FCC ID:2AW9D-HUB

FCC Verification Test Report

Client Information:

Applicant: Skylo Technologies

Applicant add.: 268, Lambert Avenue, Palo Alto, CA, 94306, USA

Manufacturer: VVDN Technologies Pvt. Ltd.

Manufacturer add.: D-22, Infocity-II, Sector 33, Gurgaon-122001, Haryana, India

Product Information:

Product Name: IoT Hub

Model No.: S-111 Mk I

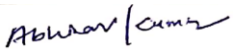
Derivative Model No.: S-101 Mk I

Brand Name: Skylo Technologies

Applied Standard:

FCC Part15-B:2014

Prepared By:



Abhinav Kumar

Laboratory Details:

AA Electro Magnetic Test Laboratory Private Limited

PlotNo174, Udyog Vihar-Phase4, Sector18, Gurgaon, Haryana, India

Date of Receipt: May 11, 2020

Date of Test: May 15, 2020

Date of Issue: Jul. 06, 2020

Test Result: **In Compliance/Pass**

This device has been tested and found to comply with the stated standard(s), which is(are) required by the council directive of 2014/53/EU and indicated in the test report and are applicable only to the tested sample identified in the report.

Note: This report shall not be reproduced except in full, without the written approval of AA Electro Magnetic Test Laboratory Private Limited, this document may be altered or revised by AA Electro Magnetic Test Laboratory Private Limited, personal only, and shall be noted in the revision of the document. This test report must not be used by the client to claim product endorsement.

Reviewed by: 

(Dr R Lenin Raja) (Authorized Representative) (/ lenin83/)

Approved by: 

(Steven Wu)

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1 Contents

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2 Test Summary

Test	Test Requirement	Test Method	Criterion	Result
Conducted Emission 150kHz to 30MHz	FCC Part15-B:2014, CISPR 32:2015+AMD1:2019 CSV	Clause 7 of CISPR 16-2-1	Limits	**PASS**
Radiated Emissions 30MHz to 1GHz	FCC Part15-B:2014, CISPR 32:2015+AMD1:2019 CSV	Clause 7.3 of CISPR 16-2-3	Limits	**PASS**

N/A is an abbreviation for Not Applicable.

Model description:
ANSI C63.4 : the detail version is ANSI C63.4 :2014 in the whole report.

Product documentation

The specification used by the manufacturer to define the performance criteria for the testing required by this standard shall be made available to the user upon request.

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2.1 Measurement Uncertainty

The report uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty Multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately 95%.

No.	Item	Frequency Range	U , Value
1	Power Line Conducted Emission	150KHz~30MHz	2.77 dB
2	Disturbance Power Emission	30MHz~300MHz	2.96 dB
3	Radiated Emission Test	30MHz~1GHz	2.77 dB
4	Radiated Emission Test	1GHz~18GHz	2.80 dB

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3 Test Facility

AA Electro Magnetic Test Laboratory is an ISO 17025:2017 certified lab by NABL, Certification No.TC-8597, CE Marking Certificate from Phoenix Germany #800058_00 and lLC-MRA #0366.
We are also accredited ISO17025:2017 by A2LA(American association for laboratory accreditation) #5593.0I ,
FCC Recognized #0029402088, ISED recognized for wireless product #26046, VCCI(Japan) supporting member #4053.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

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4 General Information

4.1 General Description of EUT

Manufacturer:	VVDN Technologies Pvt. Ltd.
Manufacturer Address:	D-22, Infocity-II, Sector 33, Gurgaon-122001, Haryana, India
EUT Name:	IoT Hub
Model No:	S-111 Mk I
Serial Model:	S-101 Mk I
Serial Number:	N/A
Brand Name:	Skylo Technologies
H/W No.:	901-1-00624 (Rev B1)
S/W No.:	1.4.1
Power Supply Range:	Input : 9-36VDC, 2.5A **Adapter:** Input: 100-240VAC, 50/60Hz Output: 24VDC
Battery:	3.7V / 12000mAh

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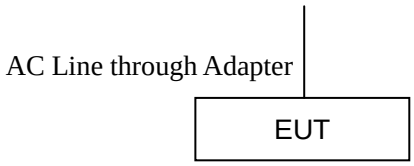
4.2 EUT Test Mode

Mode 1	The EUT in full transmission mode.

4.3 Description of Test setup

EUT was tested in normal configuration (Please See following Block diagrams)

1. Block diagram of EUT configuration
Config 1:



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4.3 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

4.4 EUT Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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5 Equipments List for All Test Items

☒ Radiation Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI TEST Receiver	Rohde and schwarz	ESIB26	838786/010	2020/01/28	2021/01/27
2	Loop antenna	DA ZE Beijing	ZN30900C	18052	2020/01/29	2021/01/28
3	Horn antenna	DA ZE Beijing	ZN30701	18012	2020/01/30	2021/01/29
4	Horn antenna	DA ZE Beijing	ZN30702	18006	2020/01/30	2021/01/29
5	Horn antenna	DA ZE Beijing	ZN30703	18005	2020/01/30	2021/01/29
6	Pre Amplifier	KELIANDA	LNA-0009295	-	2020/01/28	2021/01/27
7	Pre Amplifier	KELIANDA	CF-00218	-	2020/01/28	2021/01/27
8	Bi conical Antenna	DA ZE Beijing	ZN30505C	17038	2020/01/29	2021/01/30

☒ Conduction Test equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI-RECEIVER	Schwarzbeck	FCKL	1528194	2020/01/28	2021/01/27
2	Spectrum Analyzer	ADVANTEST	R3361	-	2019/05/15	2021/05/14
4	LISN	Kyoritsu	KNW-407	8-1789-5	2020/01/28	2021/01/27
5	Network – LISN	Schwarzbeck	NNBM8125	81251314	2020/01/28	2021/01/27
6	Network – LISN	Schwarzbeck	NNBM8125	81251315	2020/01/28	2021/01/27
7	ISN	Schwarzbeck	ISN T8 CAT5	CATS-8158#225	2020/01/28	2021/01/27
8	ISN	Schwarzbeck	ISN T8 CAT6	NTFM8158#184	2020/01/28	2021-01-27
9	ISN	Schwarzbeck	ISN T8 CAT3	CAT3-8158#120	2020/01/28	2021/01/27
10	PULSE LIMITER	Rohde and schwarz	ESH3-Z2	100681	2019/05/13	2021/05/12
11	50Ω Coaxial Switch	DAIWA	1565157	-	2019/05/13	2021/05/12
12	50Ω Coaxial Switch	-	-	-	2019/05/13	2021/05/12

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6 Emission Test Results

6.1 Mains Terminals Disturbance Voltage Measurement

Limits for AC mains Port :

Frequency (MHz)	☒ Class A (dBµV)		☐ Class B (dBµV)	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.50	79	66	66 to 56	56 to 46
0.50 ~ 5.0	73	60	56	46
5.0 ~ 30	73	60	60	50

Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximized peak within 6dB of Average Limit

6.1.1 E.U.T. Operation

Temperature:	24°C	Humidity:	52% RH	Atmospheric Pressure:	101	Kpa
Test Mode:	Mode 1					

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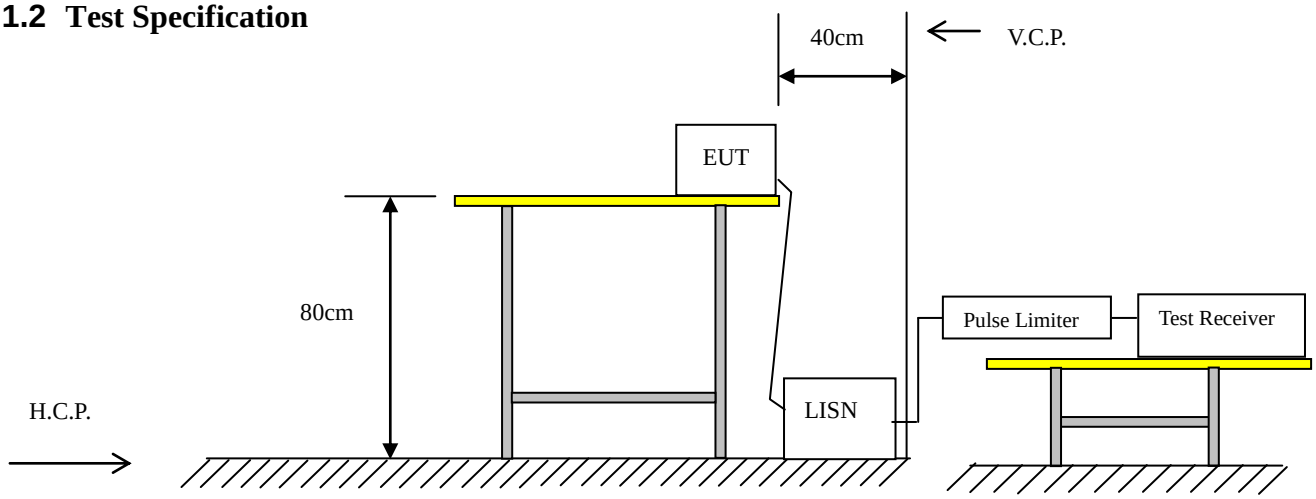
6.1.2 Test Specification



EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

6.1.3 Measurement Data

An initial pre-scan was performed on the live and neutral lines.

Quasi-peak or average measurements were performed at the frequency which maximum peak emissions were detected.

Please refer to the attached quasi-peak & average measurement data for reference.

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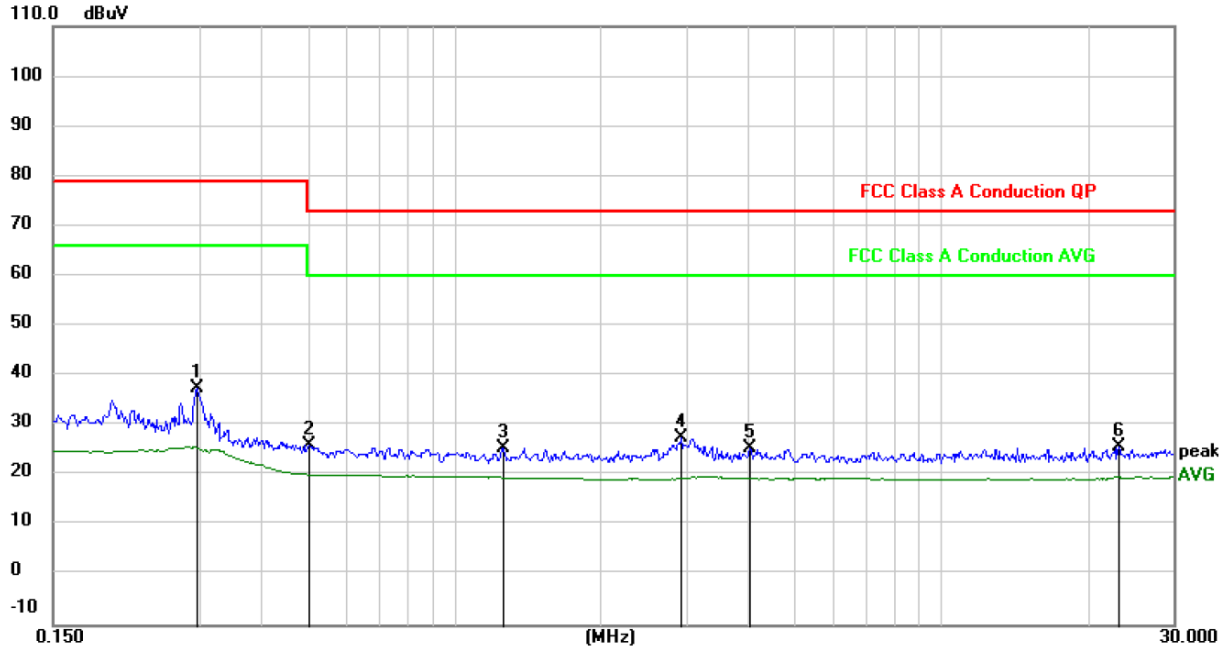
Mode:	Mode 1	Test Date :	2020-05-15
Test Voltage:	AC 120V,60Hz	Phase :	Ambient



Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.2941	21.41	16.25	37.66	79.00	-41.34	peak
2		0.5044	10.01	16.12	26.13	73.00	-46.87	peak
3		1.2559	9.81	15.87	25.68	73.00	-47.32	peak
4		2.9210	11.93	15.84	27.77	73.00	-45.23	peak
5		4.0280	9.77	15.88	25.65	73.00	-47.35	peak
6		23.0249	9.89	15.88	25.77	73.00	-47.23	peak

*Maximum Data

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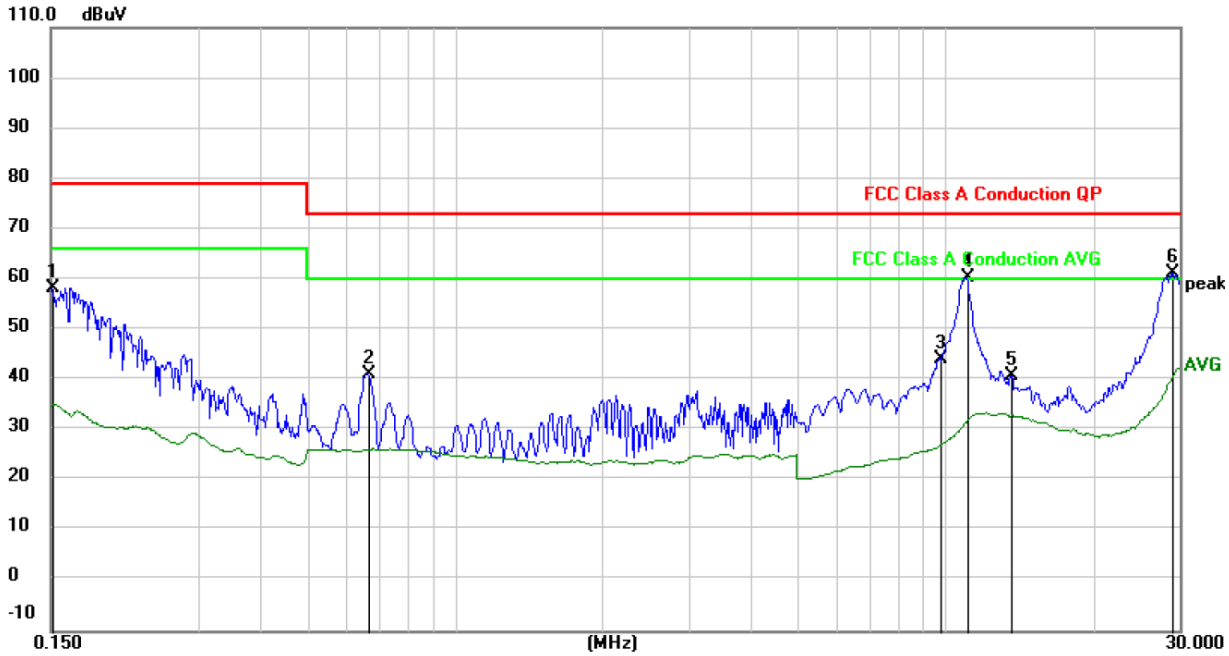
Mode:	Mode 1	Test Date :	2020-05-15
Test Voltage:	AC 120V,60Hz	Phase :	Line



Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1510	42.10	16.28	58.38	79.00	-20.62	peak
2		0.6664	25.06	16.05	41.11	73.00	-31.89	peak
3		9.7250	28.35	15.85	44.20	73.00	-28.80	peak
4		11.0250	44.64	15.85	60.49	73.00	-12.51	peak
5		13.5750	24.92	15.85	40.77	73.00	-32.23	peak
6	*	28.9249	45.27	16.03	61.30	73.00	-11.70	peak

*Maximum Data

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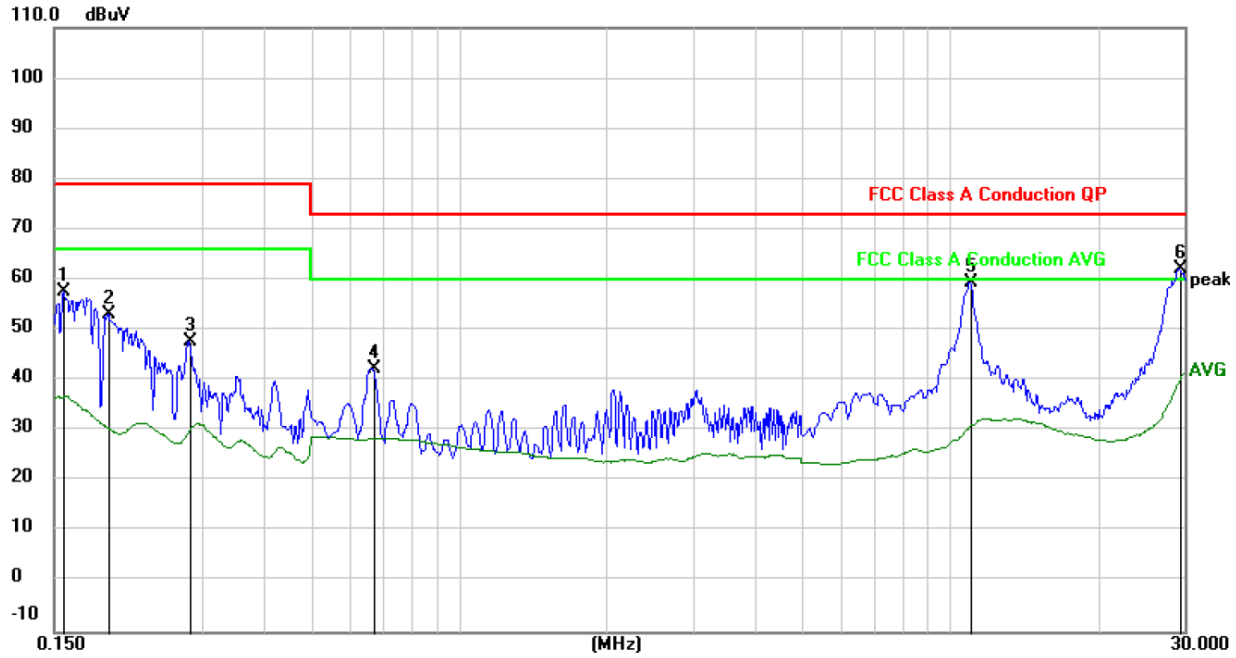
Mode:	Mode 1	Test Date :	2020-05-15
Test Voltage:	AC 120V,60Hz	Phase :	Neutral



Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1566	41.24	16.28	57.52	79.00	-21.48	peak
2		0.1927	36.82	16.27	53.09	79.00	-25.91	peak
3		0.2819	31.54	16.25	47.79	79.00	-31.21	peak
4		0.6710	26.18	16.05	42.23	73.00	-30.77	peak
5		10.9750	43.63	15.85	59.48	73.00	-13.52	peak
6	*	29.2250	46.03	16.02	62.05	73.00	-10.95	peak

*Maximum Data

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6.1.4 Test Setup photograph

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6.2 Radiated Emission Measurement

Limits of Radiated Emission Measurement (Below 1GHz)

Frequency (MHz)	☒ Class A (3m)	☐ Class B (3m)
	Quasi-Peak dB(μV/m)	Quasi-Peak dB(μV/m)
30 ~ 230	50.0	40.0
230 ~ 1000	57.0	47.0

Limits of Radiated Emission Measurement (Above 1GHz)

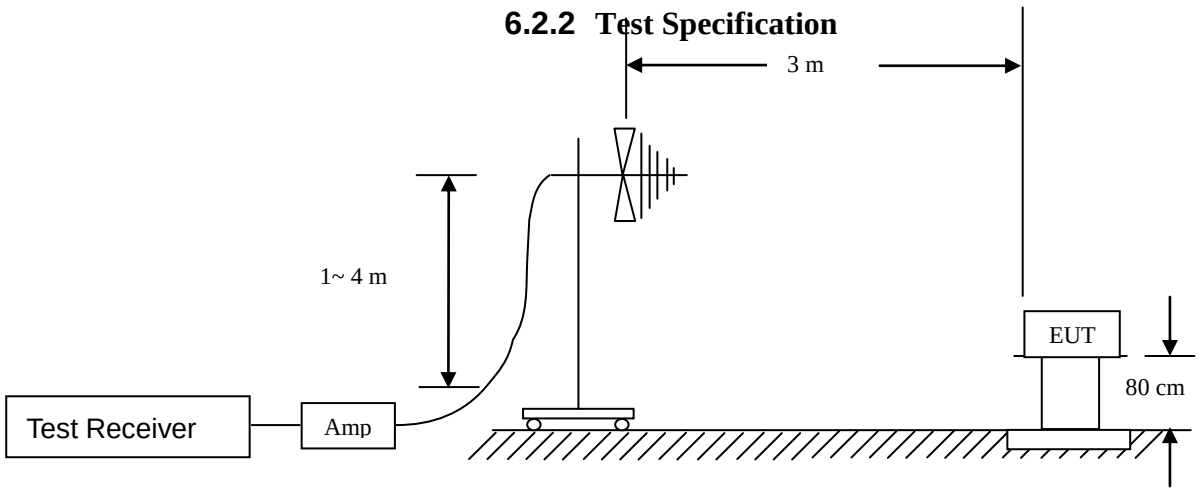
Frequency (MHz)	☐ Class A (3m)		☐ Class B (3m)	
	Peak dB(μV/m)	Average dB(μV/m)	Peak dB(μV/m)	Average dB(μV/m)
1000~3000	76	56	70	50
3000~6000	80	60	74	54

Detector:	Peak for pre-scan (120kHz resolution bandwidth) Quasi-Peak if maximum peak within 6dB of limit

6.2.1 E.U.T. Operation

Temperature:	24.5°C	Humidity:	51% RH	Atmospheric Pressure:	98.6	Kpa
Test Mode:	Mode 1					

6.2.2 Test Specification



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EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at adistance of 10cm between each other. Both horizontal and vertical antenna polarities were tested.

6.2.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyzers in peak detection mode. The EUT was measured by Biolog antenna with 2 orthogonal polarities and peak emissions from the EUT were detected within 6dB of the class B limit line.

The following quasi-peak measurements were performed on the EUT.

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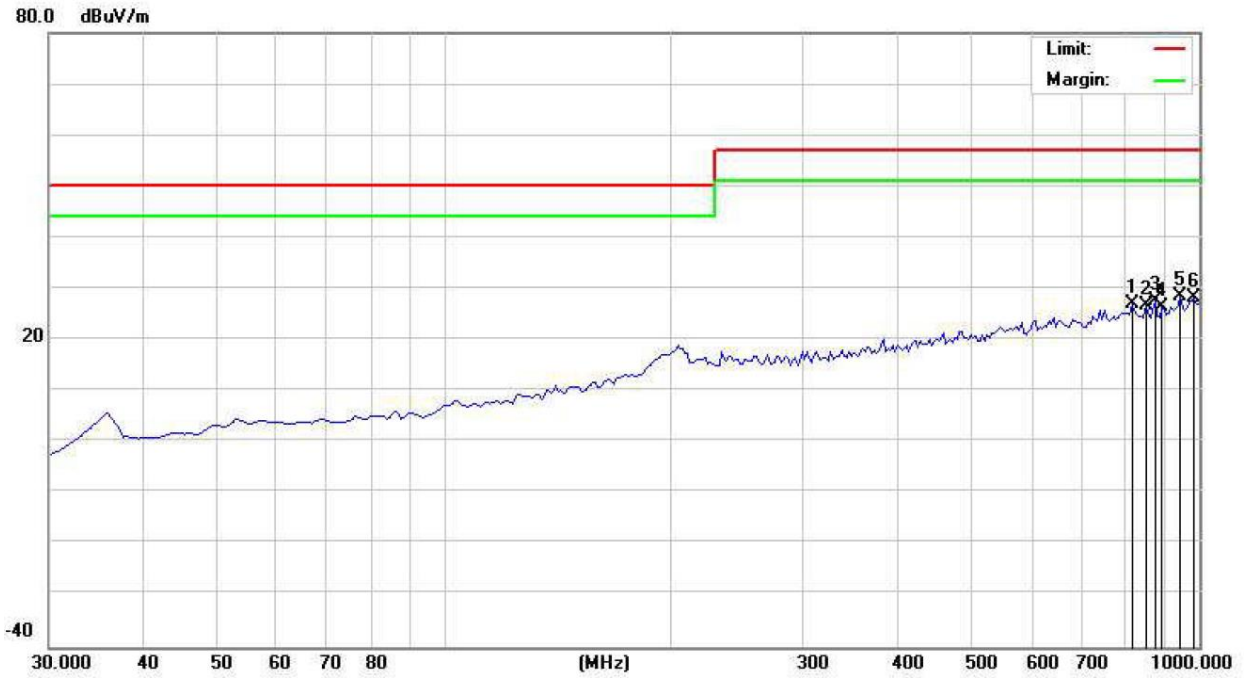
Between 30 MHz - 1000 MHz

Test Mode:	Mode 1	Test Date :	2020-05-15
Test Voltage :	AC 120V,60Hz	Polarization :	Ambient



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		817.2745	30.89	-3.75	27.14	57.00	-29.86	peak
2		852.2645	30.47	-3.72	26.75	57.00	-30.25	peak
3		875.5911	31.37	-3.69	27.68	57.00	-29.32	peak
4		896.9739	30.13	-3.67	26.46	57.00	-30.54	peak
5	*	945.5711	31.23	-2.58	28.65	57.00	-28.35	peak
6		990.2805	29.68	-1.53	28.15	57.00	-28.85	peak

*Maximum Data

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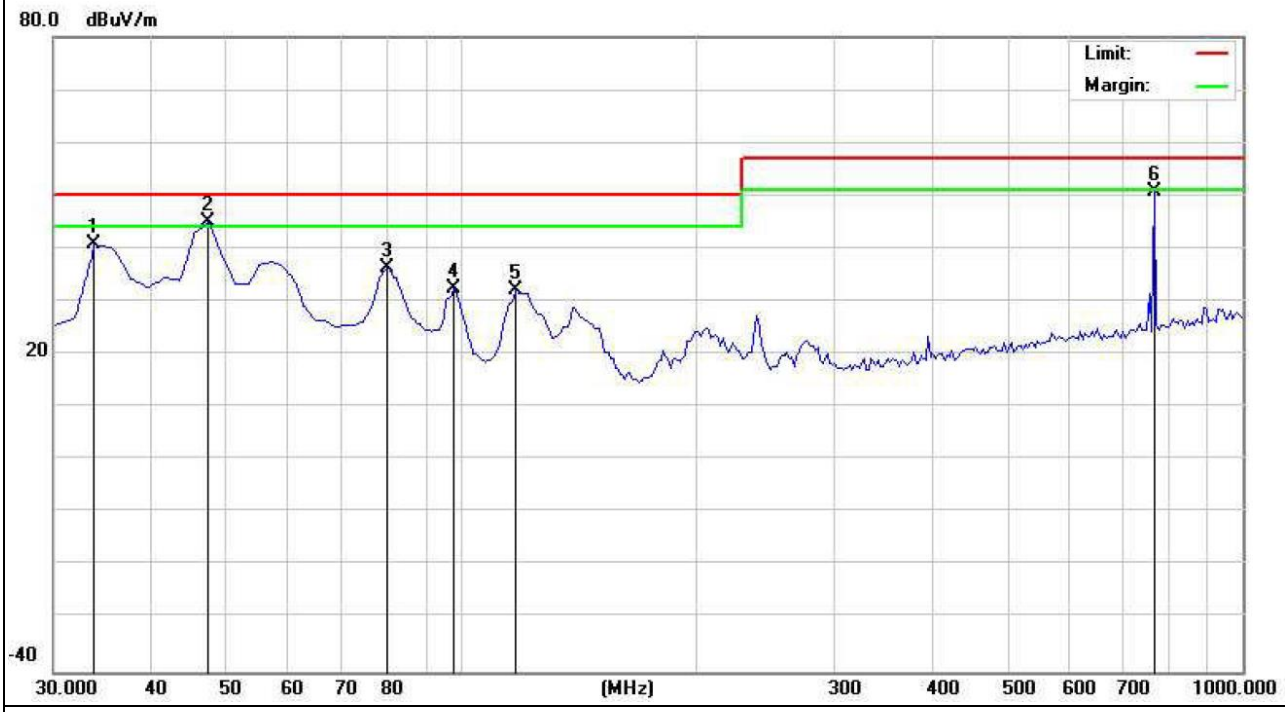
Test Mode:	Mode 1	Test Date :	2020-05-15
Test Voltage :	AC 120V,60Hz	Polarization :	Vertical



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		33.8878	75.31	-34.45	40.86	50.00	-9.14	peak
2	*	47.4950	74.31	-29.27	45.04	50.00	-4.96	peak
3		80.5411	62.48	-26.03	36.45	50.00	-13.55	peak
4		98.0361	56.26	-23.89	32.37	50.00	-17.63	peak
5		117.4750	54.28	-22.24	32.04	50.00	-17.96	peak
6		772.5651	54.95	-4.32	50.63	57.00	-6.37	peak

*Maximum Data

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Contact:0124-4235350,4145343;e-mail:info@aaemtlabs.com;Website: www.aaemtlabs.com
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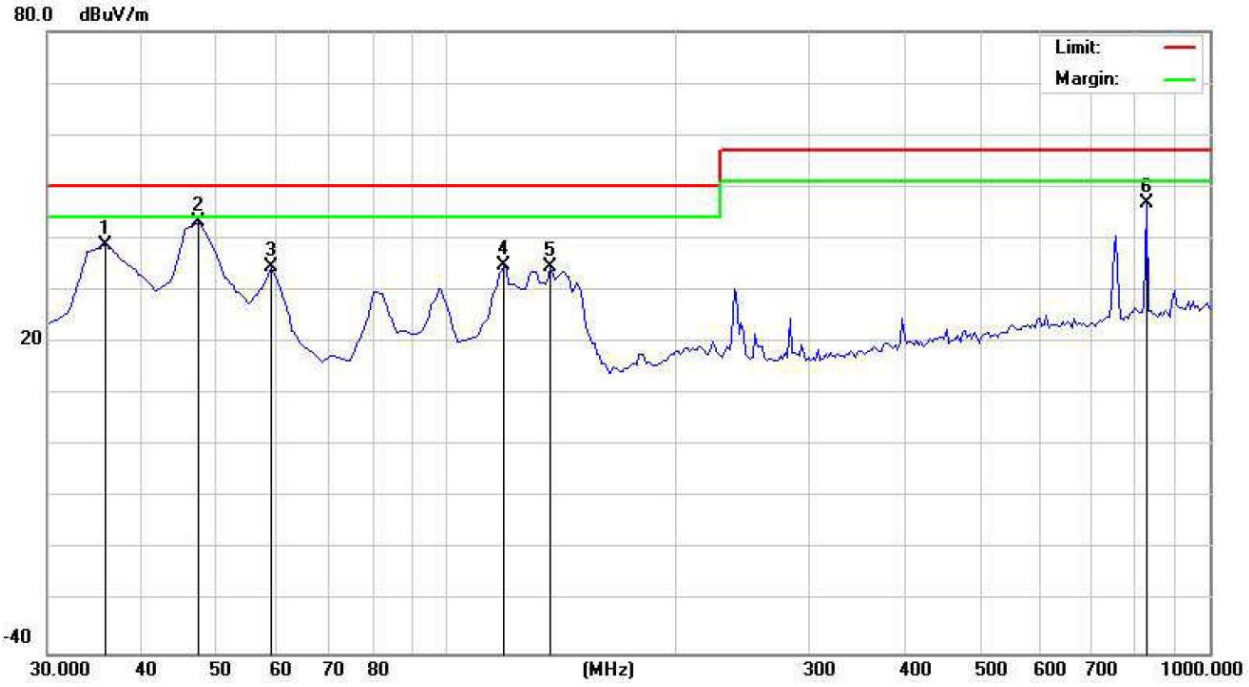
Test Mode:	Mode 1	Test Date :	2020-05-15
Test Voltage:	AC 120V,60Hz	Polarization :	Horizontal



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		35.8316	72.01	-33.15	38.86	50.00	-11.14	peak
2	*	47.4950	72.23	-29.12	43.11	50.00	-6.89	peak
3		59.1583	62.59	-28.14	34.45	50.00	-15.55	peak
4		119.4188	56.56	-21.58	34.98	50.00	-15.02	peak
5		136.9138	54.57	-20.08	34.49	50.00	-15.51	peak
6		830.8817	50.69	-3.87	46.82	57.00	-10.18	peak

*Maximum Data

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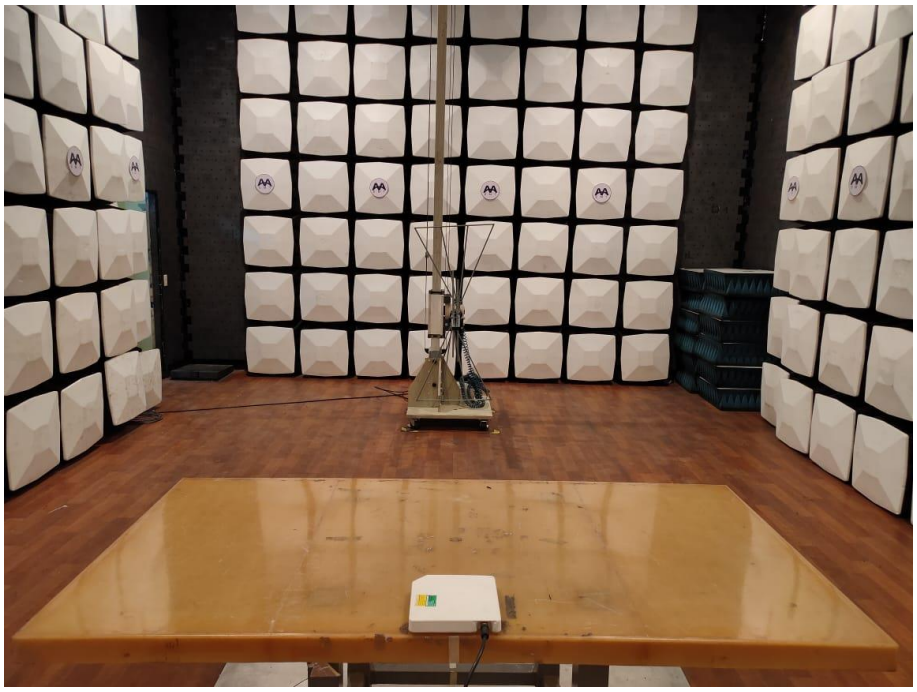
6.2.4 Test Setup photograph



****END OF REPORT****

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