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# Digital Matter Inc. TEST REPORT

## SCOPE OF WORK

EMC TESTING – BARRA-EDGE-4G

## REPORT NUMBER

105586385LEX-001

## ISSUE DATE

10/23/2023

## PAGES

17

## DOCUMENT CONTROL NUMBER

Non-Specific EMC Report Shell Rev. December 2017  
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## EMC TEST REPORT (FULL COMPLIANCE)

**Report Number:** 105586385LEX-001

**Project Number:** G105586385

**Report Issue Date:** 10/23/2023

**Model(s) Tested:** Barra-Edge-4G

**Standards:** FCC Part 15B  
ICES-003 Issue 7

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

Client:  
Digital Matter Inc.  
239 Grant Street SE, Suite 101  
Atlanta, GA 30312  
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Report prepared by



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Report reviewed by



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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 (Unintentional Radiators) (ANSI C63.4:2014)	Pass



### 3 Client Information

This product was tested at the request of the following:

Client Information	
<b>Client Name:</b>	Digital Matter Inc.
<b>Address:</b>	239 Grant Street SE, Suite 101 Atlanta, GA 30312 USA
<b>Contact:</b>	Craig Russell
<b>Telephone:</b>	071-363-4010
<b>Email:</b>	craig@digitalmatter.com
Manufacturer Information	
<b>Manufacturer Name:</b>	Digital Matter Inc.
<b>Manufacturer Address:</b>	239 Grant Street SE, Suite 101 Atlanta, GA 30312 USA



#### 4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	Barra-Edge-4G
Model Number	Barra-Edge-4G
Serial Number	358447170997051
Receive Date	9/18/2023
Test Start Date	9/20/2023
Test End Date	9/20/2023
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	3.3VDC (Battery)
Low Voltage	3.0VDC (Battery)
High Voltage	3.6VDC (Battery)
Description of Equipment Under Test (provided by client)	
Lowest-cost battery-powered indoor/outdoor asset tracker for LTE-M/NB-IoT networks	

##### 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	Battery Power: ON

### 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.

**TEST SITE:** 10m ALSE

**Site Designation:** 10m Chamber

#### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	U <sub>cispr</sub>
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 $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ 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 $\mu$ 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 $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
AF = 7.4 dB/m  
CF = 1.6 dB  
AG = 29.0 dB  
FS = 32 dB $\mu$ V/m

To convert from dB $\mu$ V to  $\mu$ 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 $\mu$ 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 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	8285	Rohde&Schwarz	ESW44	9/19/2023	9/19/2024
Bilog Antenna	7085	SunAR	JB6	3/7/2023	3/7/2024
Horn Antenna	4001	ETS Lindgren	3117	2/28/2023	2/28/2024
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
Preamplifier	3918	TS-PR18	122005	1/12/2023	1/12/2024
Coaxial Cable	3074			1/12/2023	1/12/2024
Coaxial Cable	2588			1/12/2023	1/12/2024
Coaxial Cable	2593			1/12/2023	1/12/2024
Coaxial Cable	2592			1/12/2023	1/12/2024
Coaxial Cable	8188			1/12/2023	1/12/2024
Coaxial Cable	8185			1/12/2023	1/12/2024

### 6.4 Software Utilized:

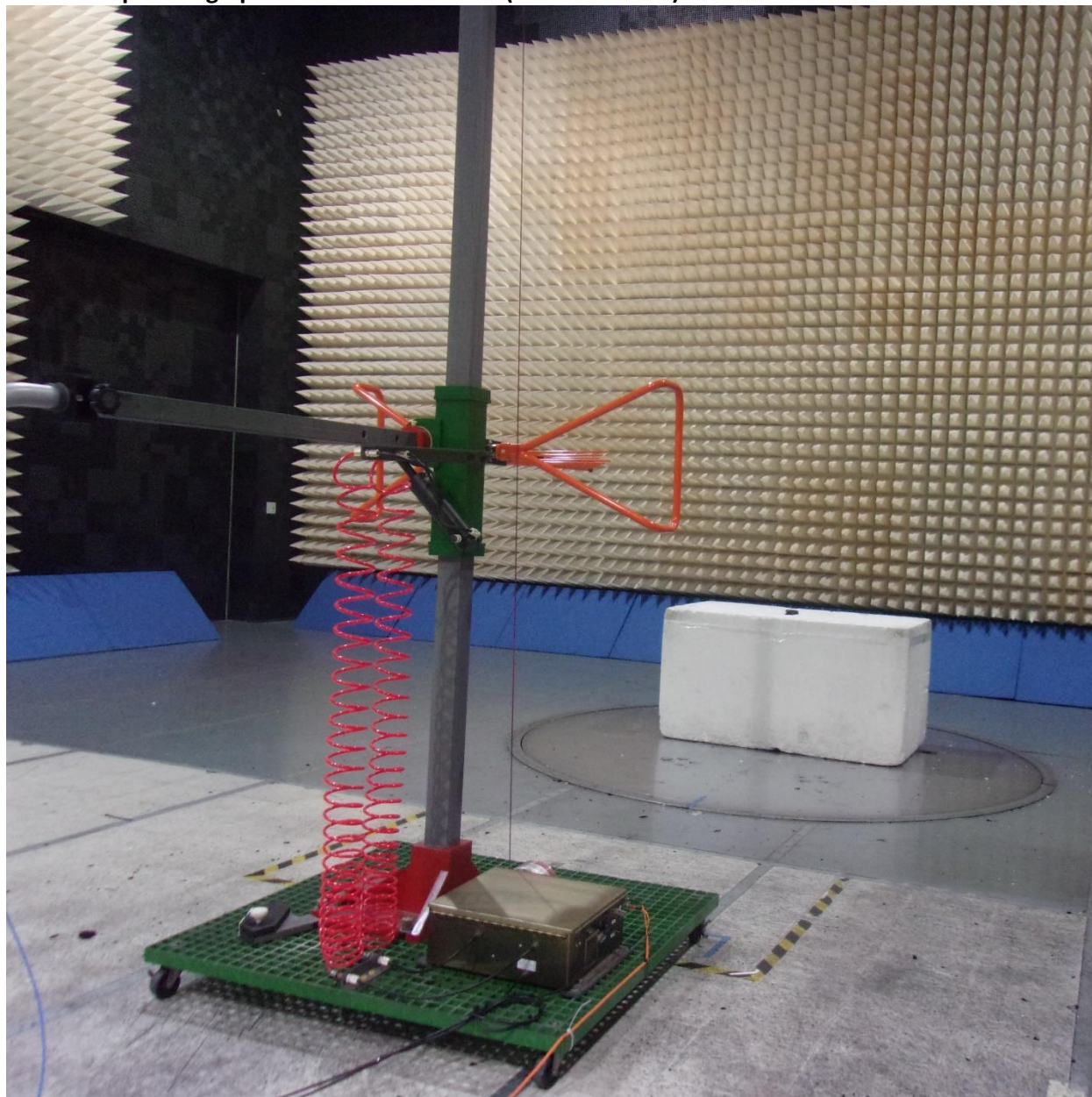
Name	Manufacturer	Version
EMC32	Rohde & Schwarz	Version 10.60.20

### 6.5 Results:

The sample tested was found to Comply.

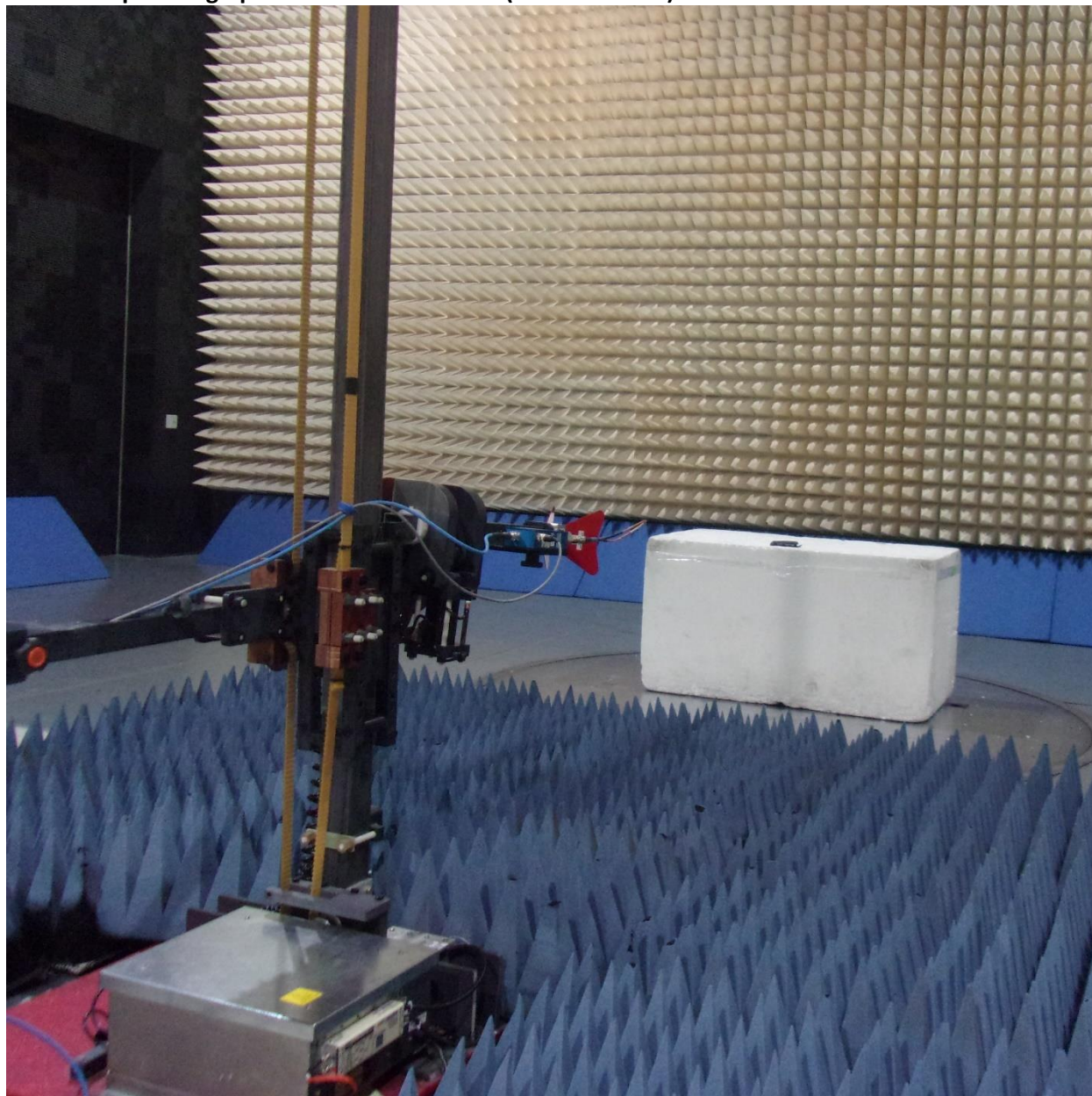


## 6.6 Setup Photographs: Radiated Emissions (30MHz – 1GHz)



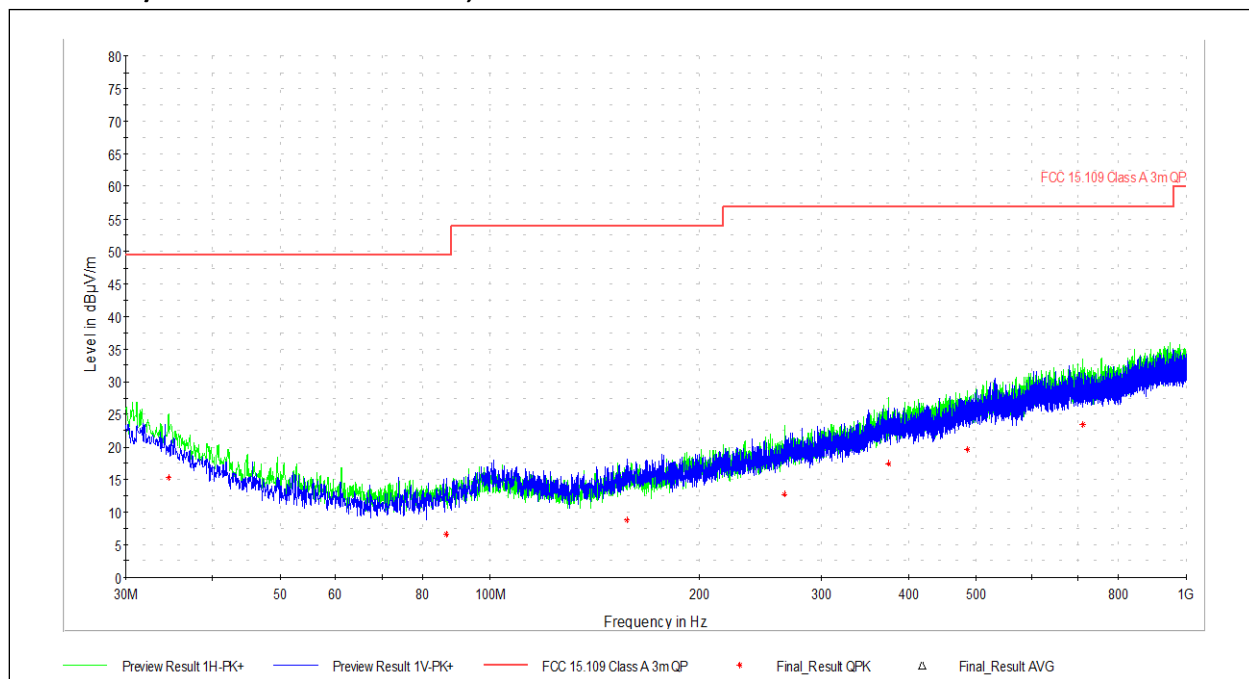


## 6.7 Setup Photographs: Radiated Emissions (1GHz – 18GHz)





## 6.8 Plots/Data: Radiated Emissions, 30MHz – 1GHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.581	15.32	49.54	34.22	231.0	H	199.0	22.2
86.583	6.60	49.54	42.94	320.0	V	150.0	13.8
157.232	8.77	53.98	45.21	176.0	V	131.0	17.1
265.279	12.69	56.90	44.21	278.0	H	130.0	20.5
373.973	17.43	56.90	39.47	259.0	H	47.0	24.1
485.199	19.58	56.90	37.32	95.0	H	0.0	26.8
710.078	23.44	56.90	33.46	246.0	H	0.0	30.9

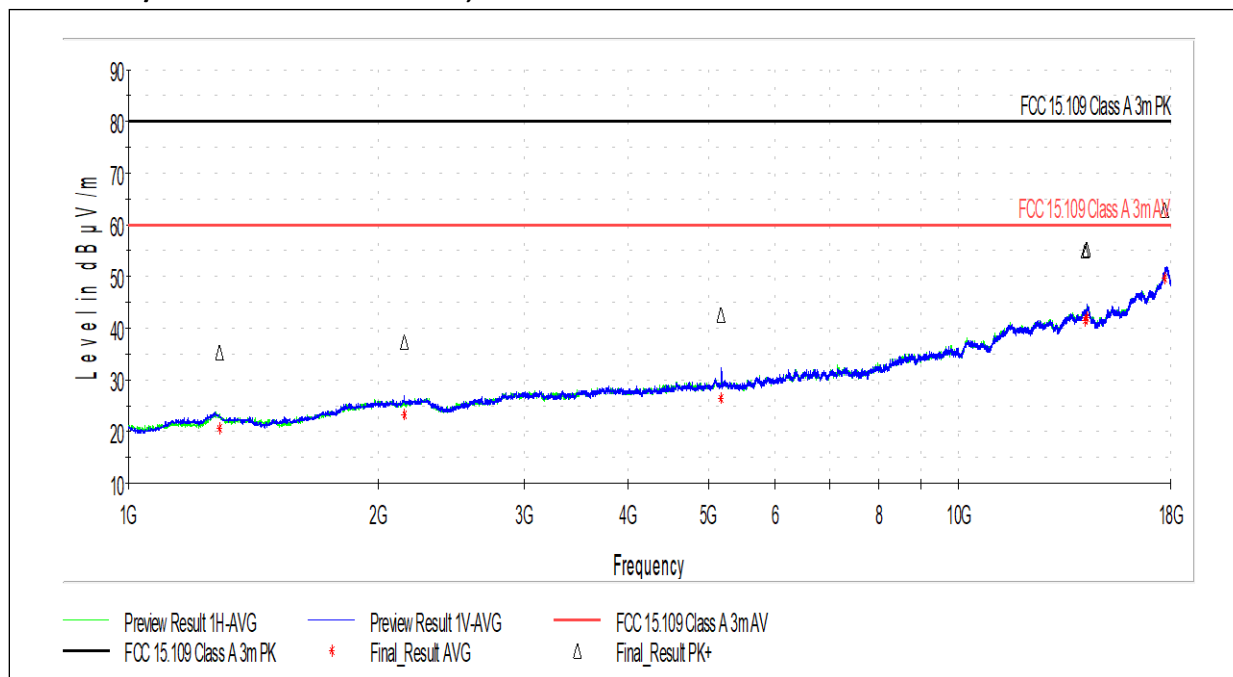
Test Personnel: Jeremiah Andrade  
Supervising/Reviewing Engineer: Michael Carlson  
(Where Applicable) FCC Part 15B  
Product Standard: ICES-003 Issue 7  
Input Voltage: 3.3V  
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 9/20/2023  
Limit Applied: Class A  
Ambient Temperature: 22.9°C  
Relative Humidity: 48.5 %  
Atmospheric Pressure: 982.1 mbar

Deviations, Additions, or Exclusions: The FCC Part 15.109 limits are more stringent than the corresponding limits from ICES-003 Issue 7.



## 6.9 Plots/Data: Radiated Emissions, 1GHz – 18GHz



Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1287.500	35.19	80.00	44.81	109.0	H	0.0	0.8
2151.000	37.35	80.00	42.65	216.0	V	0.0	4.5
5174.500	42.59	80.00	37.41	109.0	V	254.0	10.7
14178.500	54.91	80.00	25.09	239.0	H	34.0	23.4
14256.500	55.38	80.00	24.62	109.0	V	58.0	23.8
17708.500	63.08	80.00	16.92	151.0	H	300.0	34.4

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1287.500	20.63	60.00	39.37	109.0	H	0.0	0.8
2151.000	23.27	60.00	36.73	216.0	V	0.0	4.5
5174.500	26.53	60.00	33.47	109.0	V	254.0	10.7
14178.500	41.57	60.00	18.43	239.0	H	34.0	23.4
14256.500	42.12	60.00	17.88	109.0	V	58.0	23.8
17708.500	49.76	60.00	10.24	151.0	H	300.0	34.4

Test Personnel: Jeremiah Andrade  
Supervising/Reviewing Engineer: Michael Carlson  
(Where Applicable) FCC Part 15B  
Product Standard: ICES-003 Issue 7  
Input Voltage: 3.3V  
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 9/20/2023  
Limit Applied: Class A  
Ambient Temperature: 22.9°C  
Relative Humidity: 48.5 %  
Atmospheric Pressure: 982.1 mbar

Deviations, Additions, or Exclusions: None



## 7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	10/23/2023	105586385LEX-001	JJA	MC	Original Issue