

## FCC 15B and ICES-003 Test Class B Report

**Report No.:** EMC\_SL19093002-DME-004\_FCC\_ICES

**Test Model:** MUS\_DIGITAL\_1901#YABBY

**Received Date:** 10/11/2019

**Test Date:** 10/15/2019

**Issued Date:** 10/21/2019

**Applicant:** Digital Matter Embedded

**Address:** Suite 6, 100 Railway Road, Subiaco, 6008, Western Australia

**Manufacturer:** Digital Matter Embedded

**Address:** Unit 7, Pinetree Business Park, 63 Brahman Crescent, Westfield, Edenvale, 1610, South Africa

**Issued By:** Bureau Veritas Consumer Products Services, Inc.

**Test Lab Address:** 775 Montague Expressway, Milpitas, CA 95035, USA

**FCC/ IC Test  
Site Number:** 540430/4842D



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### Release Control Record

Issue No.	Description	Date Issued
EMC_SL19093002-DME-004_FCC_ICES	Original FCC / ICES Report	10/21/2019

## 1 Certificate of Conformity

**Product:** Yabby

**Brand:** Digital Matter Embedded

**Test Model:** MUS\_DIGITAL\_1901#YABBY


**Sample Status:** Test Sample

**Applicant:** Digital Matter Embedded

**Test Date:** 10/15/2019

**Standards:** 47 CFR FCC Part 15, Subpart B, Class B  
ICES-003:2016 Issue 6, Class B  
ANSI C63.4:2014

The above equipment has been tested by Bureau Veritas Consumer Products Services, Inc. Milpitas Branch, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**  , **Date:** 10/21/2019  
John Plotner / EMC Test Engineer

**Approved by :**  , **Date:** 10/21/2019  
George Hsu/ Reviewer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2016 Issue 6, Class B

ANSI C63.4:2014

FCC Clause	ICES-003 Clause	Test Item	Result/Remarks	Verdict
15.107	6.1	AC Power Line Conducted Emissions	The EUT does not have an AC port	Not Applicable
15.109	6.2.1	Radiated Emissions up to 1 GHz	Minimum passing Class B margin is -8.17 dB at 30.014 MHz	Pass
	6.2.2	Radiated Emissions above 1 GHz	Minimum passing Class B margin is -17.19 dB at 9954.35 MHz	Pass

Note:

There is no deviation to the applied test methods and requirements covered by the scope of this report.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.638 dB
Radiated Emissions above 1 GHz	Above 1GHz	4.580dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 Description of EUT

Product	Yabby
Brand	Digital Matter Embedded
Test Model	MUS_DIGITAL_1901#YABBY
Identification No. of EUT	Serial Number 181121
Regulatory Type	ITE
Sample Status	Test Sample
Operating Software	Automated Test Firmware
Power Rating	3 x AA Batteries - 6V Max

#### 3.2 Operating Modes of EUT and Determination of Worst Case Operating Mode

EUT has been pre-tested under following test modes, and test mode 1 was the worst case for final test.

Test Condition
Standard Operating Set Up

Test modes are presented in the report as below.

Test Condition
Radiated emission test
Standard Operating Set Up

#### 3.3 Test Program Used and Operational Description

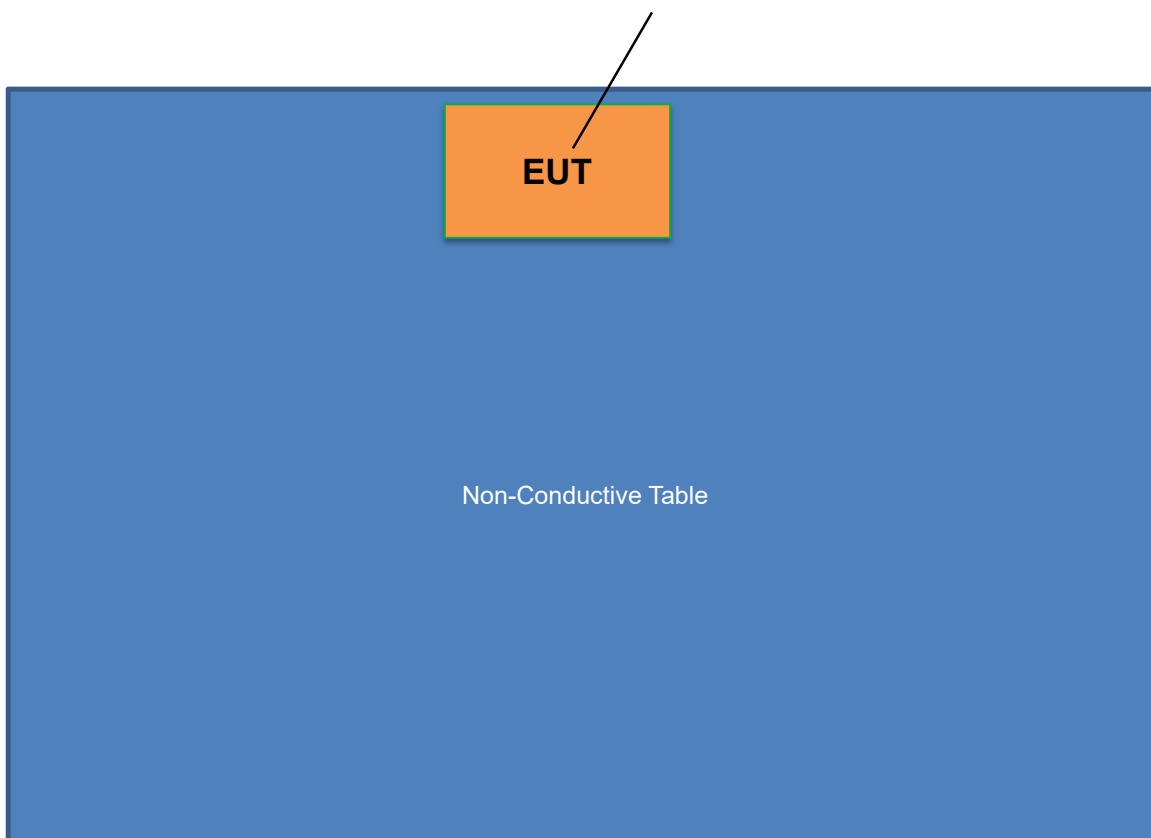
Automated Test – This test program is representative of actual user data

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 2.4GHz.

#### 4 Configuration and Connections with EUT

##### 4.1 Connection Diagram of EUT and Peripheral Devices

Internal Battery DC Power Source



#### 4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
EUT does not use any peripheral devices						

ID	Description	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
EUT does not use any peripheral devices						



## 5 Radiated Emissions up to 1 GHz

### 5.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dB $\mu$ V/m)		
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B
30-88	39	29.5
88-216	43.5	33
216-230	46.4	35.5
230-960		
960-1000	49.5	43.5

Radiated Emissions Limits at 3 meters (dB $\mu$ V/m)		
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B
30-88	49.6	40
88-216	54	43.5
216-230	56.9	46
230-960		
960-1000	60	54

- Notes:
1. The lower limit shall apply at the transition frequencies.
  2. Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m).
  3. QP detector shall be applied if not specified.

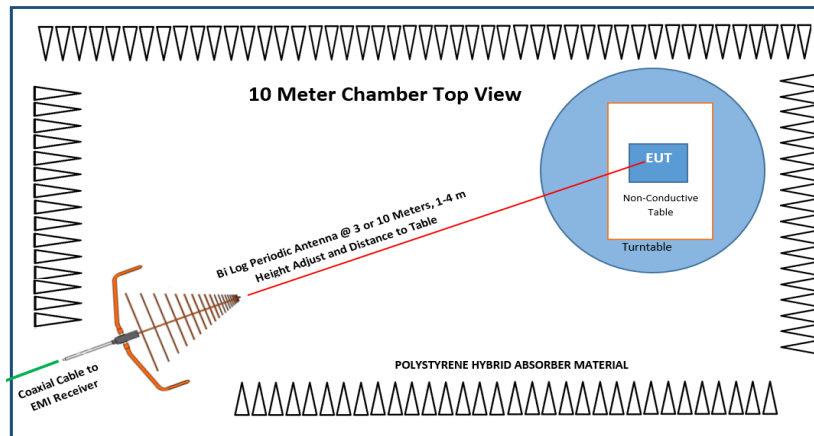
## 5.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
50GHz Spectrum Analyzer Keysight	N9030B (PXA)	MY57140597	6/5/2019	6/5/2020
Biconilog Antenna Sunol	JB1	A030702	3/9/2018	3/9/2020
Pre-Amplifier RF Bay, Inc.	LPA-6-30	11170601	4/27/2019	4/27/2020

### 5.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set {re upto 1ghz 3/10 meters} away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.



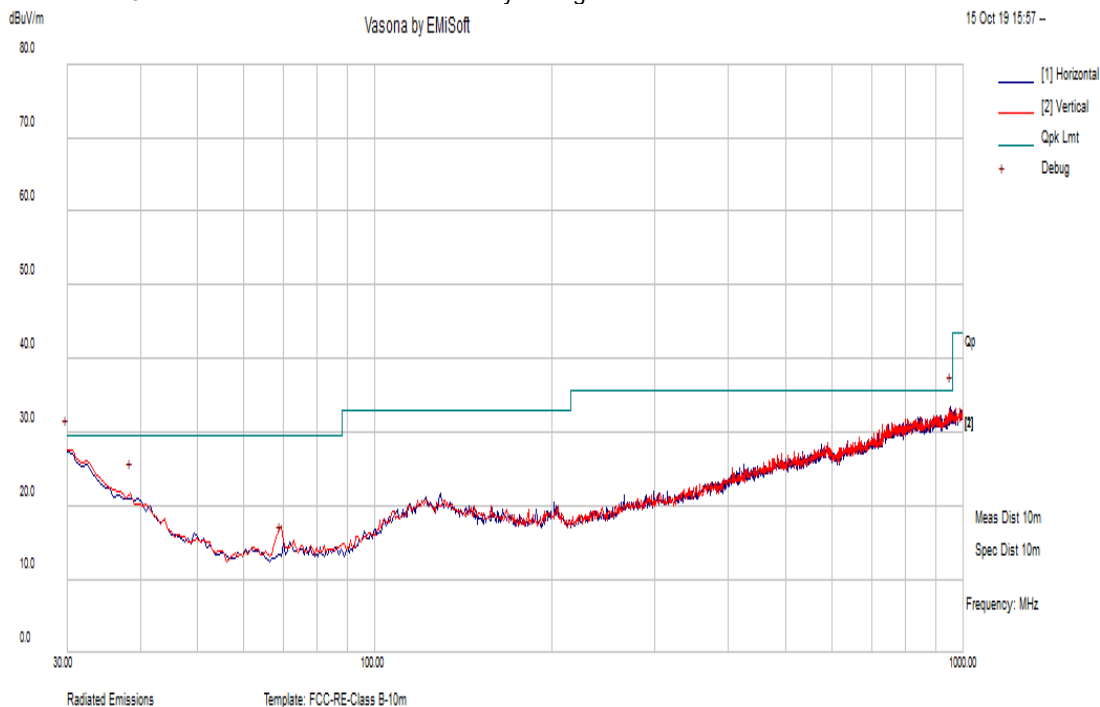
### 5.4 Test Results

Frequency Range	30-1000 MHz		
Input Power	16V Max and Battery Power	Environmental Conditions	22 °C, 38% RH
Tested by	John Plotner	Test Date	10/15/2019
Test Mode	Standard Operating State Simulation		

Antenna Polarity & Test Distance: Vertical and Horizontal at 10m											
Frequency (MHz)	Reading Level (dBuV)	Cable Loss (dB)	AF (dB/m)	Emission Level (dBuV/m)	Measurement Type	Polarization (H/V)	Height (cm)	Azimuth (Degrees)	Limit (dBuV/m)	Margin (dB)	Pass/Fail
30.014963	23.49	11.12	-13.28	21.33	Quasi Max	V	228	327	29.5	-8.17	Pass
954.325938	22.82	16.06	-13.06	25.82	Quasi Max	H	190	169	35.5	-9.68	Pass
38.4875	30.62	11.27	-20.17	21.72	Quasi Max	V	250	0	29.5	-7.78	Pass
205.315	30.35	12.67	-24.57	18.45	Quasi Max	H	99	114	33	-14.55	Pass
266.142	31.76	13.06	-24.04	20.78	Quasi Max	H	99	114	35.5	-14.72	Pass
69.359	29.92	11.57	-28.35	13.14	Quasi Max	H	99	114	29.5	-16.36	Pass

**Remarks:**

1. Reading level(dBuV/m) = Raw Value(dBuV) – Pre-Amplifier Factor (dB).
2. Correction Factor(dB/m) = Antenna Factor(AF) (dB/m) + Cable Loss (dB)
3. Emission Level(dBuV/m) = Reading level + Correction Factor
4. Margin value = Emission level – Limit value.
5. The other emission levels were very low against the limit.



## 6 Radiated Emissions above 1 GHz

### 6.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 3 meters (dB $\mu$ V/m)		
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B
1000-3000	Avg: 60	Avg: 54
Above 3000	Peak: 80	Peak: 74

- Notes:
1. The lower limit shall apply at the transition frequencies.
  2. Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m).
  3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Frequency Range (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

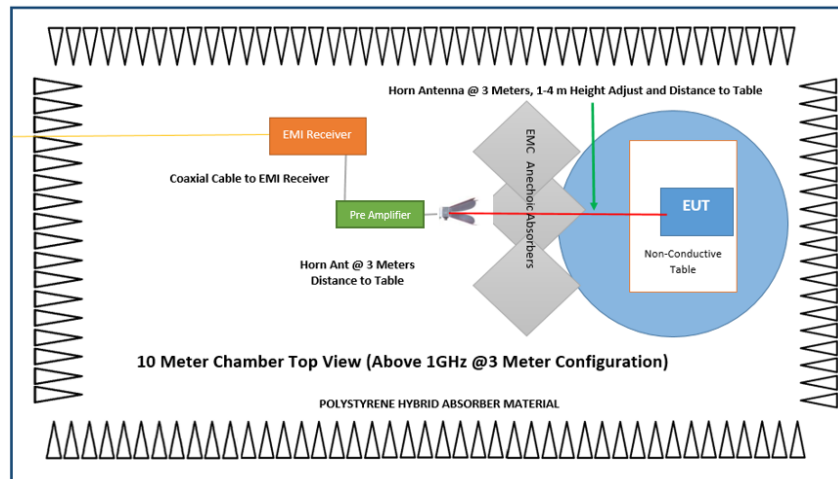
## 6.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
50GHz Spectrum Analyzer Keysight	N9030B (PXA)	MY57140597	6/5/2019	6/5/2020
Horn Antenna ETS-Lindgren	3117	218554	11/22/2017	11/22/2019
Pre-Amplifier RF-Lambda	RAMP00M50GA	17032300048	6/18/2019	6/18/2020

### 6.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The spectrum analyzer system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.



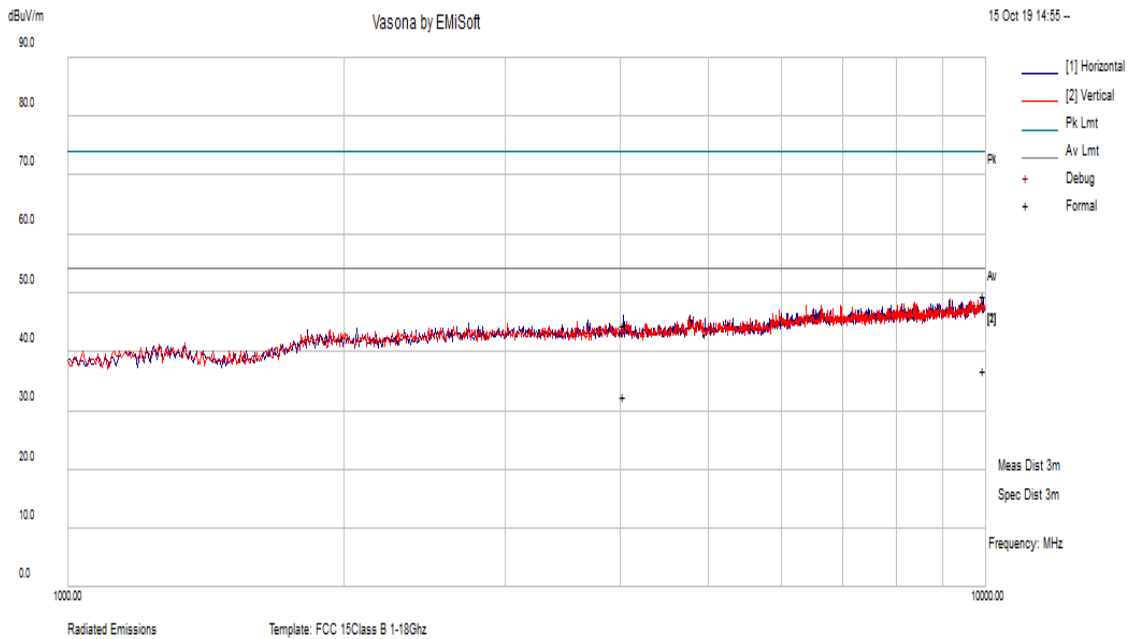
## 6.4 Test Results

Frequency Range	1000 - 18000 MHz		
Input Power	16V Max and Battery Power	Environmental Conditions	22 °C, 38% RH
Tested by	John Plotner	Test Date	10/15/2019
Test Mode	Standard Operating State Simulation		

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m												
Frequency (MHz)	Reading Level (dBuV)	Cable Loss (dB)	AF (dB/m)	Emission Level (dBuV/m)	Measurement Type	Polarization (H/V)	Height (cm)	Azimuth (Degrees)	Limit (dBuV/m)	Margin (dB)	Pass/Fail	
9954.3575	46.61	7.52	-4.58	49.55	Peak Max	H	199	333	74	-24.45	Pass	
4037.1115	52.02	4.68	-11.99	44.71	Peak Max	V	166	251	74	-29.29	Pass	
9954.3575	33.87	7.52	-4.58	36.81	Average Max	H	199	333	54	-17.19	Pass	
4037.1115	39.98	4.68	-11.99	32.67	Average Max	V	166	251	54	-21.33	Pass	

### Remarks:

1. Reading level(dBuV/m) = Raw Value(dBuV) – Pre-Amplifier Factor (dB).
2. Correction Factor(dB/m) = Antenna Factor(AF) (dB/m) + Cable Loss (dB)
3. Emission Level(dBuV/m) = Reading level + Correction Factor
4. Margin value = Emission level – Limit value.
5. The other emission levels were very low against the limit.





## 7 Pictures of Test Arrangements

### 7.1 EUT Photos

EUT Front

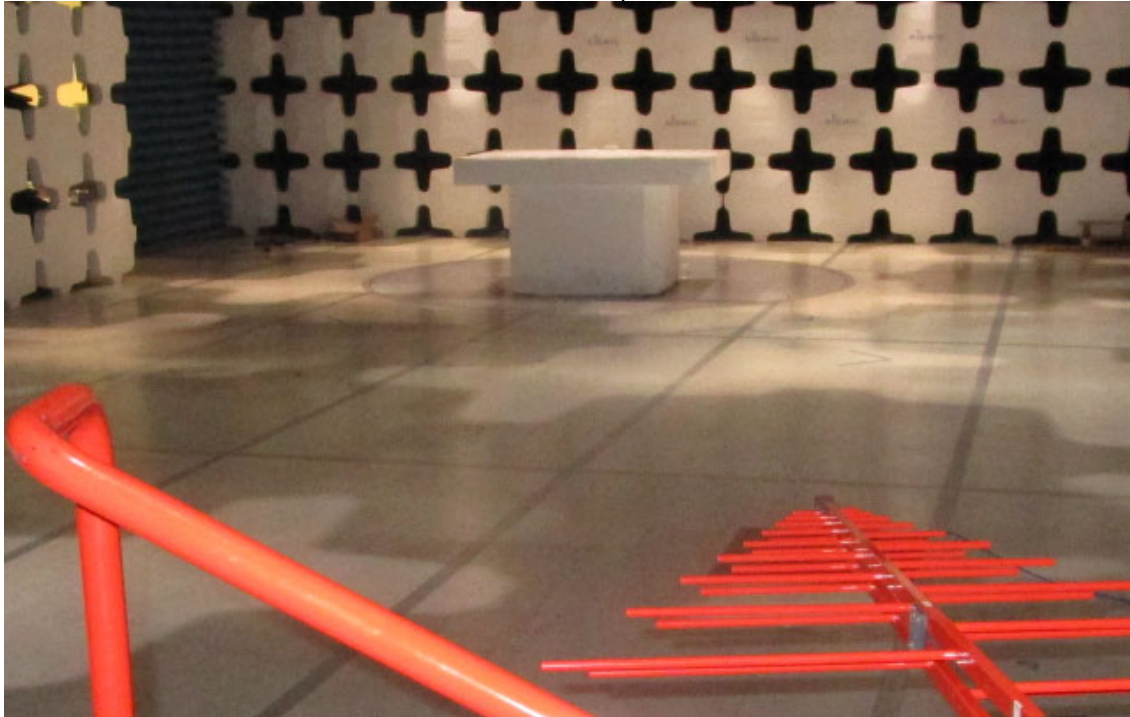


EUT Rear

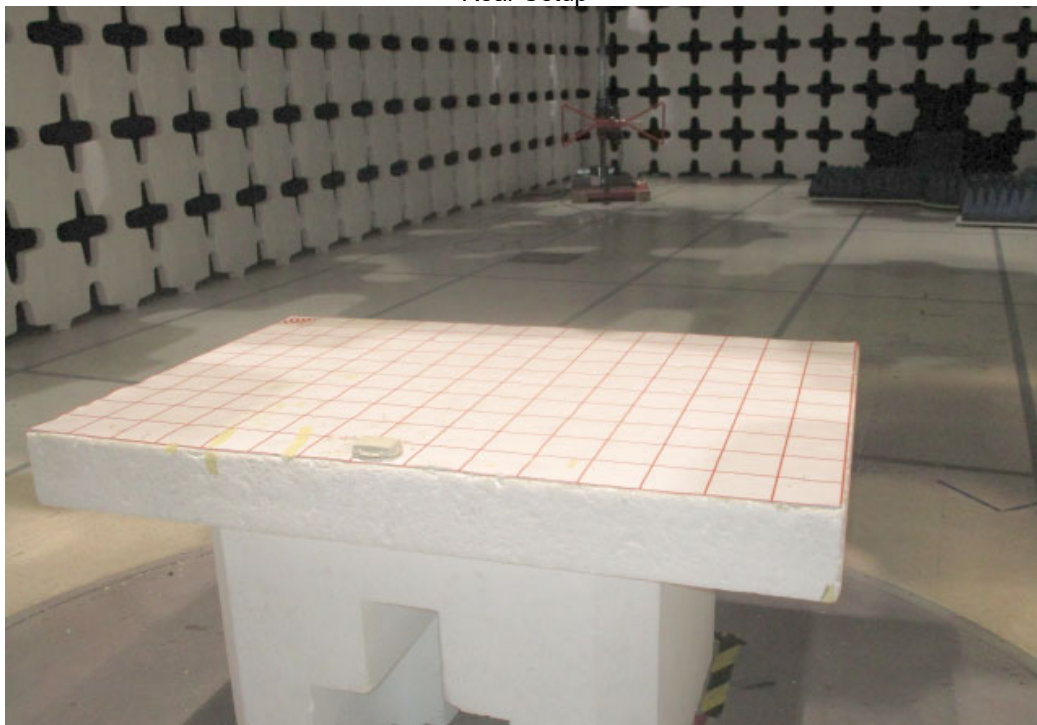


## 7.2 Radiated Emissions up to 1 GHz

Front Setup



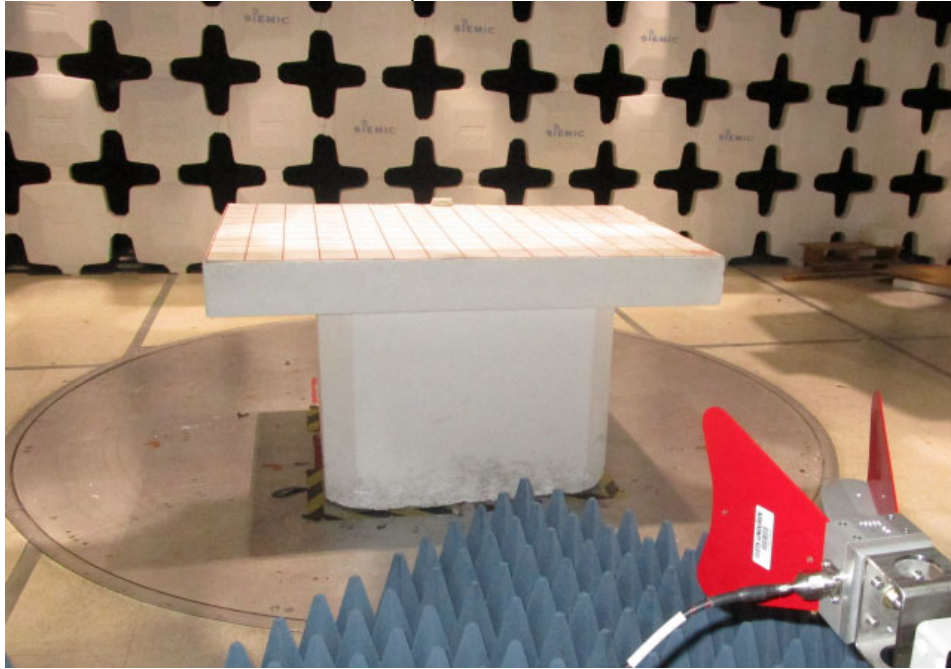
Rear Setup



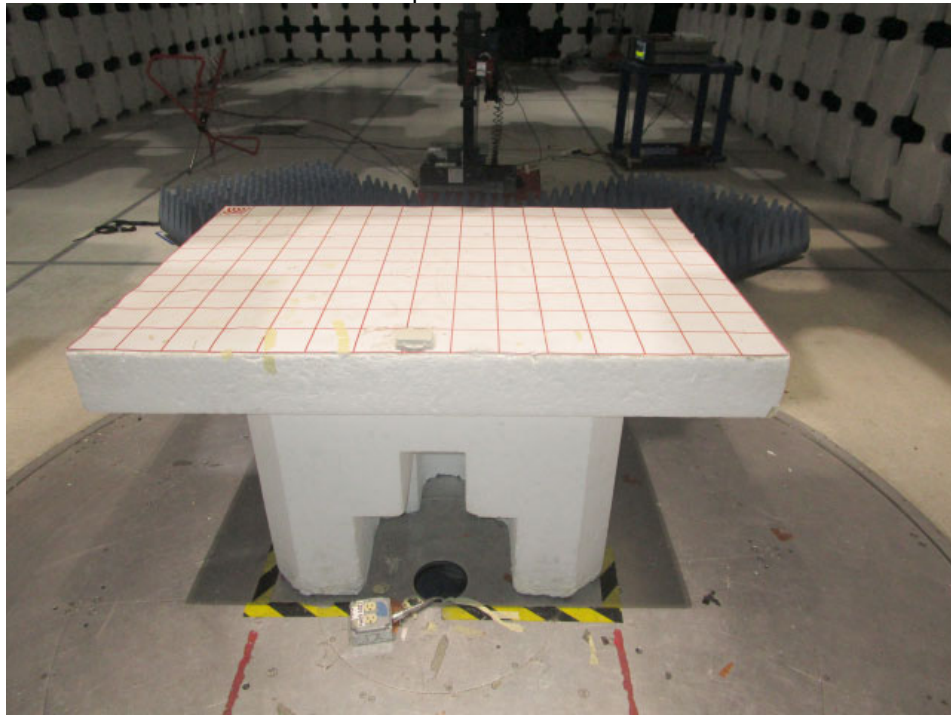


### 7.3 Radiated Emissions above 1 GHz

Setup 1-18 GHz Front



Setup 1-18 GHz Rear



## Appendix – Information of the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

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--- End of Test Report ---