21.7

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1555.800000	21.14	54.00	32.86	1000.000	410.0	V	215.0	-1.9
1720.600000	22.32	54.00	31.68	1000.000	100.0	V	345.0	-0.4
1720.900000	22.29	54.00	31.71	1000.000	308.0	V	236.0	-0.4
1721.300000	22.25	54.00	31.75	1000.000	305.0	V	242.0	-0.4
2450.400000	25.85	54.00	28.15	1000.000	308.0	H	156.0	3.5
16947.600000	40.28	54.00	13.72	1000.000	387.0	V	275.0	21.7

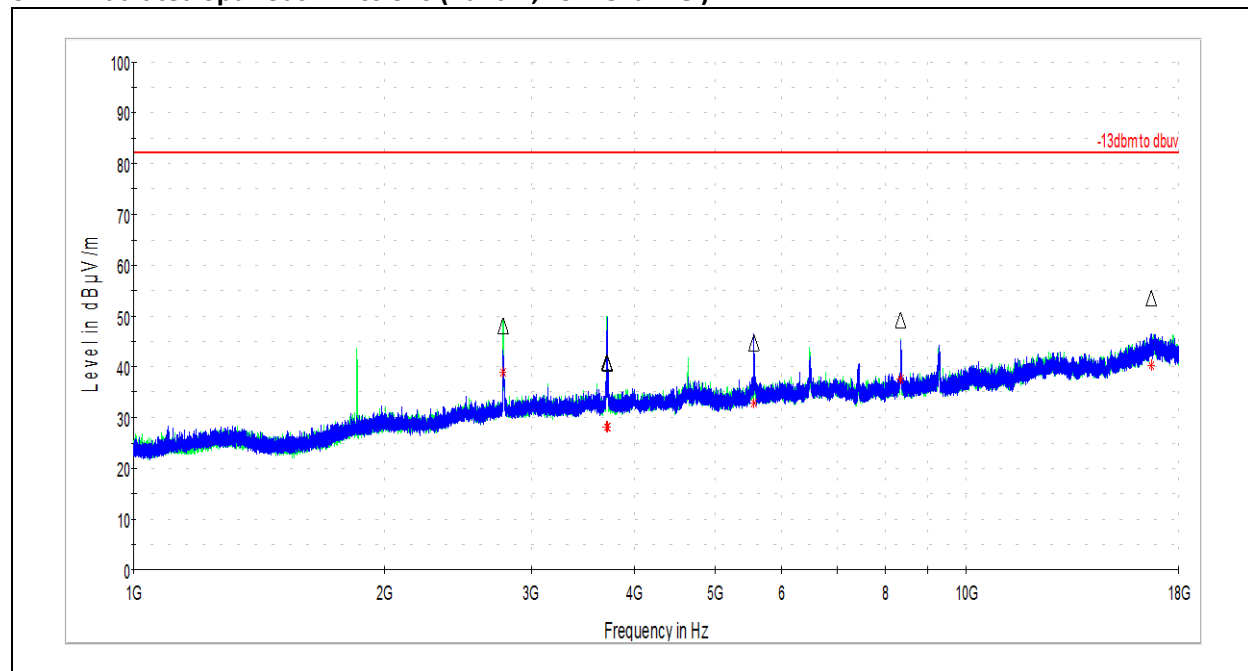
Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: (Where Applicable) NA
Product Standard: FCC Part 15B
Input Voltage: Battery
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/20/2018
Limit Applied: Class B
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None



6.12 Radiated Spurious Emissions (Band 2, Low Channel)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2779.600000	47.99	102.25	54.26	1000.000	410.0	H	133.0	3.6
3702.600000	40.91	102.25	61.34	1000.000	410.0	H	254.0	5.7
3707.000000	40.57	102.25	61.68	1000.000	410.0	H	0.0	5.8
5553.600000	44.75	102.25	57.50	1000.000	410.0	V	140.0	8.9
8336.400000	49.26	102.25	52.99	1000.000	389.0	H	168.0	11.2
16672.800000	53.50	102.25	48.75	1000.000	410.0	V	236.0	21.2

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2779.600000	38.91	82.25	43.34	1000.000	410.0	H	133.0	3.6
3702.600000	28.04	82.25	54.21	1000.000	410.0	H	254.0	5.7
3707.000000	28.00	82.25	54.25	1000.000	410.0	H	0.0	5.8
5553.600000	32.73	82.25	49.52	1000.000	410.0	V	140.0	8.9
8336.400000	37.56	82.25	44.69	1000.000	389.0	H	168.0	11.2
16672.800000	40.16	82.25	42.09	1000.000	410.0	V	236.0	21.2

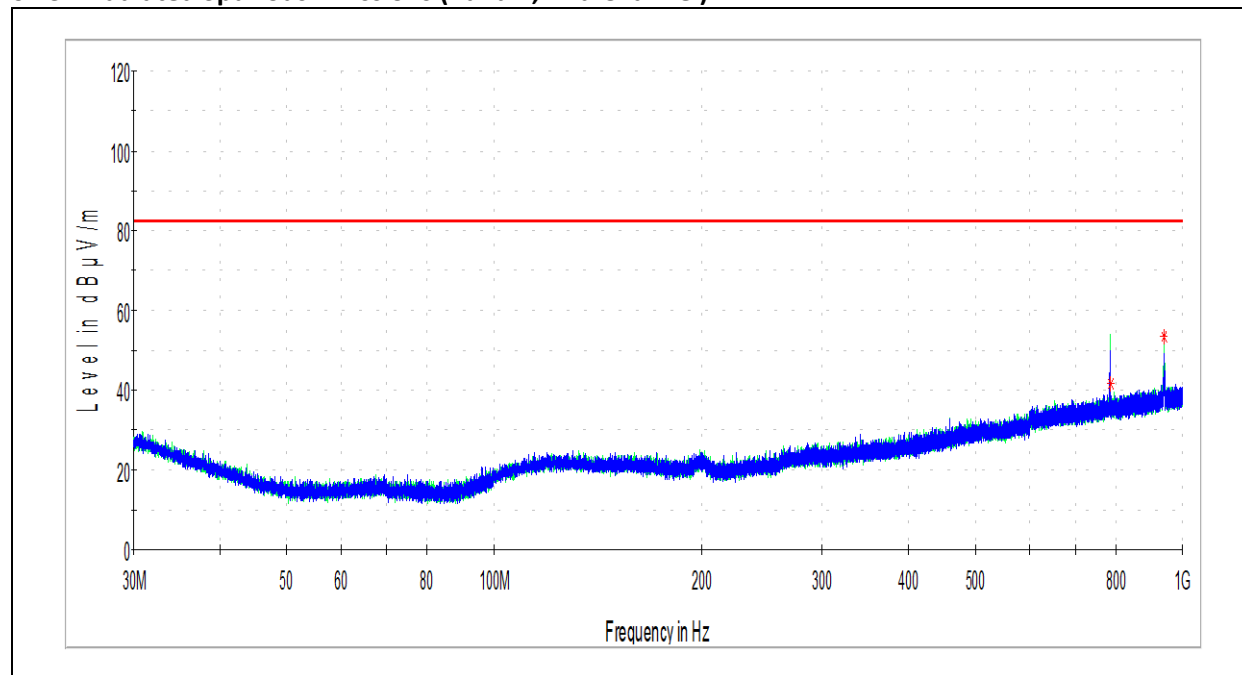
Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: (Where Applicable) NA
Product Standard: FCC Part 15B
Input Voltage: ICES-003 Issue 6
Pretest Verification w / Ambient Signals or BB Source: Battery
Yes

Test Date: 11/20/2018
Limit Applied: -13dBm (converted to field strength at 3m)
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None



6.13 Radiated Spurious Emissions (Band 2, Mid Channel)

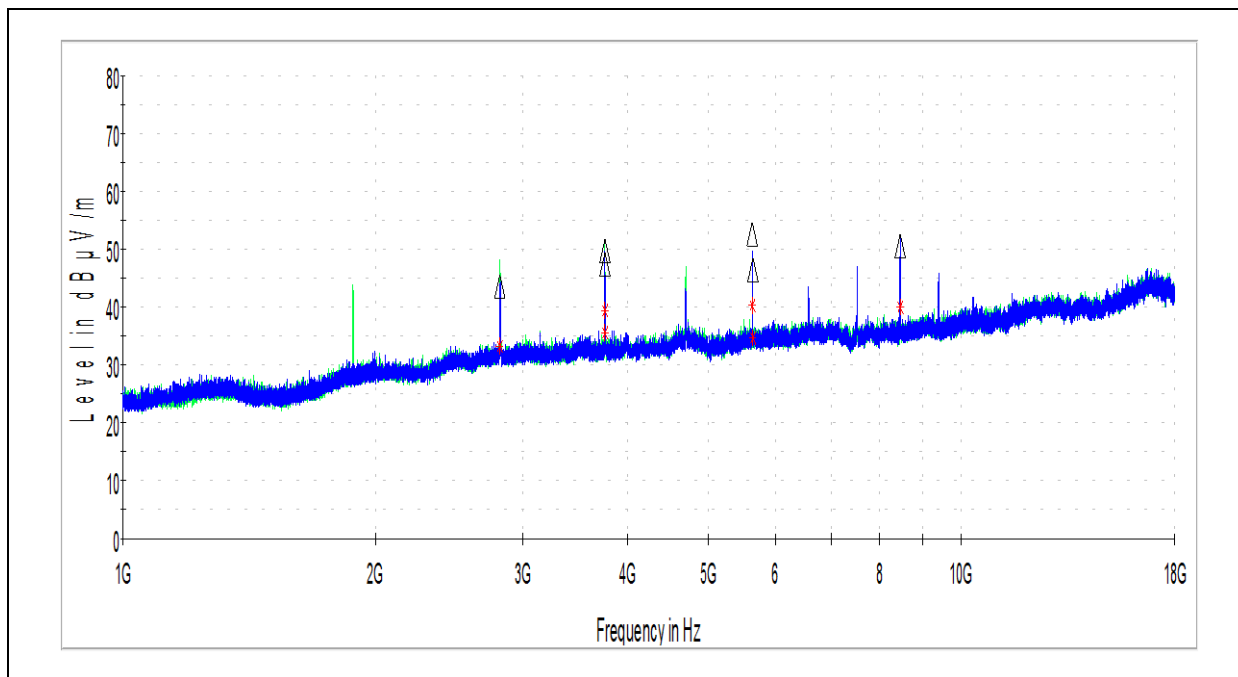


Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
785.720000	41.37	82.25	40.88	120.000	334.2	H	102.0	33.3
940.220000	53.39	82.25	28.86	120.000	100.0	H	0.0	35.4

Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: NA
(Where Applicable) FCC Part 15B
Product Standard: ICES-003 Issue 6
Input Voltage: Battery
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/20/2018
Limit Applied: -13dBm (converted to field strength at 3m)
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: This plot is representative of the worst case for low, mid, and high channels.



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2818.200000	43.58	82.25	38.67	1000.000	254.0	H	234.0	3.7
3758.400000	49.62	82.25	32.63	1000.000	410.0	H	234.0	5.9
3761.800000	47.44	82.25	34.81	1000.000	410.0	H	238.0	5.9
5637.200000	52.62	82.25	29.63	1000.000	410.0	V	0.0	8.7
5642.400000	46.61	82.25	35.64	1000.000	298.0	V	238.0	8.7
8460.000000	50.62	82.25	31.63	1000.000	285.0	V	226.0	11.3

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2818.200000	33.11	82.25	49.14	1000.000	254.0	H	234.0	3.7
3758.400000	39.45	82.25	42.80	1000.000	410.0	H	234.0	5.9
3761.800000	35.65	82.25	46.60	1000.000	410.0	H	238.0	5.9
5637.200000	40.38	82.25	41.87	1000.000	410.0	V	0.0	8.7
5642.400000	34.78	82.25	47.47	1000.000	298.0	V	238.0	8.7
8460.000000	39.90	82.25	42.35	1000.000	285.0	V	226.0	11.3

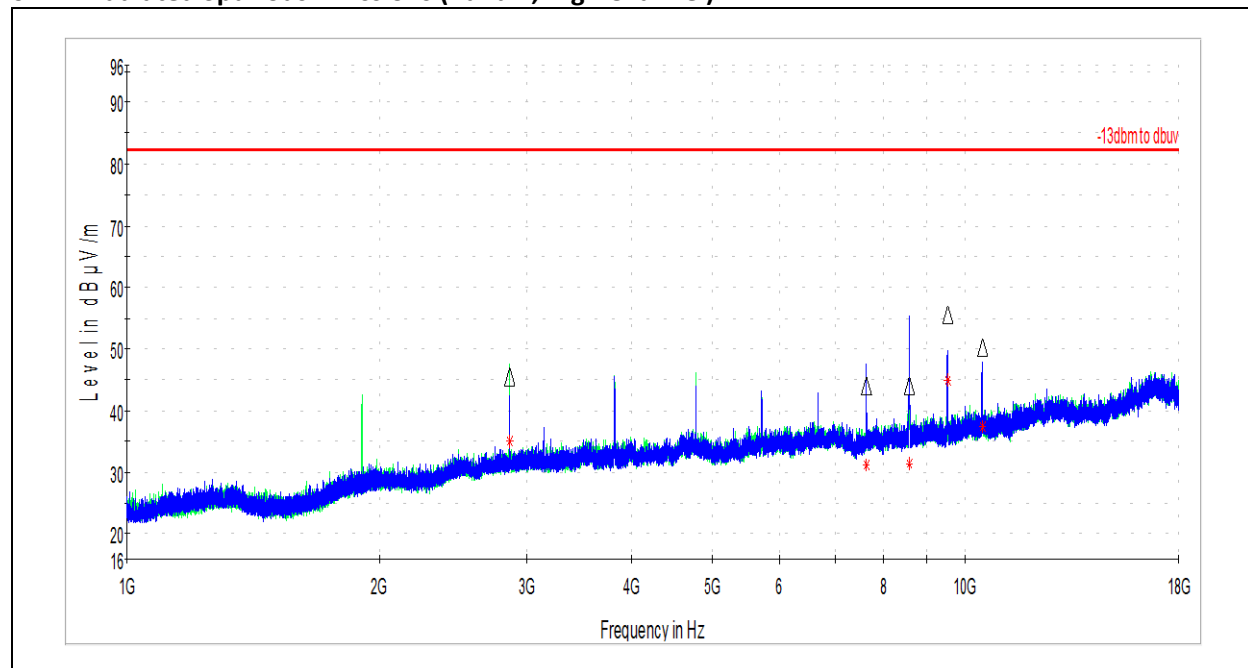
Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: (Where Applicable) NA
Product Standard: FCC Part 15B
Input Voltage: ICES-003 Issue 6
Pretest Verification w / Ambient Signals or BB Source: Battery
Yes

Test Date: 11/20/2018
Limit Applied: -13dBm (converted to field strength at 3m)
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None



6.14 Radiated Spurious Emissions (Band 2, High Channel)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2860.400000	45.42	102.25	56.83	1000.000	410.0	H	246.0	3.8
7630.800000	43.98	102.25	58.27	1000.000	320.0	V	260.0	10.5
8580.000000	43.92	102.25	58.33	1000.000	290.0	V	333.0	11.6
8588.400000	43.92	102.25	58.33	1000.000	410.0	V	151.0	11.7
9538.400000	55.57	102.25	46.68	1000.000	313.0	V	0.0	12.9
10497.600000	50.28	102.25	51.97	1000.000	410.0	V	0.0	14.1

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2860.400000	35.14	82.25	47.11	1000.000	410.0	H	246.0	3.8
7630.800000	31.24	82.25	51.01	1000.000	320.0	V	260.0	10.5
8580.000000	31.39	82.25	50.86	1000.000	290.0	V	333.0	11.6
8588.400000	31.33	82.25	50.92	1000.000	410.0	V	151.0	11.7
9538.400000	44.88	82.25	37.37	1000.000	313.0	V	0.0	12.9
10497.600000	37.41	82.25	44.84	1000.000	410.0	V	0.0	14.1

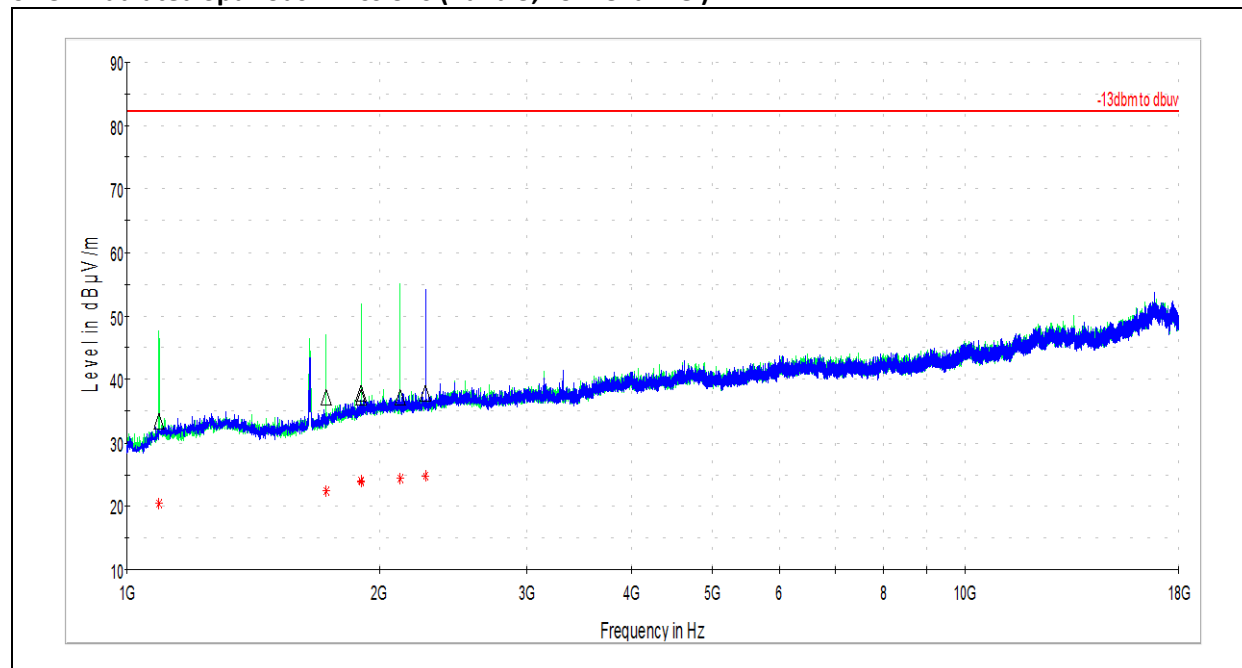
Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: (Where Applicable) NA
Product Standard: FCC Part 15B
Input Voltage: ICES-003 Issue 6
Pretest Verification w / Ambient Signals or BB Source: Battery
Yes

Test Date: 11/20/2018
Limit Applied: -13dBm (converted to field strength at 3m)
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None



6.15 Radiated Spurious Emissions (Band 5, Low Channel)



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1092.500000	33.38	82.25	48.87	1000.000	410.0	H	193.0	-3.0
1729.000000	37.19	82.25	45.06	1000.000	205.0	H	0.0	-0.4
1901.000000	37.88	82.25	44.37	1000.000	272.0	H	152.0	1.4
1903.000000	37.22	82.25	45.03	1000.000	319.0	H	103.0	1.4
2116.500000	37.09	82.25	45.16	1000.000	410.0	H	154.0	2.0
2270.000000	37.90	82.25	44.35	1000.000	410.0	V	246.0	2.6

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1092.500000	20.36	82.25	61.89	1000.000	410.0	H	193.0	-3.0
1729.000000	22.44	82.25	59.81	1000.000	205.0	H	0.0	-0.4
1901.000000	23.81	82.25	58.44	1000.000	272.0	H	152.0	1.4
1903.000000	24.09	82.25	58.16	1000.000	319.0	H	103.0	1.4
2116.500000	24.34	82.25	57.91	1000.000	410.0	H	154.0	2.0
2270.000000	24.83	82.25	57.42	1000.000	410.0	V	246.0	2.6

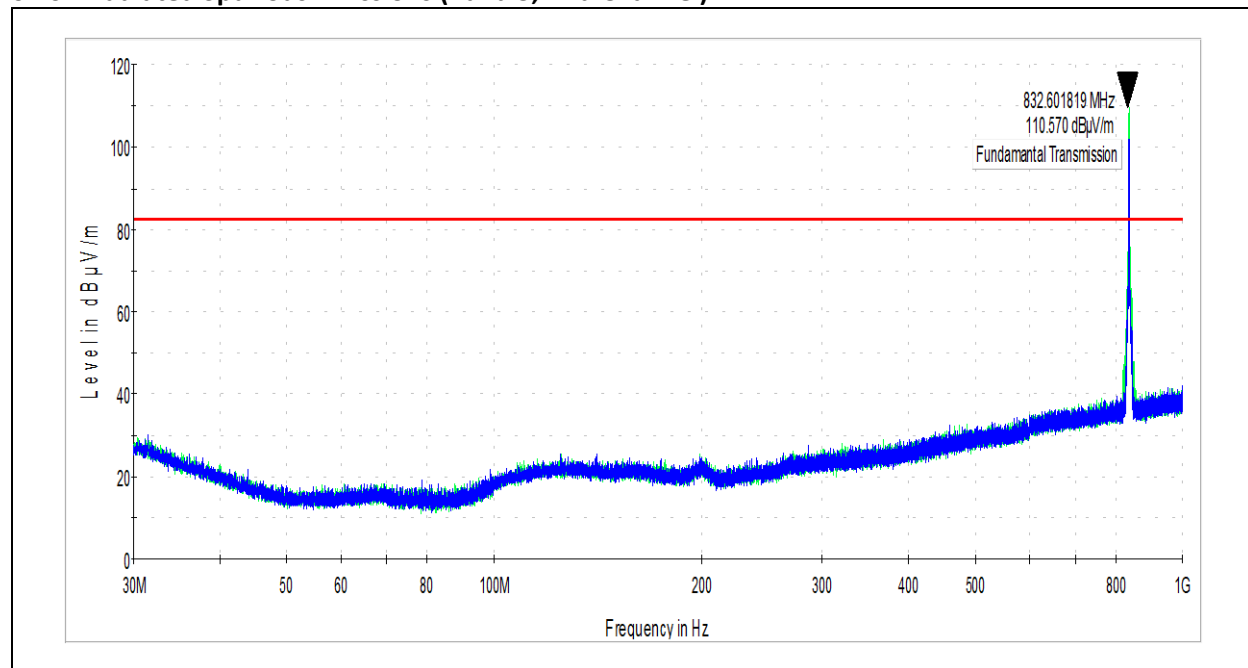
Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: (Where Applicable) NA
Product Standard: FCC Part 15B
Input Voltage: ICES-003 Issue 6
Pretest Verification w / Ambient Signals or BB Source: Battery
Yes

Test Date: 11/20/2018
Limit Applied: -13dBm (converted to field strength at 3m)
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None



6.16 Radiated Spurious Emissions (Band 5, Mid Channel)

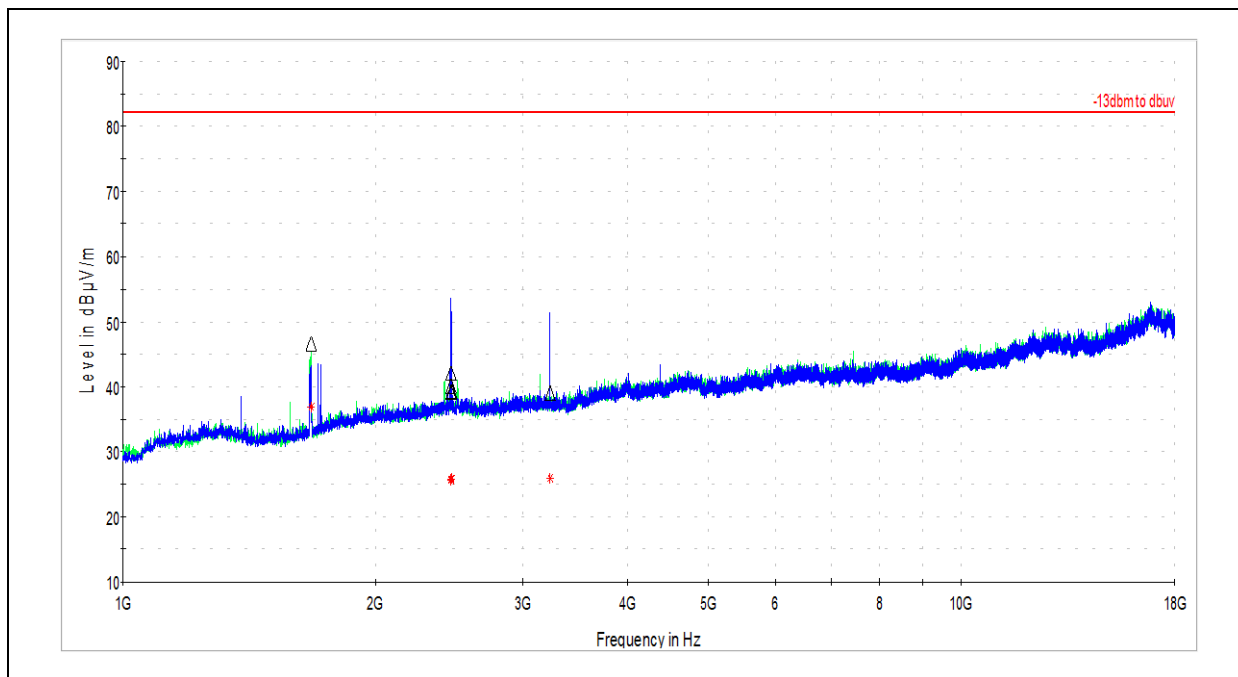


*Note: This frequency range was verified to not contain any significant spurious emissions at low and high channels as well.

Test Personnel:	Bryan Taylor
Supervising/Reviewing Engineer:	
(Where Applicable)	NA
Product Standard:	FCC Part 15B
Input Voltage:	ICES-003 Issue 6
Pretest Verification w / Ambient	Battery
Signals or BB Source:	Yes

Test Date:	11/20/2018
Limit Applied:	-13dBm (converted to field strength at 3m)
Ambient Temperature:	22.2°C
Relative Humidity:	41.2 %
Atmospheric Pressure:	990.3 mbar

Deviations, Additions, or Exclusions: None



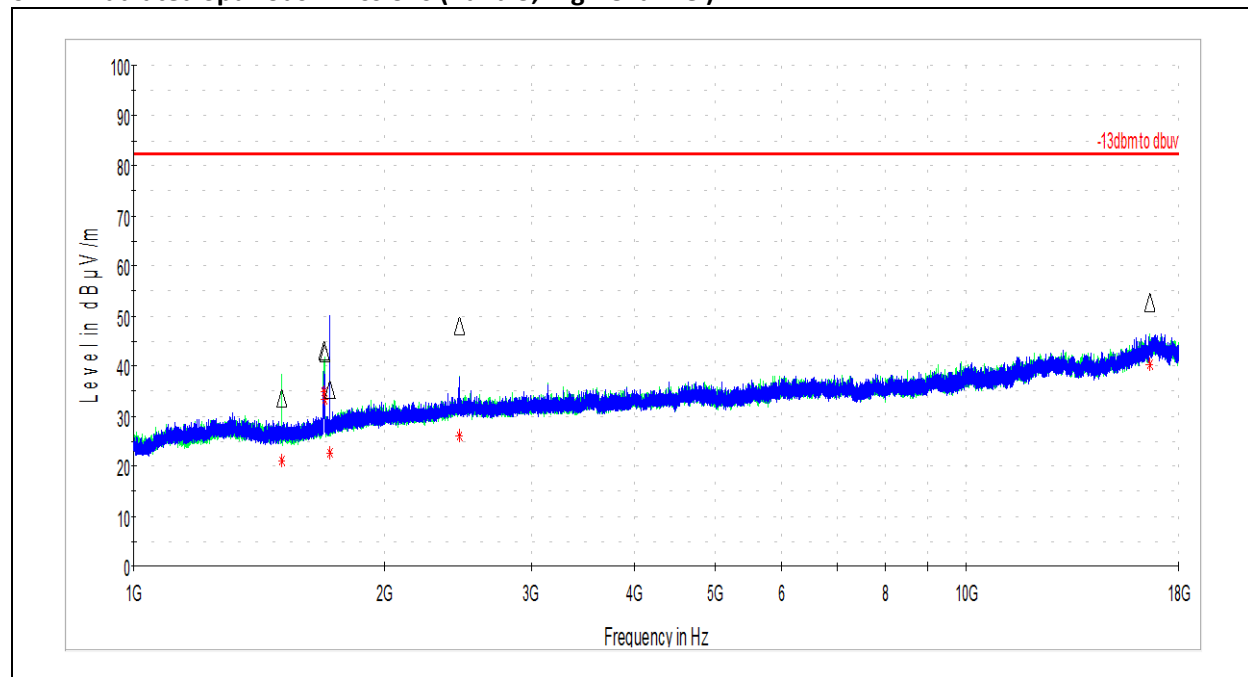
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1675.000000	46.65	82.25	35.60	1000.000	176.0	H	50.0	-1.0
2460.000000	40.17	82.25	42.08	1000.000	219.0	V	114.0	3.3
2462.500000	39.14	82.25	43.11	1000.000	100.0	V	330.0	3.3
2464.500000	42.03	82.25	40.22	1000.000	274.0	V	123.0	3.3
2467.000000	39.31	82.25	42.94	1000.000	410.0	V	145.0	3.3
3233.500000	38.96	82.25	43.29	1000.000	410.0	V	188.0	4.5

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1675.000000	36.88	82.25	45.37	1000.000	176.0	H	50.0	-1.0
2460.000000	25.66	82.25	56.59	1000.000	219.0	V	114.0	3.3
2462.500000	25.69	82.25	56.56	1000.000	100.0	V	330.0	3.3
2464.500000	25.75	82.25	56.50	1000.000	274.0	V	123.0	3.3
2467.000000	25.88	82.25	56.37	1000.000	410.0	V	145.0	3.3
3233.500000	25.96	82.25	56.29	1000.000	410.0	V	188.0	4.5

Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: NA
(Where Applicable)
Product Standard: FCC Part 15B
Input Voltage: ICES-003 Issue 6
Battery
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/20/2018
Limit Applied: -13dBm (converted to field strength at 3m)
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None

**6.17 Radiated Spurious Emissions (Band 5, High Channel)**

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1505.700000	33.45	82.25	48.80	1000.000	410.0	H	225.0	-2.0
1691.500000	43.17	82.25	39.08	1000.000	301.0	H	244.0	-1.0
1694.800000	42.66	82.25	39.59	1000.000	303.0	H	245.0	-1.0
1720.500000	35.27	82.25	46.98	1000.000	290.0	V	0.0	-0.4
2459.200000	48.04	82.25	34.21	1000.000	410.0	H	128.0	3.5
16623.000000	52.60	82.25	29.65	1000.000	298.0	H	277.0	21.3

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1505.700000	21.04	82.25	61.21	1000.000	410.0	H	225.0	-2.0
1691.500000	34.69	82.25	47.56	1000.000	301.0	H	244.0	-1.0
1694.800000	33.36	82.25	48.89	1000.000	303.0	H	245.0	-1.0
1720.500000	22.53	82.25	59.72	1000.000	290.0	V	0.0	-0.4
2459.200000	25.97	82.25	56.28	1000.000	410.0	H	128.0	3.5
16623.000000	40.23	82.25	42.02	1000.000	298.0	H	277.0	21.3

Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: (Where Applicable) NA
Product Standard: FCC Part 15B
Input Voltage: Battery
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/20/2018
Limit Applied: -13dBm (converted to field strength at 3m)
Ambient Temperature: 22.2°C
Relative Humidity: 41.2 %
Atmospheric Pressure: 990.3 mbar

Deviations, Additions, or Exclusions: None



7 Conducted Emissions

7.1 Method

Tests are performed in accordance with ANSI C63.4:2014.

TEST SITE: Ground Plane

Site Designation: Ground Plane

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
AC Line Conducted Emissions	150 kHz - 30 MHz	3.1dB	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.

7.2 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:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu V$$
$$NF = \text{Net Reading in dB}\mu V$$

Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu V$$

$$UF = 10^{(49.1 \text{ dB}\mu V / 20)} = 285.1 \mu V/m$$

**7.3 Test Equipment Used:**

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	3900	Rohde & Schwarz	ESU40	9/18/2018	9/18/2019
LISN	2509	Fischer Custom Communication	FCC-LISN-50-50-2M	4/10/2018	4/10/2019
Coaxial Cable (COND 3)	6026			11/26/2018	11/26/2019

7.4 Software Utilized:

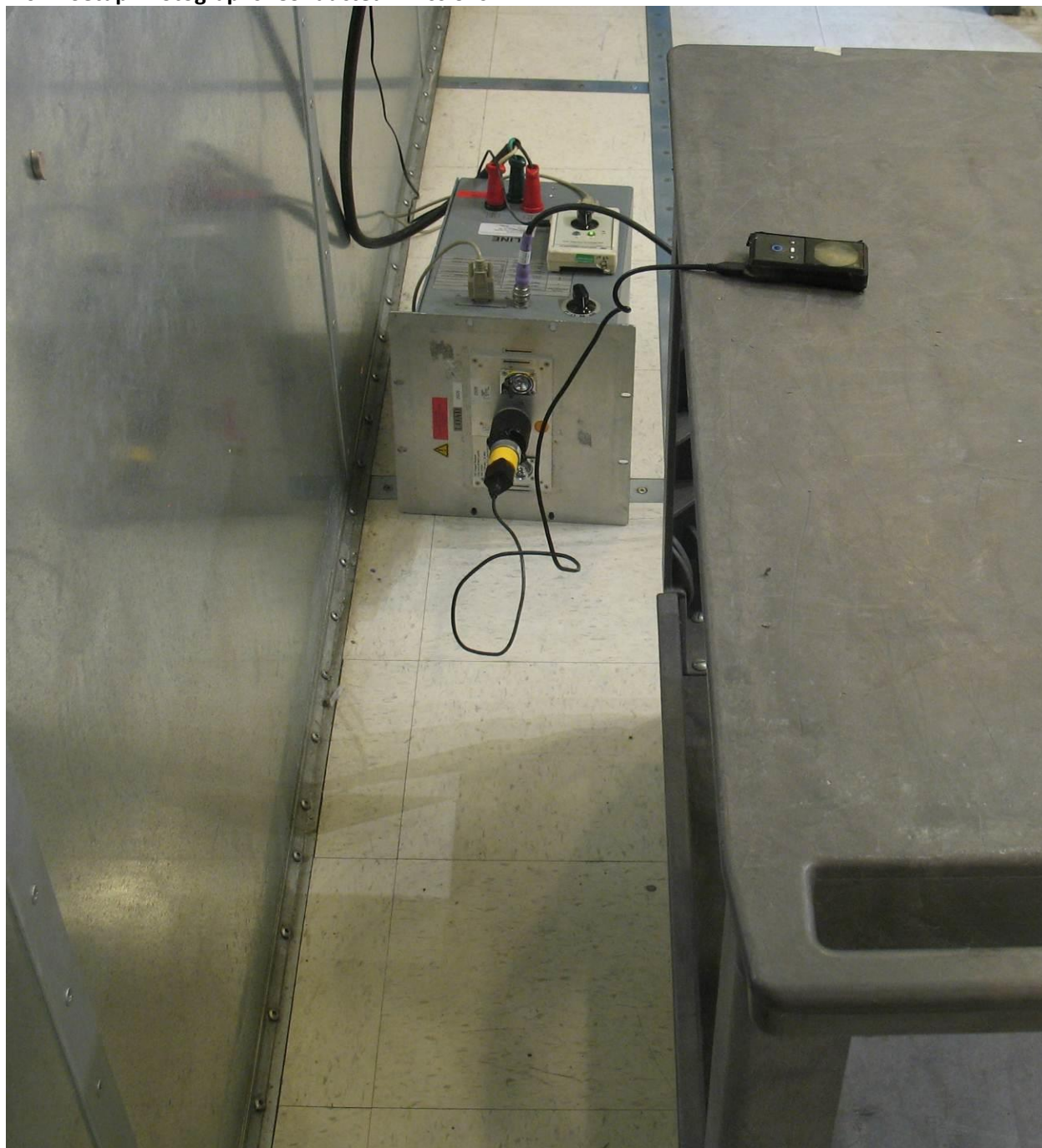
Name	Manufacturer	Version
TILE	ETS Lindgren	V7.0.6.545

7.5 Results:

The sample tested was found to Comply.

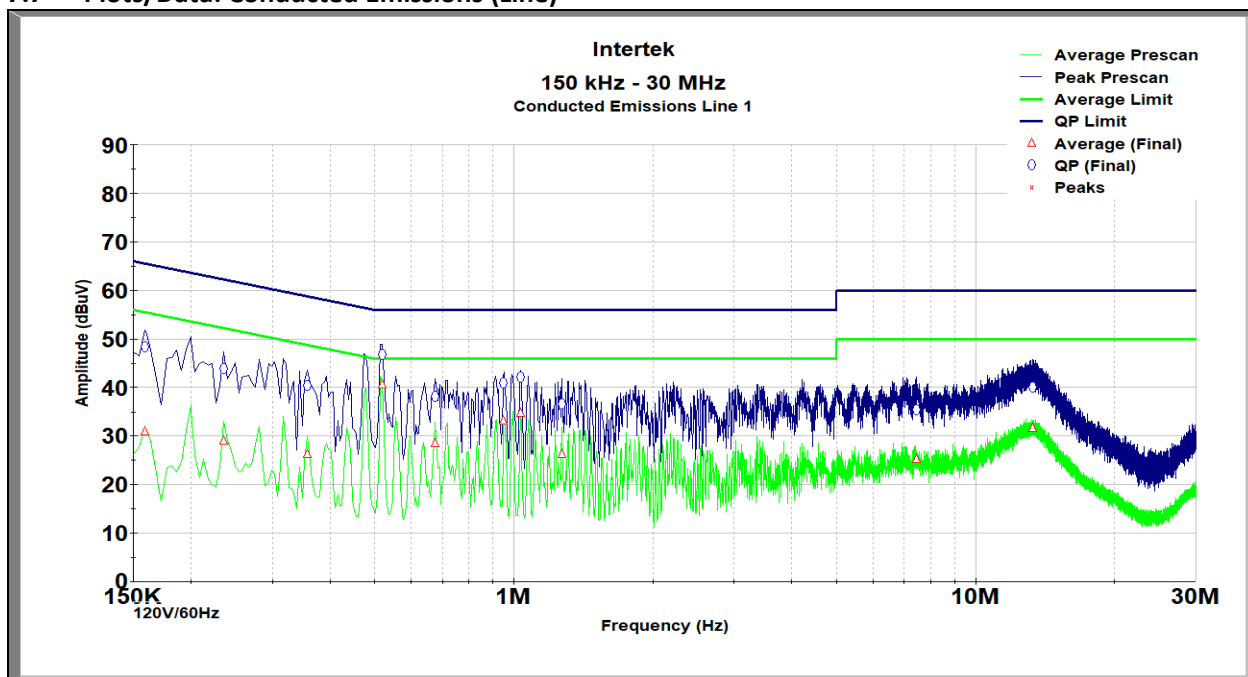


7.6 Setup Photographs: Conducted Emissions





7.7 Plots/Data: Conducted Emissions (Line)



Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Margin (dB)	Average (dBuV)	Average Limit (dBuV)	Average Margin (dB)
0.159	48.361	65.743	17.382	30.815	55.743	24.928
0.235	43.853	63.557	19.704	29.052	53.557	24.505
0.357	40.471	60.086	19.614	26.166	50.086	23.920
0.519	46.814	56.000	9.186	40.640	46.000	5.360
0.676	38.102	56.000	17.898	28.412	46.000	17.588
0.951	40.970	56.000	15.030	33.204	46.000	12.796
1.032	42.165	56.000	13.835	34.770	46.000	11.230
1.271	36.589	56.000	19.411	26.146	46.000	19.854
7.458	35.462	60.000	24.538	25.212	50.000	24.788
13.269	40.137	60.000	19.863	31.651	50.000	18.349

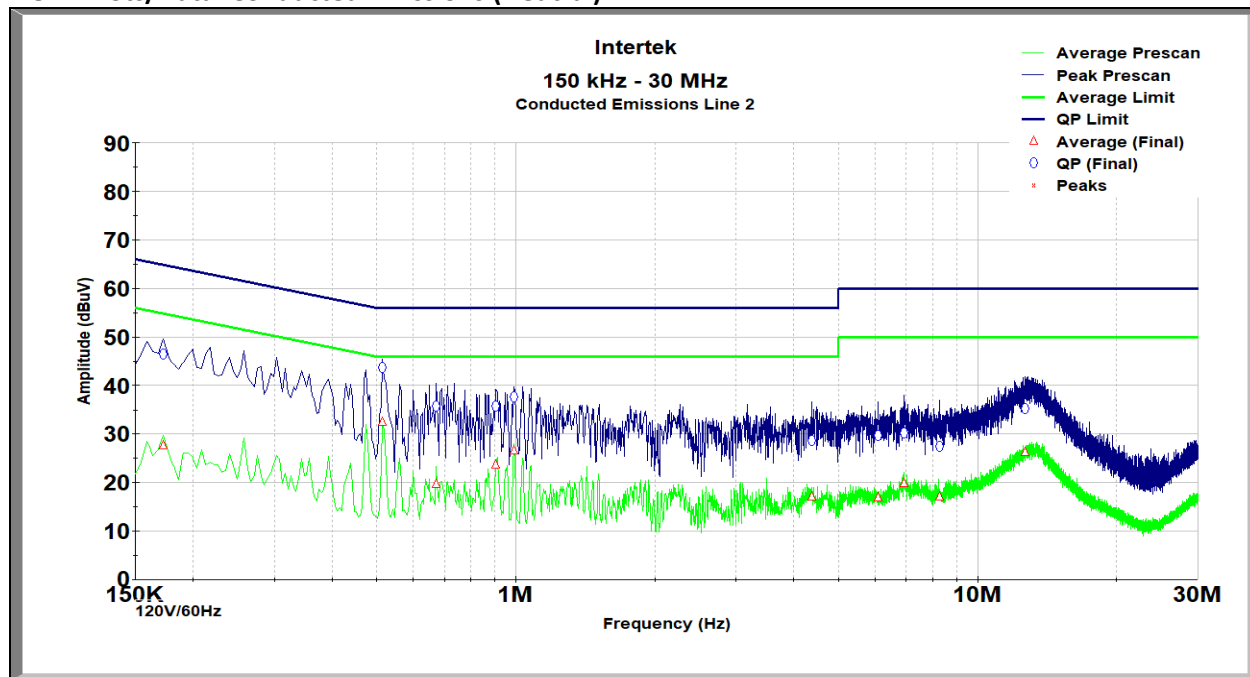
Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: NA
(Where Applicable)
Product Standard: FCC Part 15B
ICES-003 Issue 6
Input Voltage: 120VAC / 60Hz (Into charging Adapter)
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/27/2018
Limit Applied: Class B
Ambient Temperature: 23.1°C
Relative Humidity: 43.2 %
Atmospheric Pressure: 991.4 mbar

Deviations, Additions, or Exclusions: None



7.8 Plots/Data: Conducted Emissions (Neutral)



Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Margin (dB)	Average (dBuV)	Average Limit (dBuV)	Average Margin (dB)
0.172	46.416	65.357	18.941	27.553	55.357	27.805
0.514	43.705	56.000	12.295	32.424	46.000	13.576
0.672	35.657	56.000	20.343	19.686	46.000	26.314
0.906	35.789	56.000	20.211	23.670	46.000	22.330
0.992	37.674	56.000	18.326	26.558	46.000	19.442
4.375	28.726	56.000	27.274	17.093	46.000	28.907
6.081	29.691	60.000	30.309	16.929	50.000	33.071
6.918	30.147	60.000	29.853	19.842	50.000	30.158
8.287	27.521	60.000	32.479	17.059	50.000	32.941
12.653	35.272	60.000	24.728	26.194	50.000	23.806

Test Personnel: Bryan Taylor
Supervising/Reviewing Engineer: NA
(Where Applicable)
Product Standard: FCC Part 15B
ICES-003 Issue 6
120VAC / 60Hz (Into
charging Adapter)
Input Voltage:
Pretest Verification w / Ambient
Signals or BB Source: Yes

Test Date: 11/27/2018
Limit Applied: Class B
Ambient Temperature: 23.1°C
Relative Humidity: 43.2 %
Atmospheric Pressure: 991.4 mbar

Deviations, Additions, or Exclusions: None



8 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	1/21/2019	103515110LEX-001	BCT	BD	Original Issue