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eNeura, Inc. TEST REPORT

SCOPE OF WORK

EMC TESTING – STMS MINI TRANSCRANIAL MAGNETIC STIMULATOR

REPORT NUMBER

103714598LEX-006

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2/1/2019

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EMC TEST REPORT
(FULL COMPLIANCE)

Report Number: 103714598LEX-006

Project Number: G103714598

Report Issue Date: 2/1/2019

Model(s) Tested: sTMS Mini Transcranial Magnetic
Stimulator

Standards: FCC Part 15B
ICES-003 Issue 6
FCC Part 27
(Radiated Spurious Emissions)

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

Client:
eNeura, Inc.
715 N Pastoria Avenue
Sunnyvale, CA 94085
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 Spurious Emissions (Transmitters Active) (ANSI C63.26:2015)	Pass
7	Conducted Emissions (ANSI C63.4:2014)	Pass



3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	eNeura, Inc.
Address:	715 N Pastoria Avenue Sunnyvale, CA 94085 USA
Contact:	Cynthia Merrell
Telephone:	(408) 245-6400 x126
Email:	cmerell@eneura.com
Manufacturer Information	
Manufacturer Name:	eNeura, Inc.
Manufacturer Address:	715 N Pastoria Avenue Sunnyvale, CA 94085 USA



4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	sTMS Mini Transcranial Magnetic Stimulator
Model Number	sTMS Mini
Serial Number	20001152
Receive Date	11/20/2018
Test Start Date	11/21/2018
Test End Date	12/4/2018
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	12VDC
Rated Current	1.25A
Rated Frequency	DC
Number of Phases	DC
Description of Equipment Under Test (provided by client)	
The sTMS Mini Transcranial Magnetic Stimulator is a therapeutic device used in the treatment of migraine headaches. It applies magnetic stimulation therapy and then transmits data back to the supervising clinician via an embedded cellular module (Sierra Wireless Model HL7618RD). The data transmission occurs after the therapy has completed and the device could then be lying in the users lap or in a purse or bag. The data transmission does not occur whilst the device is being held to the head.	

4.1 Variant Models:

There were no variant models covered by this evaluation.



5 System Setup and Method

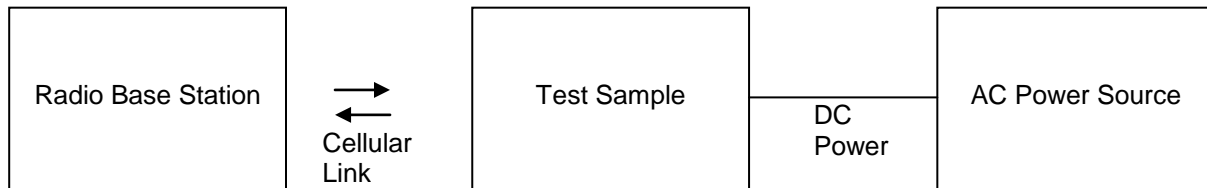
5.1 Method:

Configuration as required by ANSI C63.4:2014 and ANSI C63.26

No.	Descriptions of EUT Exercising
1	During the FCC Part 15B testing the transmitters were in idle mode.
2	During the radiated spurious emissions testing the cellular transmitter was outputting on low, mid, or high channels at maximum output power in either band 4 or band 13.
3	During the conducted emission testing the device was actively charging and the test was performed at the connection point to the AC mains.

Cables					
Qty.	Description	Length (m)	Shielding	Ferrites	Termination
1	12VDC Cable	2m	None	Yes	AC/DC Power Adapter

5.2 EUT Block Diagram:





5.3 EUT Photo (Front):





5.4 EUT Photo (Back):





5.5 EUT Photo (Power Adapter):





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)	Ucispr
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:

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

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 (dB μ V/m) = EIRP (dBm) - 20log(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.

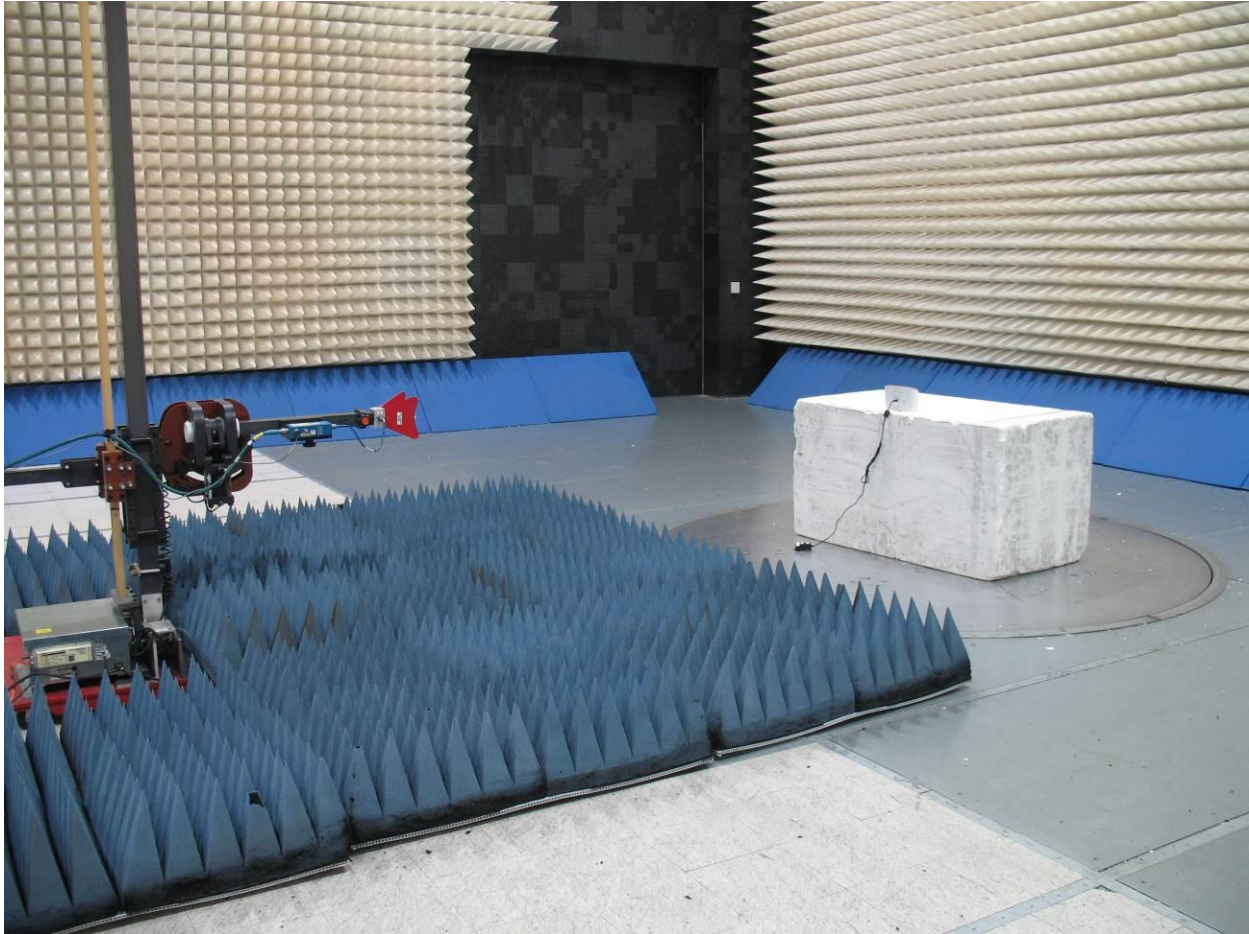


6.7 Setup Photographs: Radiated Emissions (FCC Part 15B Below 1GHz)



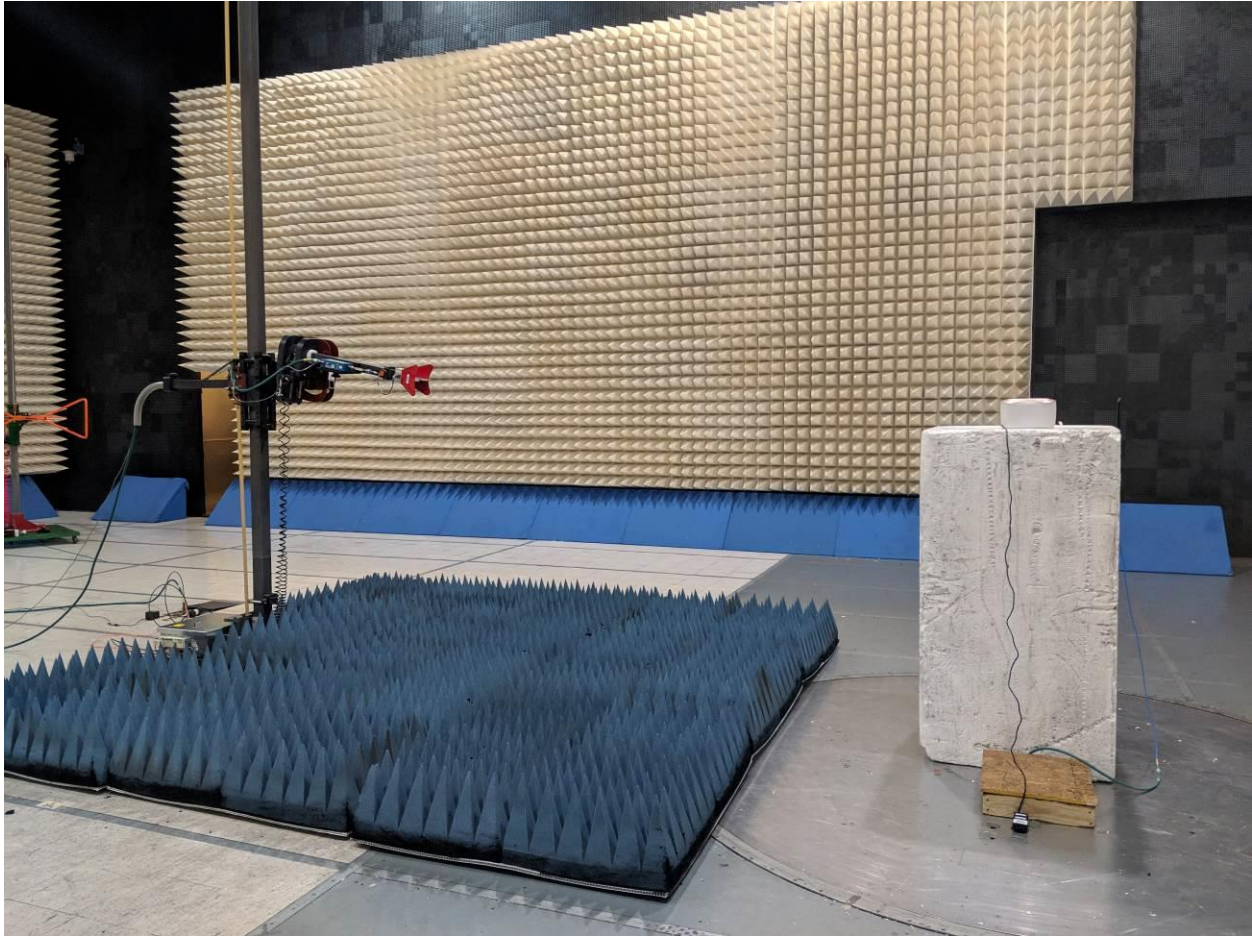


6.8 Setup Photographs: Radiated Emissions (FCC Part 15B Above 1GHz)



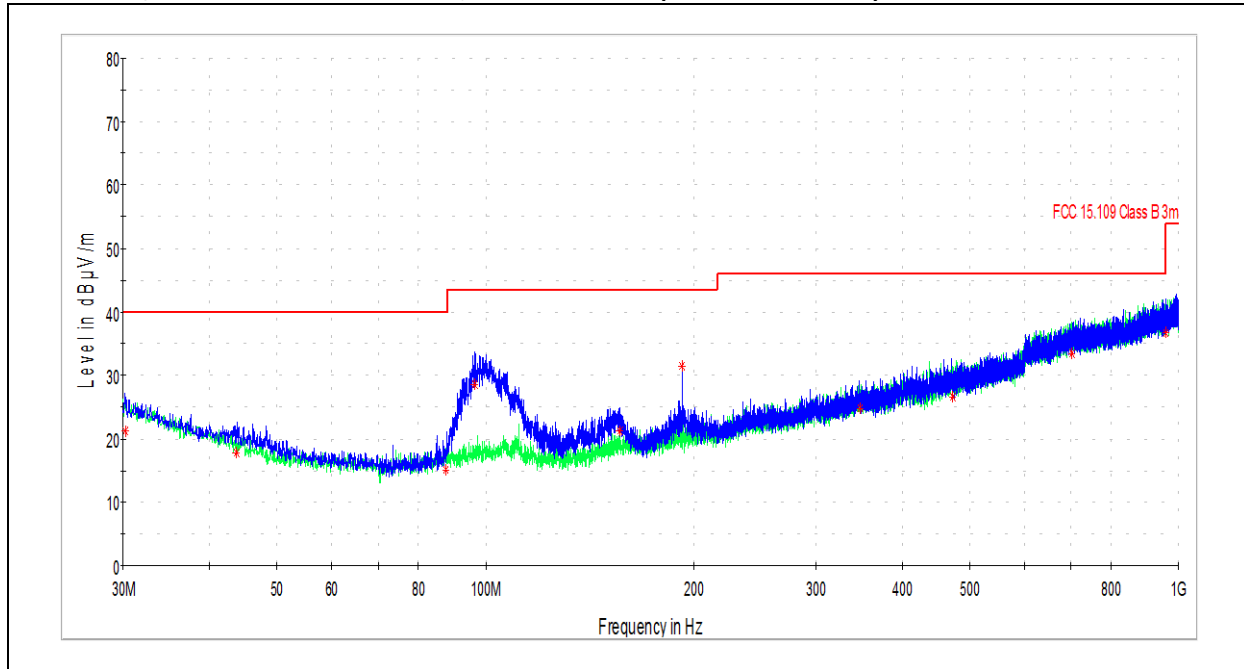


6.9 Setup Photographs: Radiated Spurious Emissions (FCC Part 27)





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



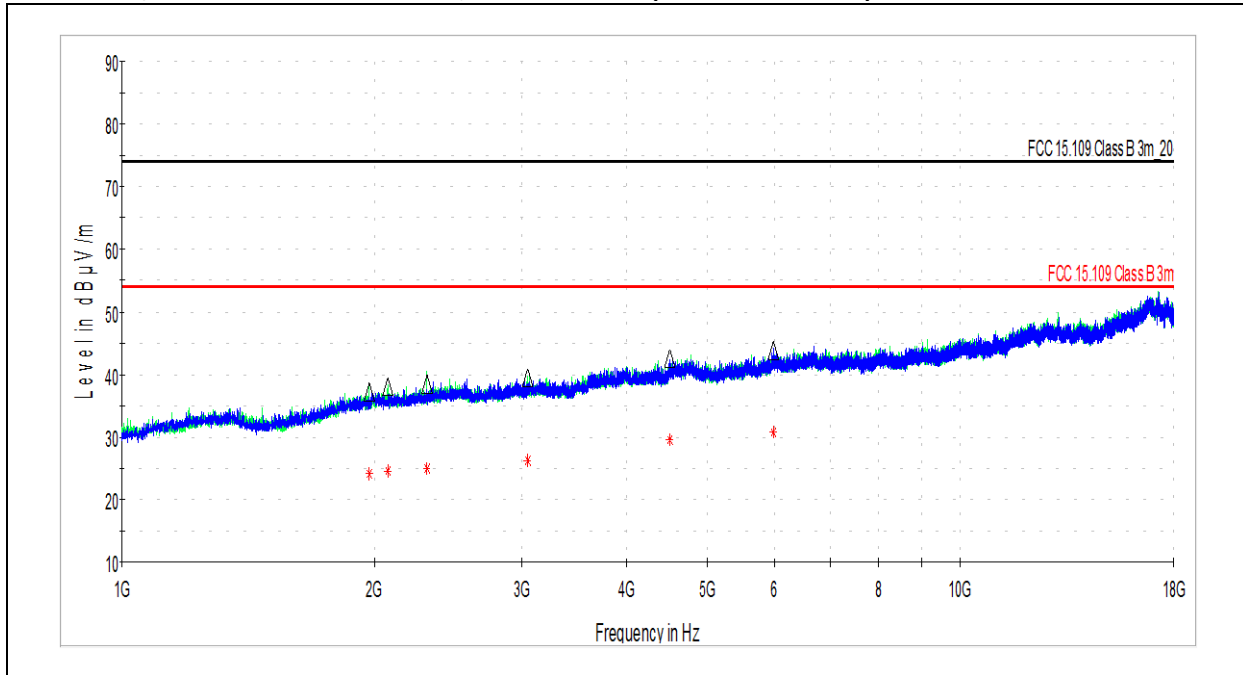
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.217000	21.17	40.00	18.83	120.000	142.1	V	145.0
43.657445	17.79	40.00	22.21	120.000	102.7	V	348.0
87.726556	15.18	40.00	24.82	120.000	97.9	V	10.0
96.395778	28.50	43.52	15.02	120.000	103.2	V	312.0
156.081667	21.27	43.52	22.25	120.000	103.4	V	74.0
191.994000	31.55	43.52	11.97	120.000	98.1	V	295.0
346.958889	24.86	46.02	21.16	120.000	127.8	V	74.0
471.821333	26.68	46.02	19.34	120.000	222.8	V	266.0
701.849222	33.36	46.02	12.66	120.000	187.1	H	174.0
959.941778	36.66	46.02	9.36	120.000	103.0	V	137.0

Test Personnel:	<u>Brian Lackey</u>	Test Date:	<u>11/21/2018</u>
Supervising/Reviewing Engineer:	<u>NA</u>	Limit Applied:	<u>Class B</u>
(Where Applicable)	<u>FCC Part 15B</u>	Ambient Temperature:	<u>23.2°C</u>
Product Standard:	<u>ICES-003 Issue 6</u>	Relative Humidity:	<u>44.5%</u>
Input Voltage:	<u>120VAC / 60Hz (Into Power Adapter)</u>	Atmospheric Pressure:	<u>985.4mbar</u>
Pretest Verification w / Ambient Signals or BB Source:	<u>Yes</u>		

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)
1971.500000	37.21	74.00	36.79	1000.000	211.0	H	239.0	1.9
2073.500000	38.12	74.00	35.88	1000.000	193.0	H	300.0	2.0
2310.500000	38.39	74.00	35.61	1000.000	245.0	H	166.0	2.7
3048.000000	39.43	74.00	34.57	1000.000	171.0	H	201.0	4.6
4507.000000	42.62	74.00	31.38	1000.000	410.0	V	100.0	7.6
5994.000000	43.88	74.00	30.12	1000.000	410.0	V	284.0	8.8

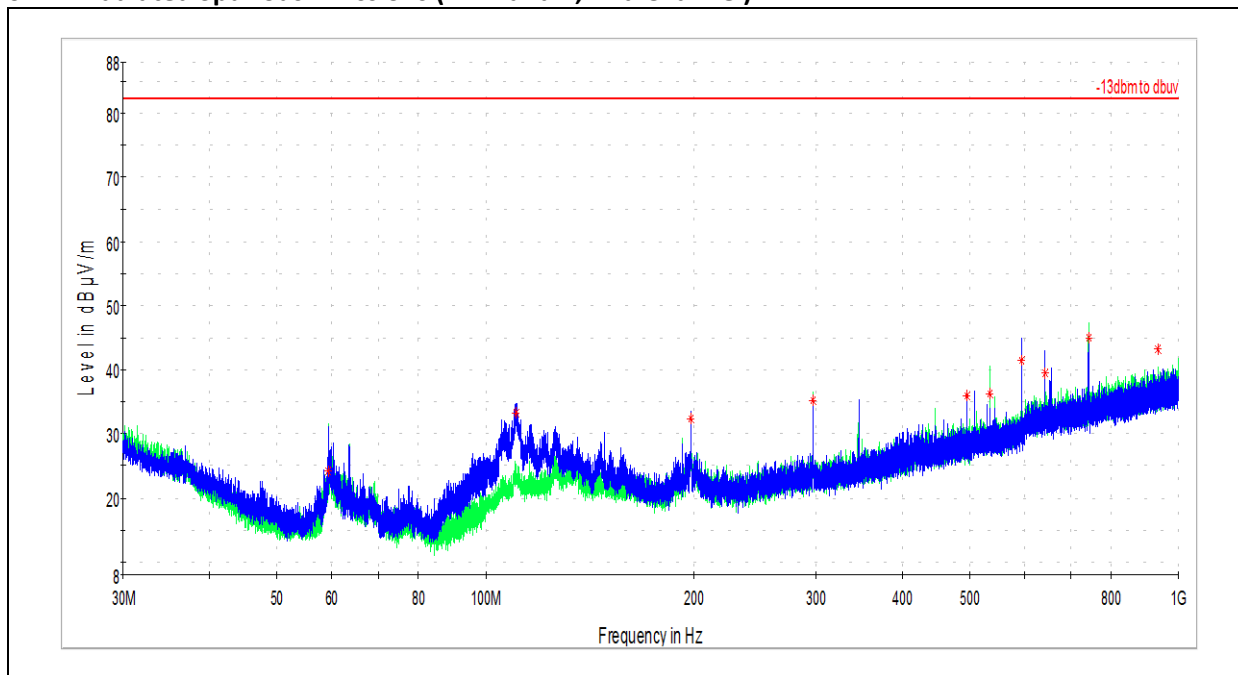
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1971.500000	24.09	54.00	29.91	1000.000	211.0	H	239.0	1.9
2073.500000	24.56	54.00	29.44	1000.000	193.0	H	300.0	2.0
2310.500000	24.87	54.00	29.13	1000.000	245.0	H	166.0	2.7
3048.000000	26.28	54.00	27.72	1000.000	171.0	H	201.0	4.6
4507.000000	29.49	54.00	24.51	1000.000	410.0	V	100.0	7.6
5994.000000	30.74	54.00	23.26	1000.000	410.0	V	284.0	8.8

Test Personnel:	Brian Lackey	Test Date:	11/21/2018
Supervising/Reviewing Engineer:	NA	Limit Applied:	Class B
(Where Applicable)	FCC Part 15B	Ambient Temperature:	23.2°C
Product Standard:	ICES-003 Issue 6	Relative Humidity:	44.5%
Input Voltage:	120VAC / 60Hz (Into Power Adapter)	Atmospheric Pressure:	985.4mbar
Pretest Verification w / Ambient Signals or BB Source:	Yes		

Deviations, Additions, or Exclusions: None



6.12 Radiated Spurious Emissions (LTE Band 4, Mid Channel)



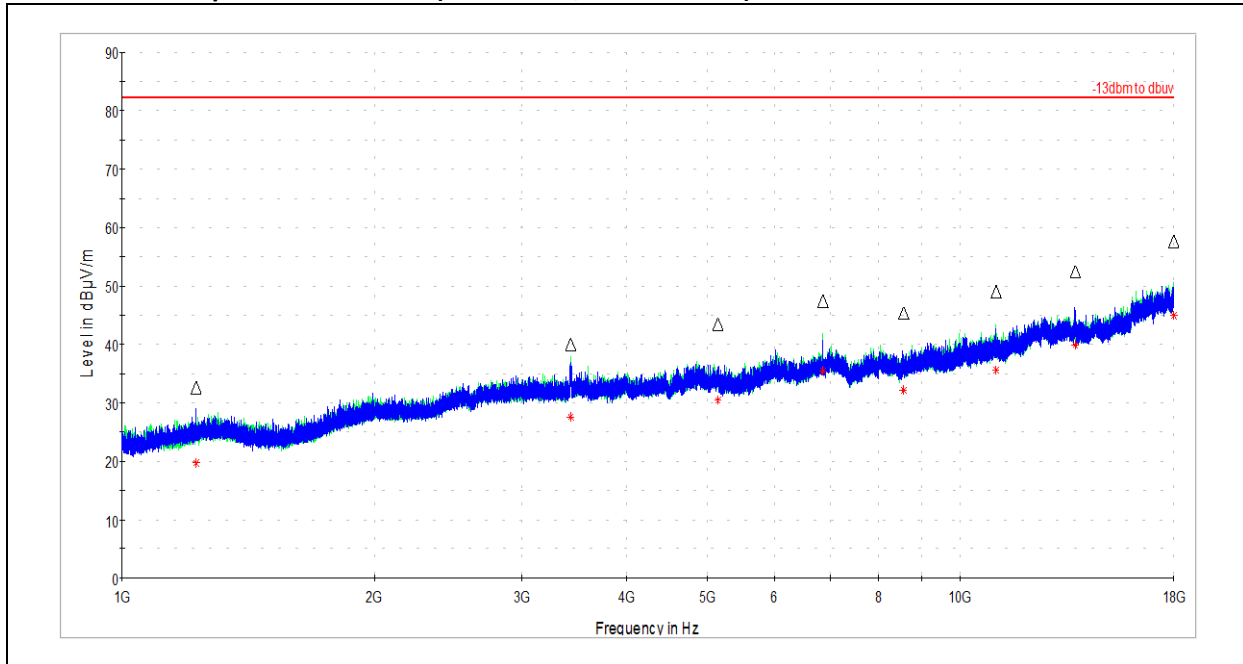
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
59.323000	24.23	82.25	58.02	120.000	106.4	H	203.0	15.0
110.680000	33.31	82.25	48.94	120.000	105.0	V	184.0	20.9
197.780000	32.42	82.25	49.83	120.000	110.6	H	164.0	21.3
296.700000	35.14	82.25	47.11	120.000	400.0	H	202.0	23.0
494.540000	35.90	82.25	46.35	120.000	213.1	V	192.0	27.6
534.080000	36.34	82.25	45.91	120.000	201.2	H	350.0	28.8
593.420000	41.44	82.25	40.81	120.000	99.9	V	268.0	29.1
642.830000	39.50	82.25	42.75	120.000	212.3	V	64.0	30.1
741.770000	44.93	82.25	37.32	120.000	295.9	H	109.0	31.8
933.280000	43.25	82.25	39.00	120.000	236.5	H	8.0	34.6

Test Personnel:	<u>Michael Carlson</u>	Test Date:	<u>12/3/2018 – 12/4/2018</u>
Supervising/Reviewing Engineer:	<u>NA</u>	Limit Applied:	<u>-13dBm (Converted to Field Strength at 3m)</u>
(Where Applicable)	<u>FCC Part 15B</u>	Ambient Temperature:	<u>21.9°C</u>
Product Standard:	<u>ICES-003 Issue 6</u>	Relative Humidity:	<u>26.3%</u>
Input Voltage:	<u>120VAC / 60Hz (Into AC Power Adapter)</u>	Atmospheric Pressure:	<u>978.7mbar</u>
Pretest Verification w / Ambient Signals or BB Source:	<u>Yes</u>		

Deviations, Additions, or Exclusions: The middle channel for the bilog range is representative of the low and high channels as well.



6.13 Radiated Spurious Emissions (LTE Band 4, Low Channel)



*Note: Carrier is suppressed with the use of a band reject filter.

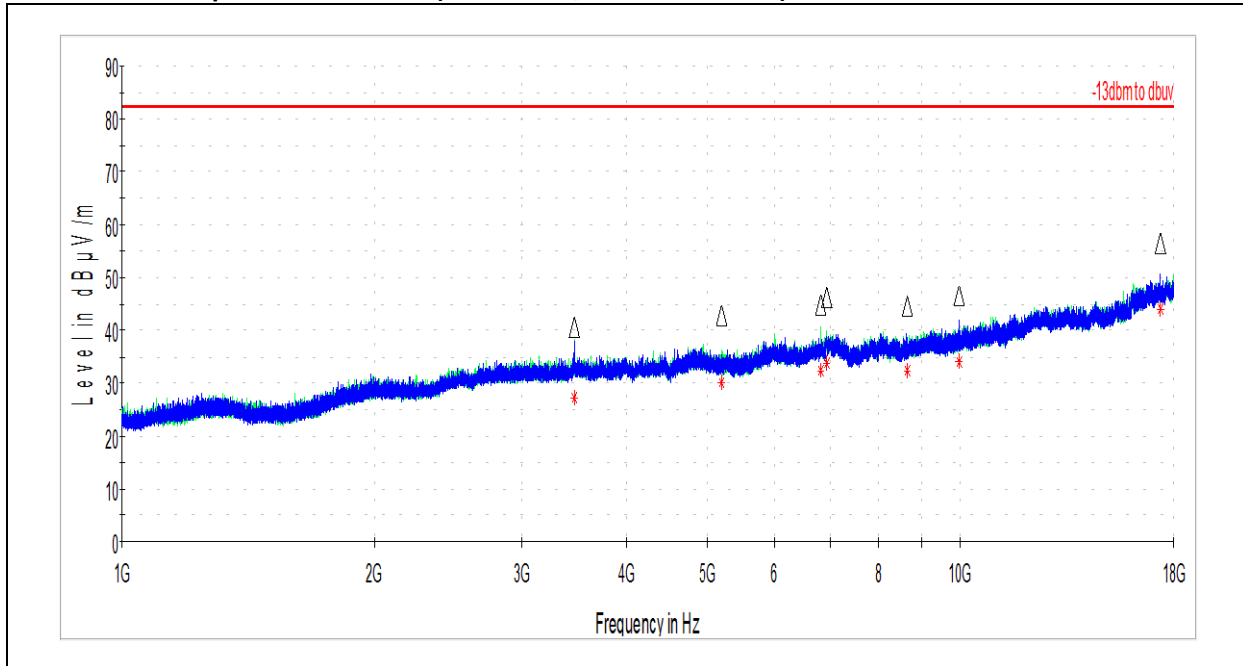
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1224.600000	19.71	82.25	62.54	1000.000	216.0	V	232.0	-2.1
3429.400000	27.64	82.25	54.61	1000.000	410.0	H	232.0	4.5
5145.000000	30.38	82.25	51.87	1000.000	236.0	V	195.0	7.4
6860.000000	35.51	82.25	46.74	1000.000	314.0	H	210.0	10.6
8575.000000	32.17	82.25	50.08	1000.000	332.0	V	256.0	11.9
11053.200000	35.66	82.25	46.59	1000.000	410.0	H	0.0	15.9
13720.000000	39.94	82.25	42.31	1000.000	287.0	V	226.0	18.8
17999.400000	44.91	82.25	37.34	1000.000	220.0	H	338.0	26.6

Test Personnel:	<u>Michael Carlson</u>	Test Date:	<u>12/3/2018 – 12/4/2018</u>
Supervising/Reviewing Engineer:	<u>NA</u>	Limit Applied:	<u>-13dBm (Converted to Field Strength at 3m)</u>
(Where Applicable)	<u>FCC Part 15B</u>	Ambient Temperature:	<u>21.9°C</u>
Product Standard:	<u>ICES-003 Issue 6</u>	Relative Humidity:	<u>26.3%</u>
Input Voltage:	<u>120VAC / 60Hz (Into AC Power Adapter)</u>	Atmospheric Pressure:	<u>978.7mbar</u>
Pretest Verification w / Ambient Signals or BB Source:	<u>Yes</u>		

Deviations, Additions, or Exclusions: None



6.14 Radiated Spurious Emissions (LTE Band 4, Middle Channel)



*Note: Carrier is suppressed with the use of a band reject filter.

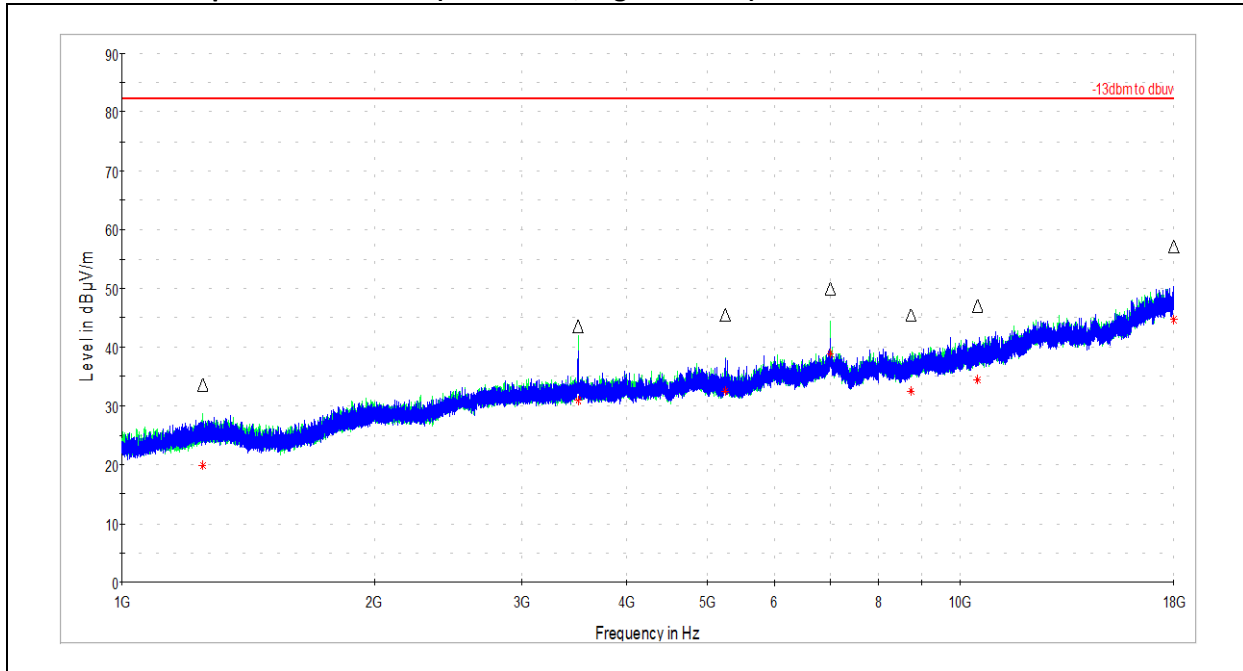
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3466.000000	27.29	82.25	54.96	1000.000	410.0	H	234.0	4.8
5197.500000	30.11	82.25	52.14	1000.000	379.0	V	240.0	7.7
6819.200000	32.23	82.25	50.02	1000.000	410.0	H	252.0	10.5
6930.000000	33.77	82.25	48.48	1000.000	410.0	V	254.0	10.7
8662.500000	32.25	82.25	50.00	1000.000	221.0	V	250.0	11.8
9975.600000	34.01	82.25	48.24	1000.000	410.0	V	202.0	14.0
17350.800000	43.92	82.25	38.33	1000.000	243.0	V	286.0	24.8

Test Personnel:	Michael Carlson	Test Date:	12/3/2018 – 12/4/2018
Supervising/Reviewing Engineer:	(Where Applicable) NA	Limit Applied:	-13dBm (Converted to Field Strength at 3m)
Product Standard:	FCC Part 15B ICES-003 Issue 6	Ambient Temperature:	21.9°C
Input Voltage:	120VAC / 60Hz (Into AC Power Adapter)	Relative Humidity:	26.3%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	978.7mbar

Deviations, Additions, or Exclusions: None



6.15 Radiated Spurious Emissions (LTE Band 4, High Channel)



*Note: Carrier is suppressed with the use of a band reject filter.

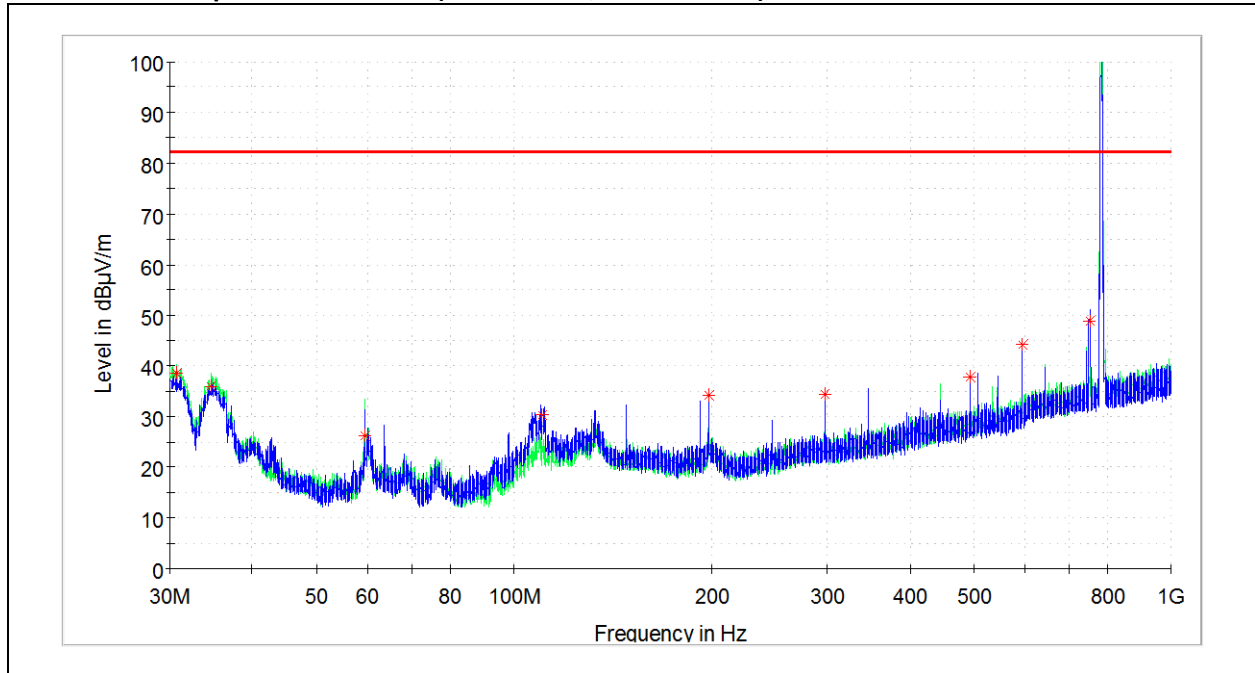
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1247.300000	19.82	82.25	62.43	1000.000	250.0	H	169.0	-1.8
3500.200000	30.96	82.25	51.29	1000.000	241.0	H	192.0	5.1
5250.800000	32.46	82.25	49.79	1000.000	227.0	H	193.0	7.7
7000.000000	38.93	82.25	43.32	1000.000	299.0	H	226.0	11.1
8750.000000	32.45	82.25	49.80	1000.000	236.0	H	157.0	12.2
10500.000000	34.50	82.25	47.75	1000.000	410.0	H	0.0	14.8
17983.800000	44.64	82.25	37.61	1000.000	410.0	V	231.0	26.3

Test Personnel:	Michael Carlson	Test Date:	12/3/2018 – 12/4/2018
Supervising/Reviewing Engineer: (Where Applicable)	NA	Limit Applied:	-13dBm (Converted to Field Strength at 3m)
Product Standard:	FCC Part 15B ICES-003 Issue 6	Ambient Temperature:	21.9°C
Input Voltage:	120VAC / 60Hz (Into AC Power Adapter)	Relative Humidity:	26.3%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	978.7mbar

Deviations, Additions, or Exclusions: None



6.16 Radiated Spurious Emissions (LTE Band 13, Mid Channel)



*The large peak at approximately 780MHz is the fundamental transmission and does not indicate a failing result.

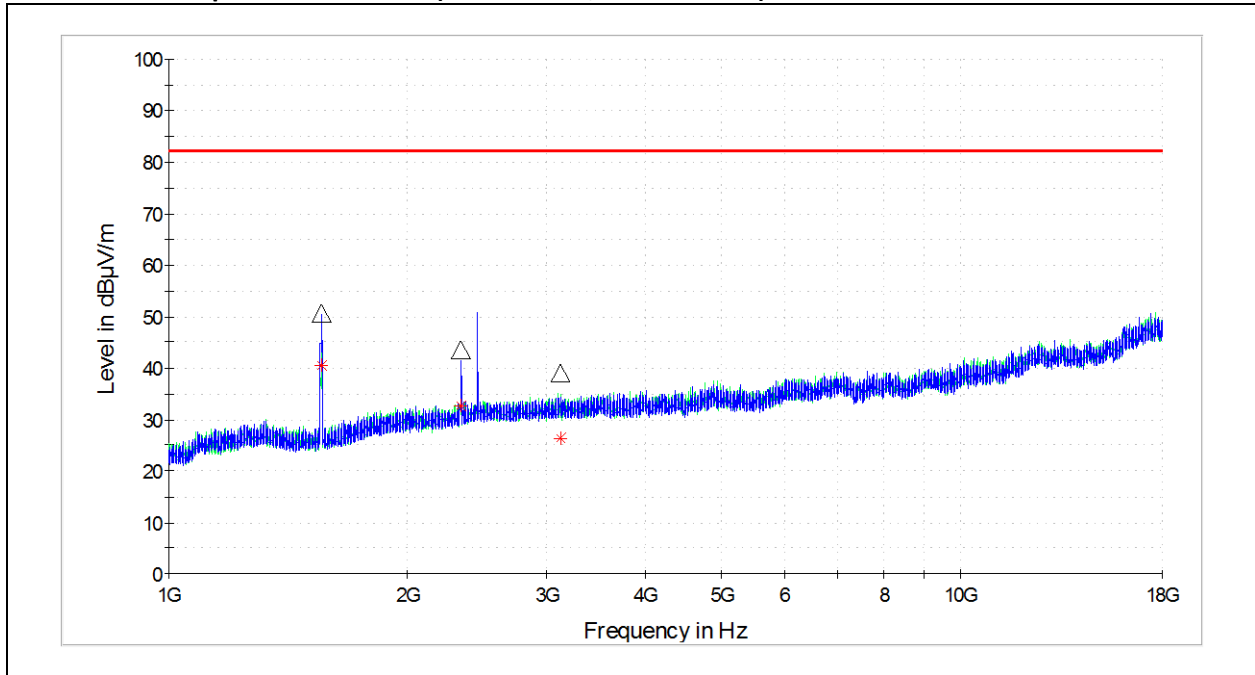
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.735000	38.58	82.25	43.67	120.000	100.1	H	148.0	28.2
34.613000	36.11	82.25	46.14	120.000	141.7	H	194.0	25.2
59.358000	26.26	82.25	55.99	120.000	343.6	H	64.0	15.1
110.600000	30.21	82.25	52.04	120.000	99.9	V	340.0	20.9
197.820000	34.14	82.25	48.11	120.000	107.9	H	313.0	21.3
296.700000	34.46	82.25	47.79	120.000	165.5	V	210.0	22.7
494.520000	37.78	82.25	44.47	120.000	307.8	V	92.0	27.6
593.390000	44.10	82.25	38.15	120.000	99.9	V	18.0	29.1
752.450000	48.91	82.25	33.34	120.000	141.7	V	111.0	31.4

Test Personnel:	<u>Michael Carlson</u>	Test Date:	<u>12/3/2018 – 12/4/2018</u>
Supervising/Reviewing Engineer:	<u>(Where Applicable) NA</u>	Limit Applied:	<u>-13dBm (Converted to Field Strength at 3m)</u>
Product Standard:	<u>FCC Part 15B ICES-003 Issue 6</u>	Ambient Temperature:	<u>21.9°C</u>
Input Voltage:	<u>120VAC / 60Hz (Into AC Power Adapter)</u>	Relative Humidity:	<u>26.3%</u>
Pretest Verification w / Ambient Signals or BB Source:	<u>Yes</u>	Atmospheric Pressure:	<u>978.7mbar</u>

Deviations, Additions, or Exclusions: The middle channel for the bilog range is representative of the low and high channels as well.



6.17 Radiated Spurious Emissions (LTE Band 13, Low Channel)



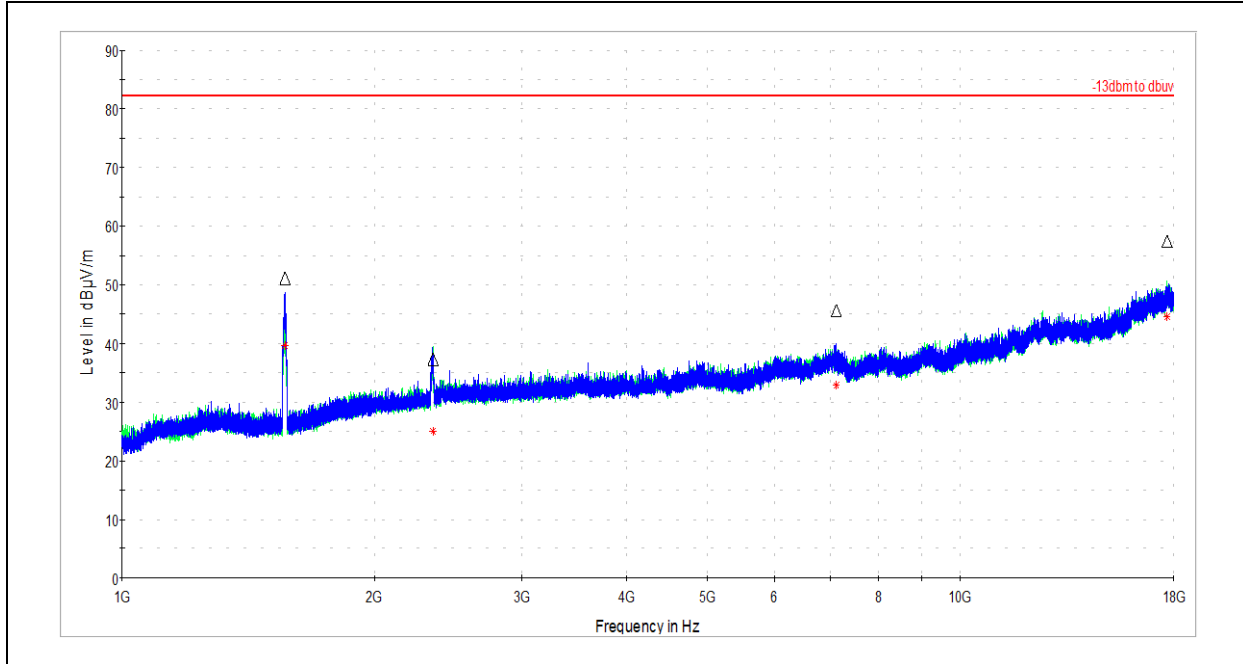
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1561.600000	40.61	82.25	41.64	1000.000	208.0	V	238.0	-2.2
2340.800000	32.55	82.25	49.70	1000.000	410.0	V	233.0	2.6
3123.000000	26.42	82.25	55.83	1000.000	344.0	V	225.0	4.5

Test Personnel:	Michael Carlson	Test Date:	12/3/2018 – 12/4/2018
Supervising/Reviewing Engineer:	(Where Applicable) NA	Limit Applied:	-13dBm (Converted to Field Strength at 3m)
Product Standard:	FCC Part 15B ICES-003 Issue 6	Ambient Temperature:	21.9°C
Input Voltage:	120VAC / 60Hz (Into AC Power Adapter)	Relative Humidity:	26.3%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	978.7mbar

Deviations, Additions, or Exclusions: None



6.18 Radiated Spurious Emissions (LTE Band 13, Middle Channel)



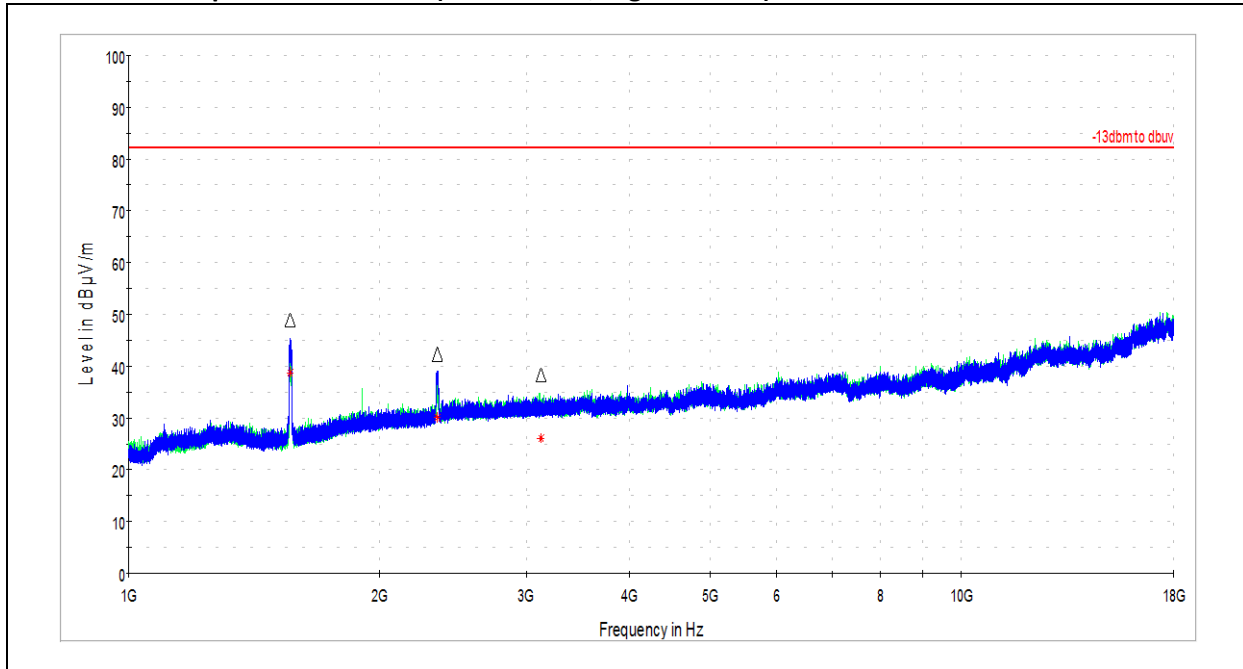
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1564.200000	39.63	82.25	42.62	1000.000	100.0	V	241.0	-2.1
2349.800000	25.06	82.25	57.19	1000.000	348.0	H	204.0	2.6
7125.200000	32.90	82.25	49.35	1000.000	410.0	V	272.0	11.0
17660.400000	44.51	82.25	37.74	1000.000	379.0	H	146.0	25.1

Test Personnel:	<u>Michael Carlson</u>	Test Date:	<u>12/3/2018 – 12/4/2018</u>
Supervising/Reviewing Engineer:	<u>NA</u>	Limit Applied:	<u>-13dBm (Converted to Field Strength at 3m)</u>
(Where Applicable)	<u>FCC Part 15B</u>	Ambient Temperature:	<u>21.9°C</u>
Product Standard:	<u>ICES-003 Issue 6</u>	Relative Humidity:	<u>26.3%</u>
Input Voltage:	<u>120VAC / 60Hz (Into AC Power Adapter)</u>	Atmospheric Pressure:	<u>978.7mbar</u>
Pretest Verification w / Ambient Signals or BB Source:	<u>Yes</u>		

Deviations, Additions, or Exclusions: None



6.19 Radiated Spurious Emissions (LTE Band 13, High Channel)



Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1562.600000	38.78	82.25	43.47	1000.000	410.0	V	327.0	-2.1
2345.800000	30.20	82.25	52.05	1000.000	410.0	V	236.0	2.7
3128.400000	26.08	82.25	56.17	1000.000	285.0	H	164.0	4.5

Test Personnel:	<u>Michael Carlson</u>	Test Date:	<u>12/3/2018 – 12/4/2018</u>
Supervising/Reviewing Engineer:	<u>NA</u>	Limit Applied:	<u>-13dBm (Converted to Field Strength at 3m)</u>
(Where Applicable)	<u>FCC Part 15B</u>	Ambient Temperature:	<u>21.9°C</u>
Product Standard:	<u>ICES-003 Issue 6</u>	Relative Humidity:	<u>26.3%</u>
Input Voltage:	<u>120VAC / 60Hz (Into AC Power Adapter)</u>	Atmospheric Pressure:	<u>978.7mbar</u>
Pretest Verification w / Ambient Signals or BB Source:	<u>Yes</u>		

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 dB μ V

RF = Reading from receiver in dB μ V

LF = LISN or ISN Correction Factor in dB

CF = Cable Correction Factor in dB

AF = Attenuator Loss Factor in dB

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

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

$$NF = \text{Net Reading in dB}\mu\text{V}$$

Example:

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

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

**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:

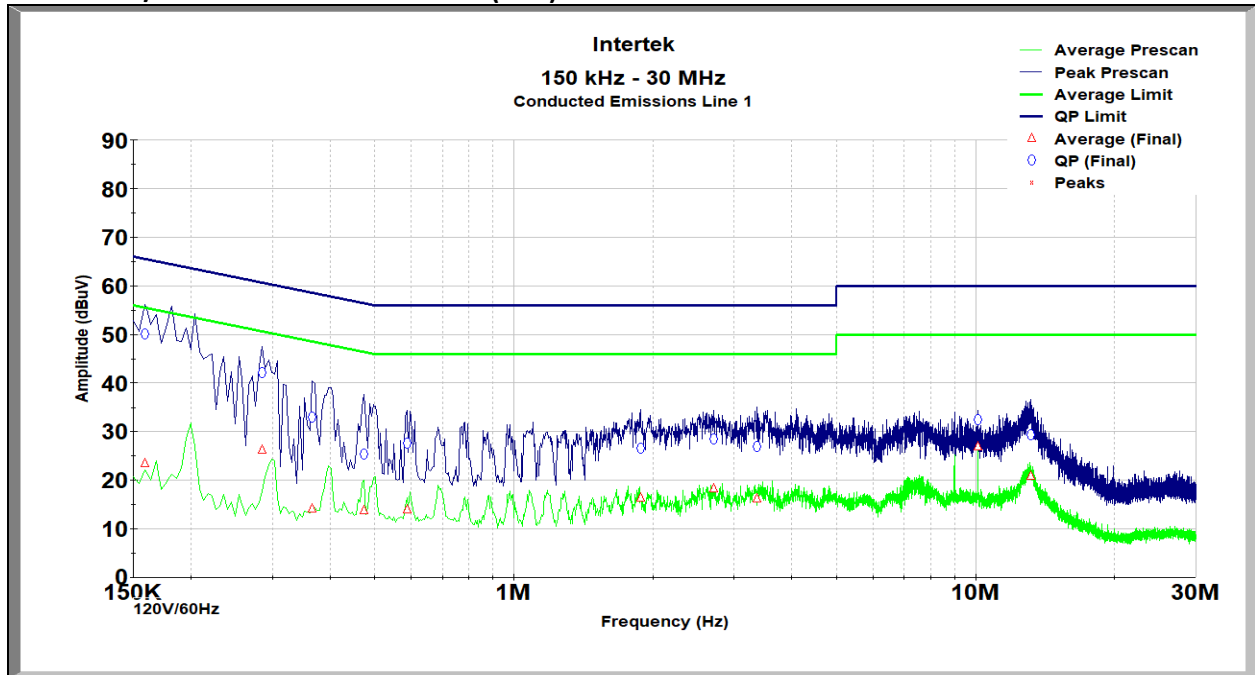
Name	Manufacturer	Version
TILE	ETS Lindgren	V7.0.6.545

7.5 Results:

The sample tested was found to Comply.



7.6 Plots/Data: Conducted Emissions (Line)



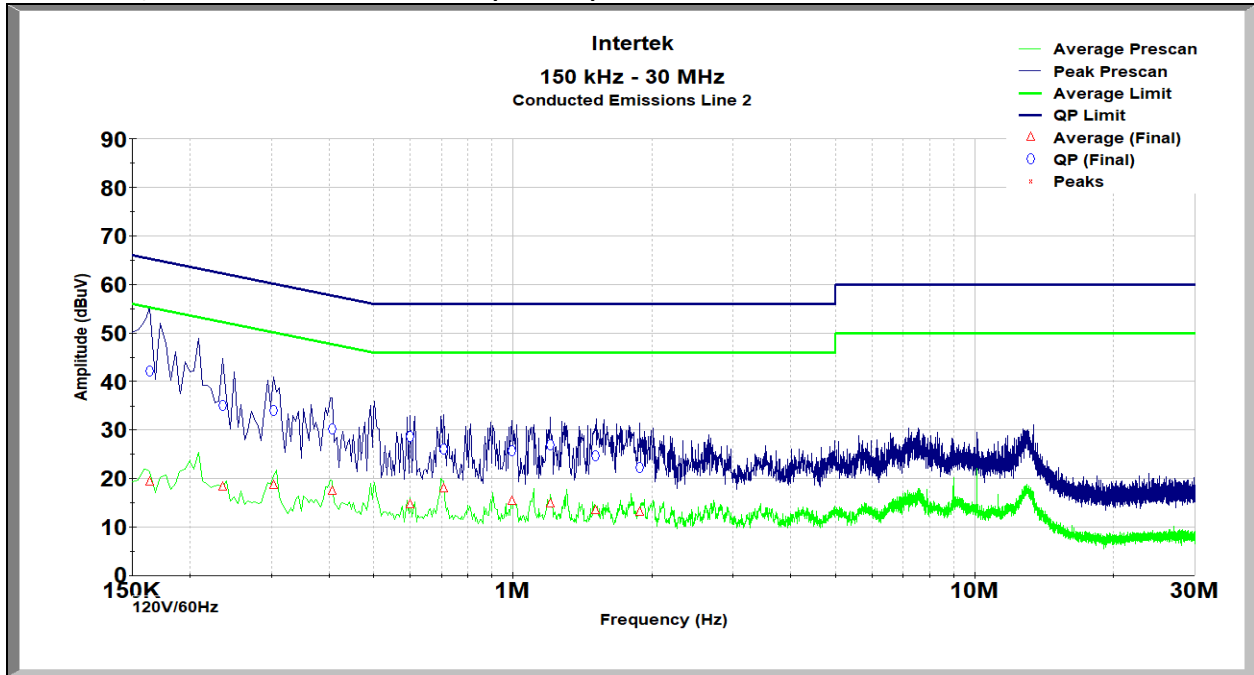
Frequency (MHz)	Quasi-Peak (dBuV)	Quasi-Peak Limit (dBuV)	Quasi-Peak Margin (dB)	Average (dBuV)	Average Limit (dBuV)	Average Margin (dB)
0.159	50.038	65.743	15.705	23.490	55.743	32.253
0.285	42.142	62.143	20.001	26.294	52.143	25.848
0.366	32.994	59.829	26.834	14.174	49.829	35.655
0.474	25.328	56.743	31.415	13.754	46.743	32.989
0.587	27.678	56.000	28.322	14.032	46.000	31.968
1.878	26.586	56.000	29.414	16.360	46.000	29.640
2.711	28.441	56.000	27.559	18.225	46.000	27.775
3.363	26.977	56.000	29.023	16.128	46.000	29.872
10.124	32.493	60.000	27.507	26.892	50.000	23.108
13.184	29.315	60.000	30.685	20.947	50.000	29.053

Test Personnel:	Bryan Taylor	Test Date:	11/27/2018
Supervising/Reviewing Engineer:	(Where Applicable)	Limit Applied:	Class B
Product Standard:	NA FCC Part 15B ICES-003 Issue 6	Ambient Temperature:	22.7°C
Input Voltage:	120VAC / 60Hz (Into AC Power Adapter)	Relative Humidity:	42.3%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	989.2mbar

Deviations, Additions, or Exclusions: None



7.7 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)
0.159	50.038	65.743	15.705	23.490	55.743	32.253
0.285	42.142	62.143	20.001	26.294	52.143	25.848
0.366	32.994	59.829	26.834	14.174	49.829	35.655
0.474	25.328	56.743	31.415	13.754	46.743	32.989
0.587	27.678	56.000	28.322	14.032	46.000	31.968
1.878	26.586	56.000	29.414	16.360	46.000	29.640
2.711	28.441	56.000	27.559	18.225	46.000	27.775
3.363	26.977	56.000	29.023	16.128	46.000	29.872
10.124	32.493	60.000	27.507	26.892	50.000	23.108
13.184	29.315	60.000	30.685	20.947	50.000	29.053

Test Personnel:	<u>Bryan Taylor</u>	Test Date:	<u>11/27/2018</u>
Supervising/Reviewing Engineer:	<u>NA</u>	Limit Applied:	<u>Class B</u>
(Where Applicable)	<u>FCC Part 15B</u>	Ambient Temperature:	<u>22.7°C</u>
Product Standard:	<u>ICES-003 Issue 6</u>	Relative Humidity:	<u>42.3%</u>
Input Voltage:	<u>120VAC / 60Hz (Into AC Power Adapter)</u>	Atmospheric Pressure:	<u>989.2mbar</u>
Pretest Verification w / Ambient Signals or BB Source:	<u>Yes</u>		

Deviations, Additions, or Exclusions: None



8 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	2/1/2019	103714598LEX-006	BCT	BD	Original Issue