

FCC Verification Test Report

Client Information

Applicant: Netradyne Inc.

Applicant add.: 9191 Towne Centre Drive, Suite 200, San Diego, CA 92122

Manufacturer: Netradyne Inc.

Manufacturer add.: 9191 Towne Centre Drive, Suite 200, San Diego, CA 92122

Product Information:

Product Name: Driveri

Model No.: DRI-128

Derivative model No.: N/A

Brand Name: Netradyne

Applied Standard:

FCC Part15-B:2014

Prepared By:



Anshul Tyagi

Laboratory Details:

AA Electro Magnetic Test Laboratory Private Limited

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

Date of Receipt: Sep. 09, 2020

Date of Test: Sep. 09, 2020

Date of Issue: Sep. 24, 2020

Test Result: **In Compliance/Pass**

This device has been tested and found to comply with the stated standard(s) 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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2 Test Summary

Test	Test Requirement	Test Method	Criterion	Result
Conducted Emission 150kHz to 30MHz	FCC Part15-B:2014	FCC Part15-B:2014	Limits Class B	PASS
Radiated Emissions 30MHz to 18GHz	FCC Part15-B:2014	FCC Part15-B:2014	Limits Class B	PASS

N/A is an abbreviation for Not Applicable.

Model description: Product is an intelligent car DVR, sold as aftermarket product to fleets. This device has below components integrated:

1. Nvidia Jetson TX1 module
2. 4 Cameras to capture 360 degree videos
3. Sierra WP7504 module which is used for LTE connectivity
4. Internal Sensors

Changes from Previous design: Changes from previous FCC design to current are only Resister, capacitor and a Power connector changes, there are no major changes in Active components and there is no changes in RF section. Changes are to improve the functionality of the device. To avoid intermediate power disconnect, we are adding a Super cap (power backup) adaptor as an accessories in the design.

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.

2.1 Measurement Uncertainty

The report uncertainty of measurement $y \pm U$, 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	Radiated Emission Test	30MHz~1GHz	2.81 dB
3	Radiated Emission Test	1GHz~18GHz	2.81 dB

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

ILAC / NABL Accreditation No.: TC-8597

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by National Accreditation Board for Testing and Calibration Laboratories (NABL).

ILAC –A2LA Accreditation No.: 5593.01

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered American Association of Laboratory Accreditation (A2LA.)

FCC- Recognition No.: 137777

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Federal Communications Commission (FCC).

ISED Recognition No.: 26046

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Institute for Social and Economic Development.(ISED)

VCCI- Registration No: 4053

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Voluntary Control Council for Interference.(VCCI)

TEC Designation No.: IND063

Three 3m Semi-Anechoic Chamber, 1 full-Anechoic chamber and 2 Shielding Rooms of AA Electro Magnetic Test Laboratory Private Limited have been registered by Telecommunication Engineering (TEC) Center.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

4 General Information

4.1 General Description of EUT

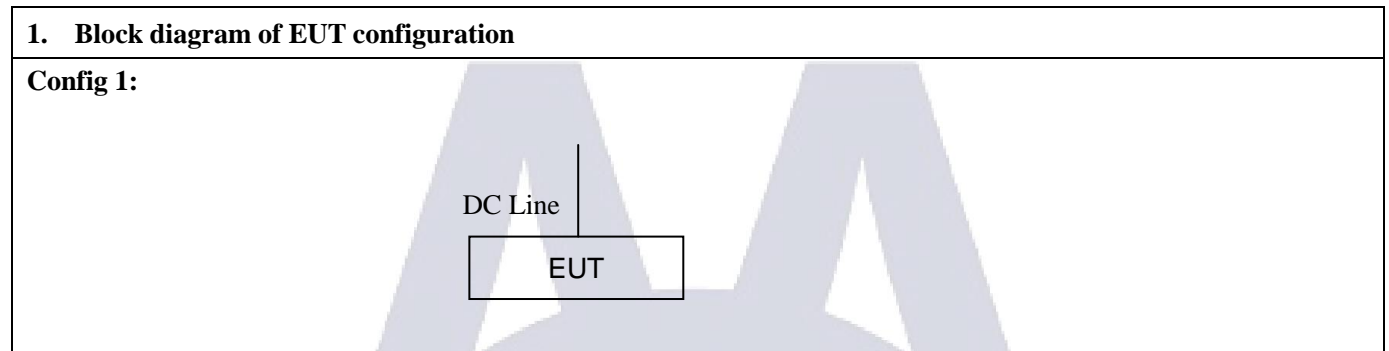
Manufacturer:	Netradyne Inc.
Manufacturer Address:	9191 Towne Centre Drive, Suite 200, San Diego, CA 92122
EUT Name:	Driveri
Model No:	DRI-128
Serial Number:	16325948
Brand Name:	Netradyne
H/W No.:	501-1-00452_F2, 501-1-00459_D1, 501-1-00489_D1, 501-1-00460_C2, 501-1-00461_C1, 501-1-00491_F1, 501-1-00994_D1
S/W No.:	0.5.3.rc.2
Power Supply Range:	Input : 12VDC, 2A
Battery:	N/A

4.2 EUT Test Mode

Mode 1	The EUT in full transmission mode.
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4.3 Description of Test setup

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



4.4 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	DC Power Supply	JUNKE	N/A	JK15040K	20181126-43	2m Unshielded Cable	N/A

4.5 EUT Peripheral List

No.	Equipment	Manufacturer	FCC ID	Model No.	Serial No.	Power cord	signal cable
1	Super Cap Adapter	Netradyne Inc	DRI128SCP	DRI128SCP	1909060324	N/A	N/A

5 Equipments List for All Test Items

<input checked="" type="checkbox"/> 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

<input checked="" type="checkbox"/> 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

6 Emission Test Results

6.1 Mains Terminals Disturbance Voltage Measurement

Limits for AC mains Port :

Frequency (MHz)	<input type="checkbox"/> Class A (dB μ V)		<input checked="" type="checkbox"/> Class B (dB μ V)	
	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:

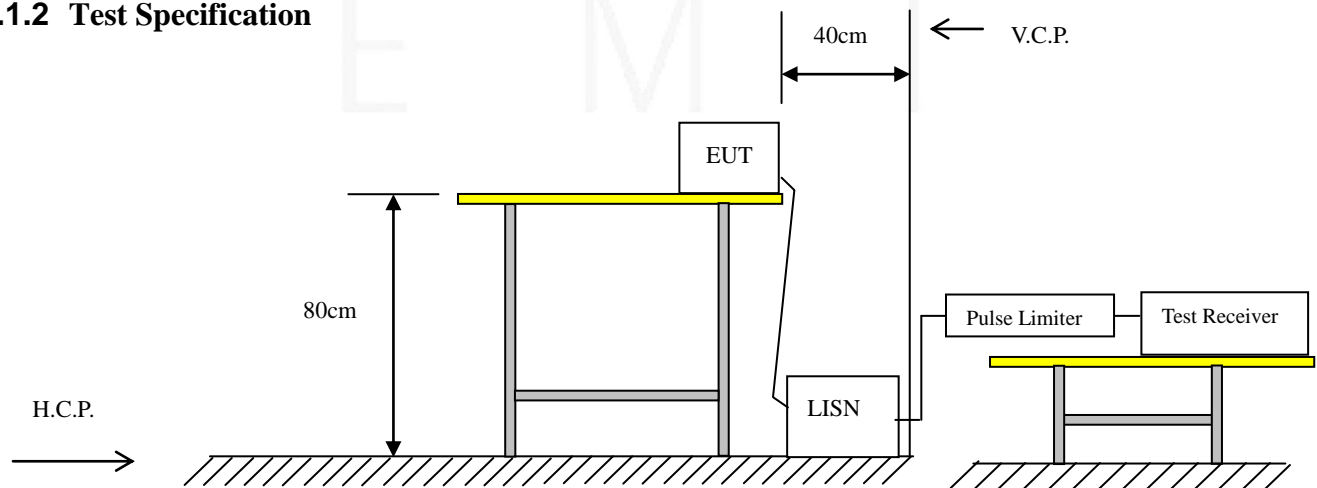
Peak for pre-scan (9kHz Resolution Bandwidth)

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					

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

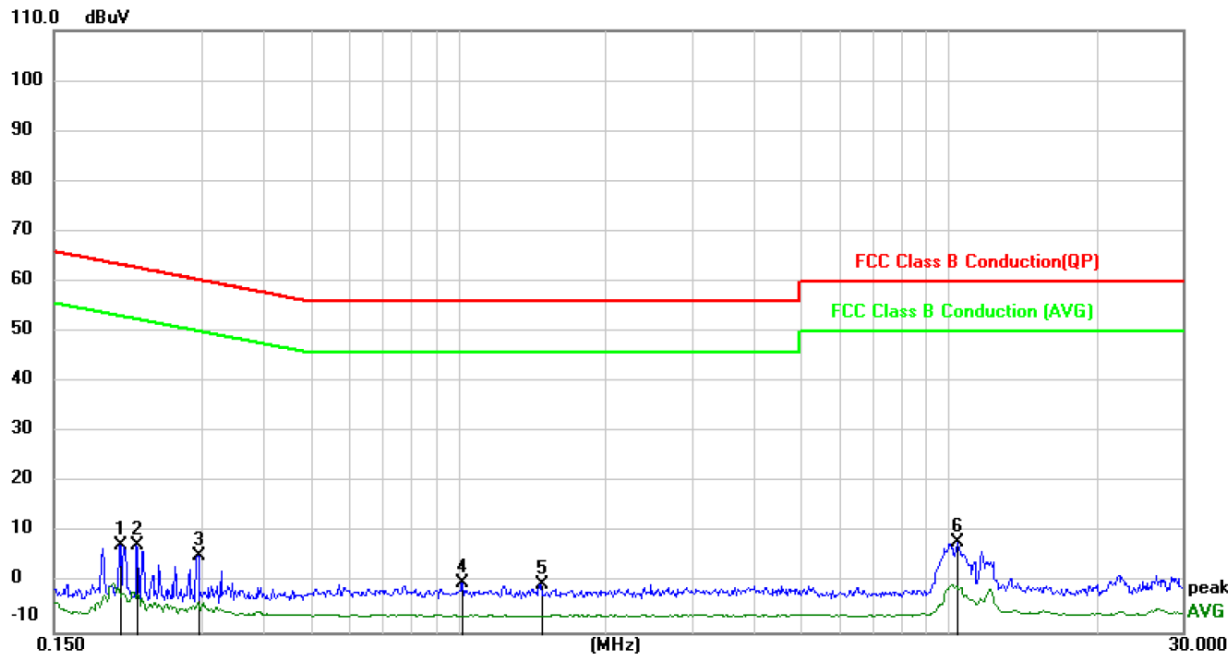
An initial pre-scan was performed on the live and neutral lines.

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.



Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage:	DC 12V	Phase :	Ambient

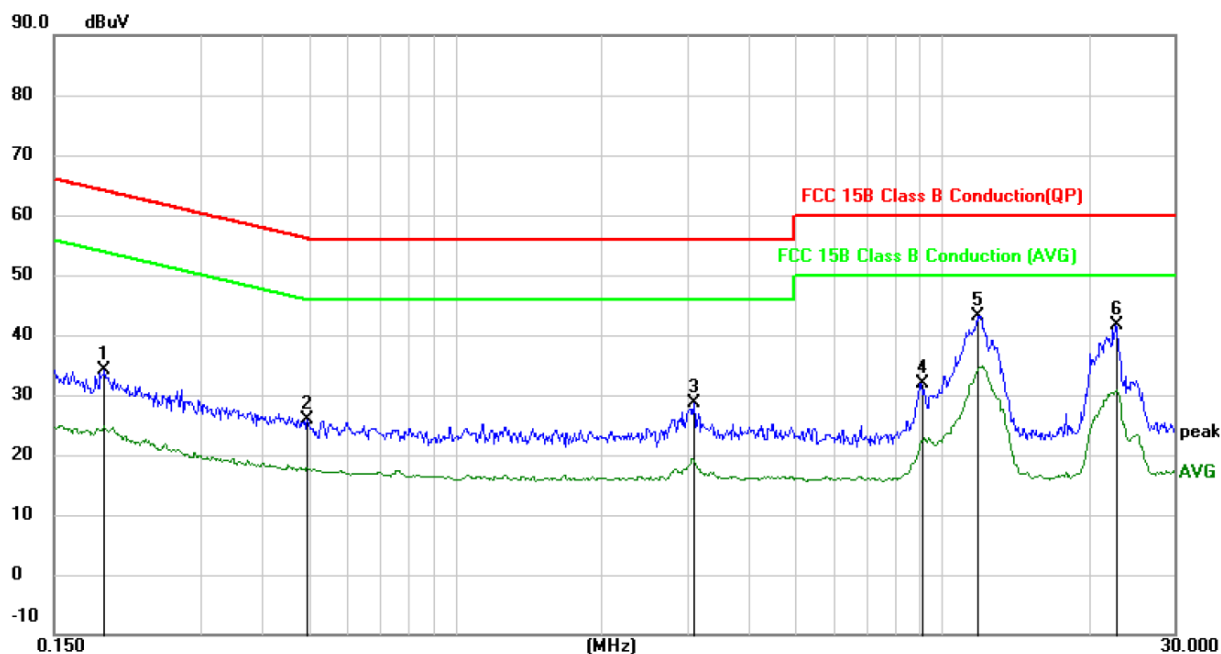


Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2042	6.27	1.27	7.54	63.43	-55.89	peak
2		0.2210	6.34	1.26	7.60	62.78	-55.18	peak
3		0.2942	4.12	1.25	5.37	60.40	-55.03	peak
4		1.0175	-0.73	0.90	0.17	56.00	-55.83	peak
5		1.4720	-1.20	0.85	-0.35	56.00	-56.35	peak
6	*	10.3500	7.36	0.85	8.21	60.00	-51.79	peak

*Maximum Data

Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage:	DC 12V	Phase :	Line

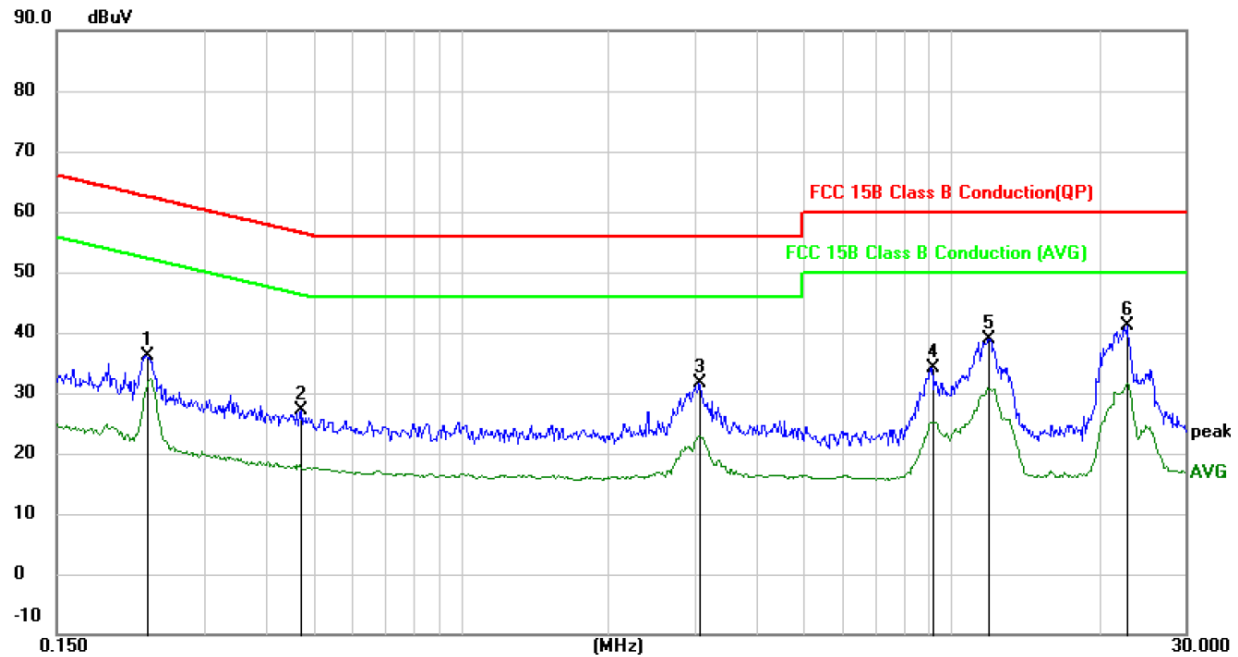


Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1898	17.77	16.28	34.05	64.04	-29.99	peak
2		0.4947	9.75	16.13	25.88	56.09	-30.21	peak
3		3.0784	12.70	15.85	28.55	56.00	-27.45	peak
4		9.0750	15.96	15.85	31.81	60.00	-28.19	peak
5	*	11.8250	27.37	15.82	43.19	60.00	-16.81	peak
6		22.6749	25.66	15.87	41.53	60.00	-18.47	peak

*Maximum Data

Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage:	DC 12V	Phase :	Neutral



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

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2280	19.94	16.26	36.20	62.52	-26.32	peak
2		0.4713	10.88	16.14	27.02	56.49	-29.47	peak
3		3.0605	15.66	15.85	31.51	56.00	-24.49	peak
4		9.1250	18.16	15.85	34.01	60.00	-25.99	peak
5		11.8750	23.02	15.82	38.84	60.00	-21.16	peak
6	*	22.7250	25.35	15.87	41.22	60.00	-18.78	peak

*Maximum Data

6.1.4 Test Setup photograph



6.2 Radiated Emission Measurement

Limits of Radiated Emission Measurement (Below 1GHz)

Frequency (MHz)	<input type="checkbox"/> Class A (3m)	<input checked="" type="checkbox"/> Class B (3m)
	Quasi-Peak dB(μ V/m)	Quasi-Peak dB(μ V/m)
30 ~ 88	49.5	40.0
88 ~ 216	54.0	43.5
216 ~ 960	57.0	46.0
Above 960	60.0	54.0

Limits of Radiated Emission Measurement (Above 1GHz)

Frequency (MHz)	<input type="checkbox"/> Class A (3m)		<input checked="" type="checkbox"/> Class B (3m)	
	Peak dB(μ V/m)	Average dB(μ V/m)	Peak dB(μ V/m)	Average dB(μ V/m)
1000~18000	80	60	74	54

Detector:

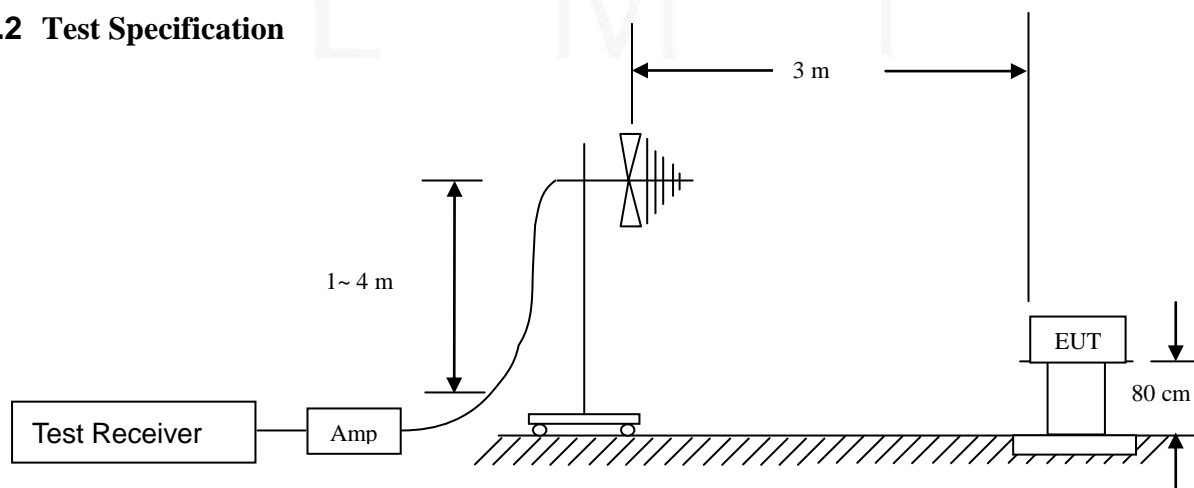
Peak for pre-scan (120kHz resolution bandwidth)

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



EUT was placed upon a polyester fiber top 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 a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested.

6.2.3 Measurement Data

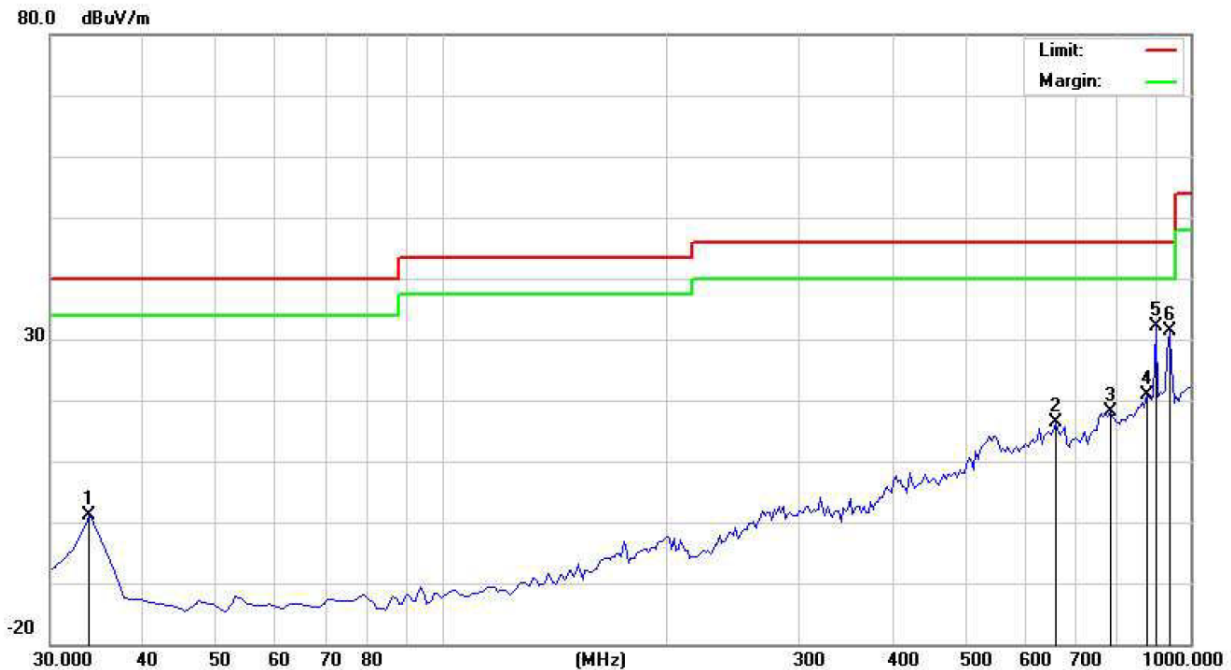
An initial pre-scan was performed in the 3m chamber using the spectrum analyzers in peak detection mode. The EUT was measured by Biolog antenna with 2 orthogonal polarities and peak emissions from the EUT were detected within 6dB of the class B limit line.

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



Between 30 MHz - 1000 MHz

Test Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage :	DC 12V	Polarization :	Ambient

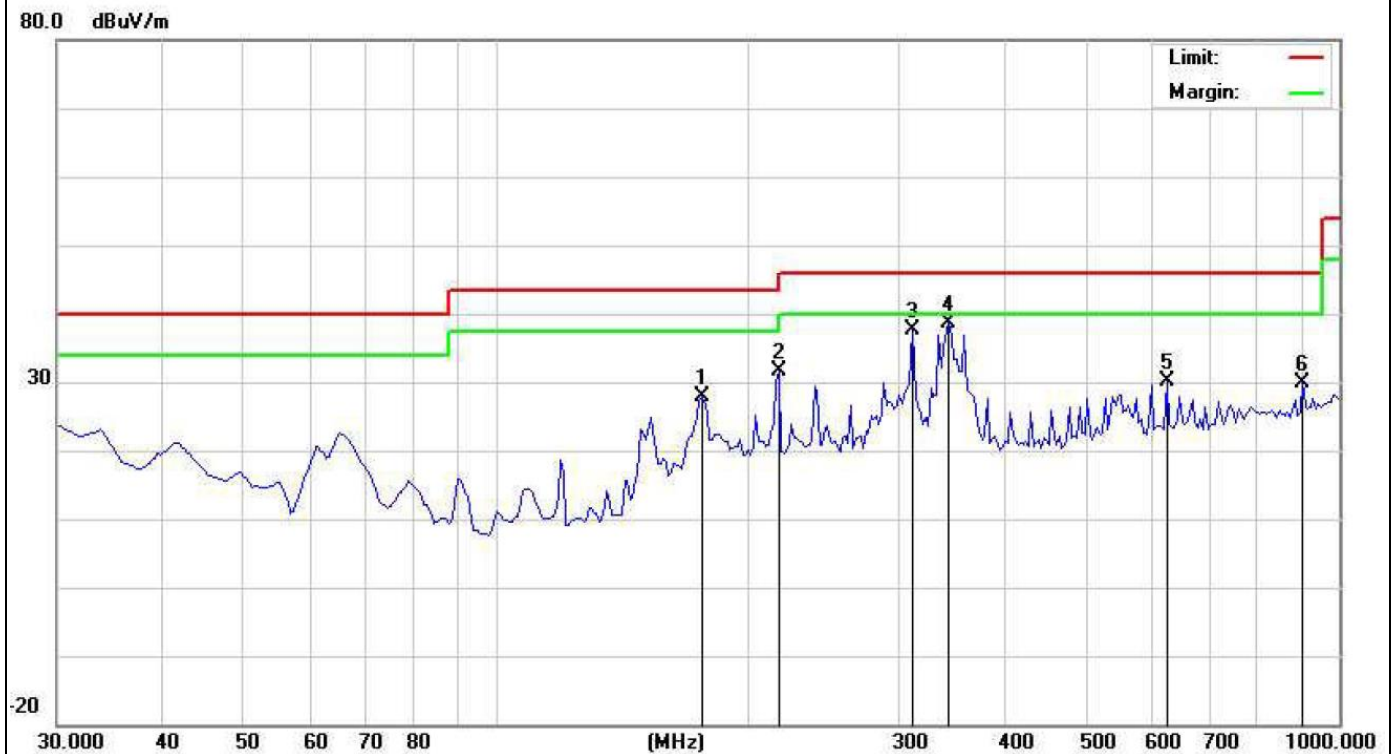


Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		33.8878	16.77	-15.52	1.25	40.00	-38.75	peak
2		661.7635	23.16	-6.75	16.41	46.00	-29.59	peak
3		782.2846	22.88	-4.78	18.10	46.00	-27.90	peak
4		877.5351	25.54	-4.61	20.93	46.00	-25.07	peak
5	*	902.8056	36.60	-4.49	32.11	46.00	-13.89	peak
6		941.6834	34.74	-3.31	31.43	46.00	-14.57	peak

*Maximum Data

Test Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage :	DC 12V	Polarization :	Vertical

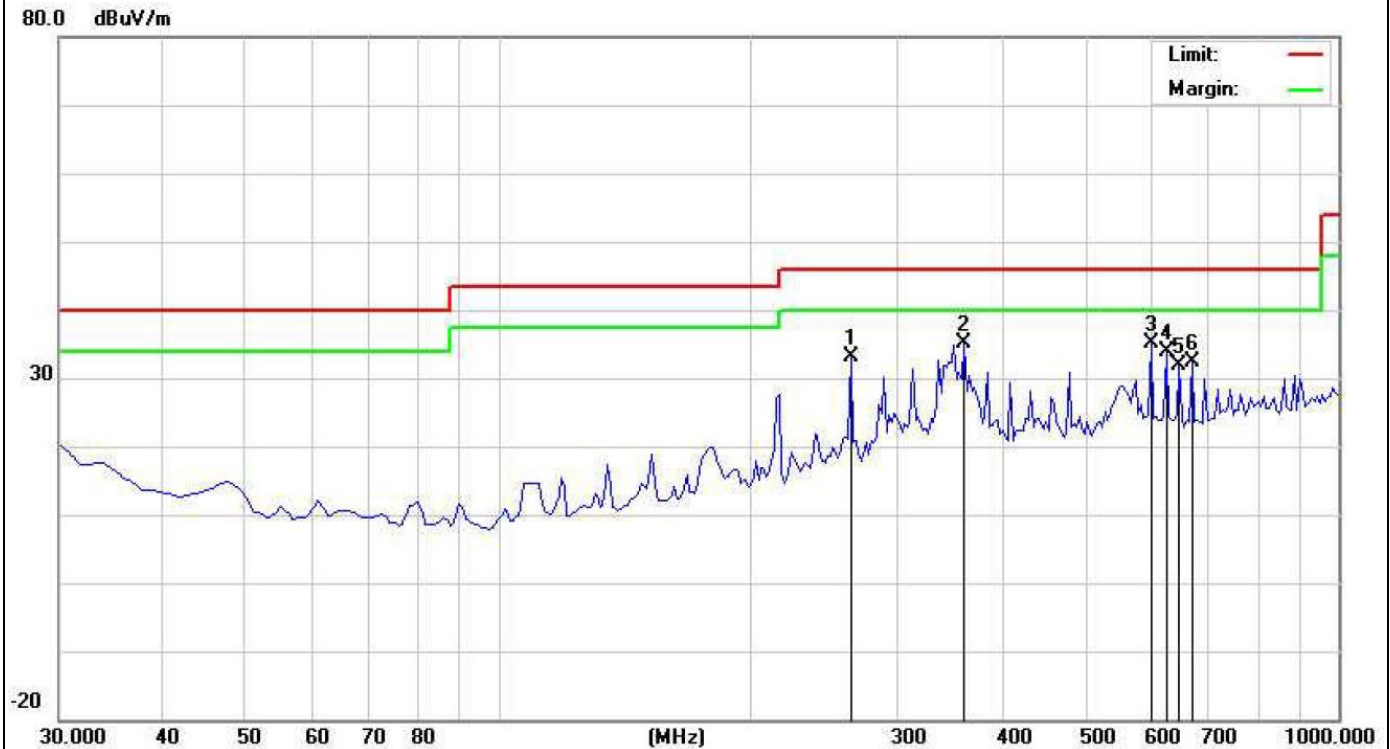


Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		175.7916	48.64	-20.79	27.85	43.50	-15.65	QP
2		216.6132	49.95	-18.40	31.55	46.00	-14.45	QP
3		311.8637	51.89	-14.32	37.57	46.00	-8.43	QP
4	*	344.9098	52.53	-13.78	38.75	46.00	-7.25	QP
5		624.8297	37.79	-7.60	30.19	46.00	-15.81	QP
6		912.5250	34.99	-4.99	30.00	46.00	-16.00	QP

*Maximum Data

Test Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage:	DC 12V	Polarization :	Horizontal



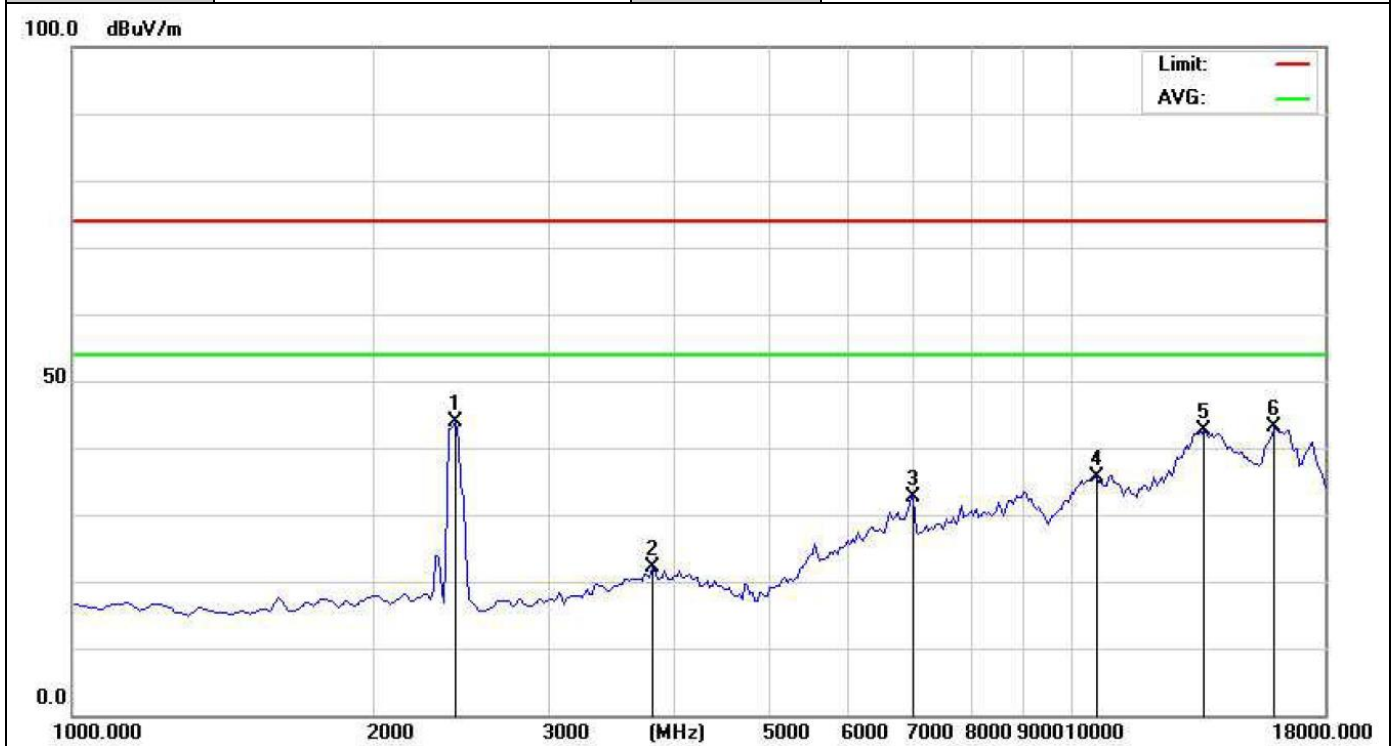
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		263.2664	48.20	-15.16	33.04	46.00	-12.96	QP
2	*	360.4609	48.39	-13.34	35.05	46.00	-10.95	QP
3		601.5030	42.82	-7.77	35.05	46.00	-10.95	QP
4		624.8297	41.43	-7.60	33.83	46.00	-12.17	QP
5		648.1563	39.35	-7.50	31.85	46.00	-14.15	QP
6		673.4269	40.10	-7.77	32.33	46.00	-13.67	QP

*Maximum Data

Between 1000 MHz - 18000 MHz

Test Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage :	DC 12V	Polarization :	Vertical

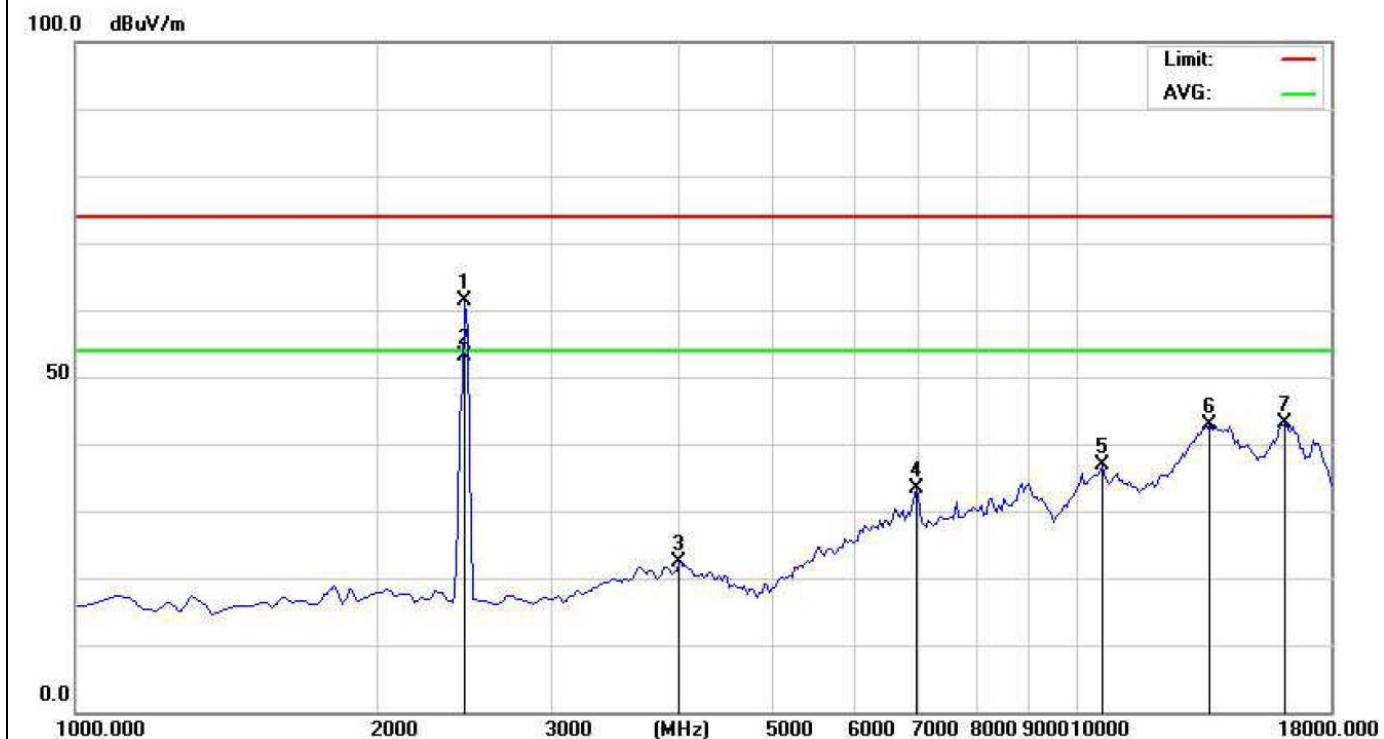


Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	2430.862	53.29	-9.51	43.78	74.00	-30.22	peak
2		3827.655	27.78	-5.71	22.07	74.00	-51.93	peak
3		6961.924	30.73	1.92	32.65	74.00	-41.35	peak
4		10675.35	24.62	10.99	35.61	74.00	-38.39	peak
5		13673.34	23.18	19.34	42.52	74.00	-31.48	peak
6		16058.11	24.62	18.48	43.10	74.00	-30.90	peak

*Maximum Data

Test Mode:	Mode 1	Test Date :	2020-09-09
Test Voltage:	DC 12V	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		2464.930	71.05	-9.55	61.50	74.00	-12.50	peak
2	*	2464.930	62.58	-9.55	53.03	54.00	-0.97	AVG
3		4032.064	27.86	-5.36	22.50	74.00	-51.50	peak
4		6927.856	31.79	1.70	33.49	74.00	-40.51	peak
5		10675.35	25.85	10.99	36.84	74.00	-37.16	peak
6		13673.34	23.50	19.34	42.84	74.00	-31.16	peak
7		16296.59	24.65	18.40	43.05	74.00	-30.95	peak

*Maximum Data

6.2.4 Test Setup photograph



****END OF REPORT****