



EMC TEST REPORT

Report No.: 20240917G19677X-W1

Product Name: OBDII

FCC ID: 2BHGX-BTOBDII

Model No. : BTOBDII

Applicant: Thermal Master Technology Co., Ltd.

Address: Building C, Room 606, No. 3 Nanchang Street, Guxian Street, Yantai, Shandong, China

Received Date: 2024.09.29

Dates of Testing: 2024.10.08~2024.10.18

Issued by: CCIC Southern Testing Co., Ltd.

Lab Location: Electronic Testing Building, No.43, Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.

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Manufacturer..... Thermal Master Technology Co., Ltd.

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Shandong, China

Test Standards 47 CFR Part 15 Subpart B

Test Result..... PASS

Tested by Sun Jiaohui
Sun Jiaohui, Test Engineer 2024.10.21

Reviewed by Chris You
Chris You, Senior Engineer 2024.10.21

Approved by Wang Shijie
Wang Shijie, Manager 2024.10.21



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Change History		
Issue	Date	Reason for change
1.0	2024.10.21	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Name	OBDII
Hardware Version.....	V01
Software Version	Ve030rsion: 1010.1030
Power supply:	DC 12V

Note1: The EUT is a OBDII;

Note2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	N.A
2	15.109	Radiated Emission	PASS

NOTE:

- (1) The EUT has been tested according to 47 CFR Part 15 Subpart B, Class B. The test procedure is according to ANSI C63.4:2014.
- (2) AC conduction is not applicable because the product is 12V DC power supply.



1.3 Facilities and Accreditations

1.3.1 Facilities

FCC-Registration No.: CN1283

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until Jun 30, 2025.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Jun 30, 2025.

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 °C - 35 °C
Relative Humidity (%):	25% -75%
Atmospheric Pressure (kPa):	86kPa-106kPa

1.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	Uc = 3.2 dB (k=2)
Uncertainty of Radiated Emission: (30MHz~1GHz)	Uc = 5.8 dB (k=2)
Uncertainty of Radiated Emission: (1~6GHz)	Uc = 5.1 dB (k=2)
Uncertainty of Radiated Emission: (6~18GHz)	Uc = 5.5 dB (k=2)



2. TEST CONDITIONS SETTING

2.1 Test Peripherals

The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Support Equipment:

Description	Brand name	Model	Serial No.	FCCID
/	/	/	/	/

Support Cable:

Description	Shield Type	Ferrite Core	Length
DC Power Cable	Un- shielding	/	1.5m

2.2 Test Mode

Note 1: The EUT is a OBDII; It could support the following operating mode and frequency band:
Bluetooth;

The EUT have the following typical setups during the test:

Setup1: Bluetooth + EUT + DC Power Supply (12V)

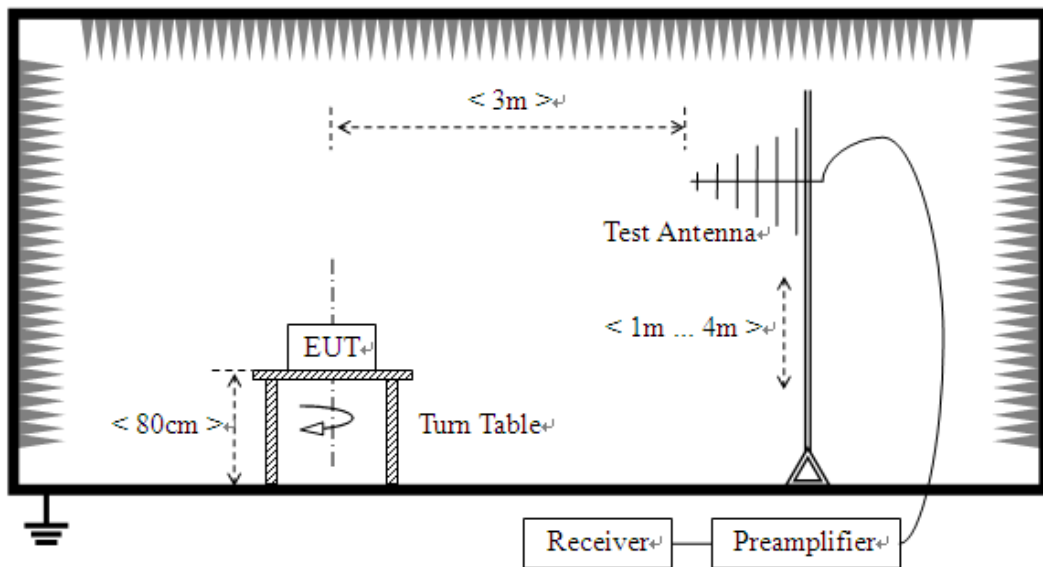
Note 2: All models are tested and the worst results are provided in the report.

2.3 Test Setup and Equipments List

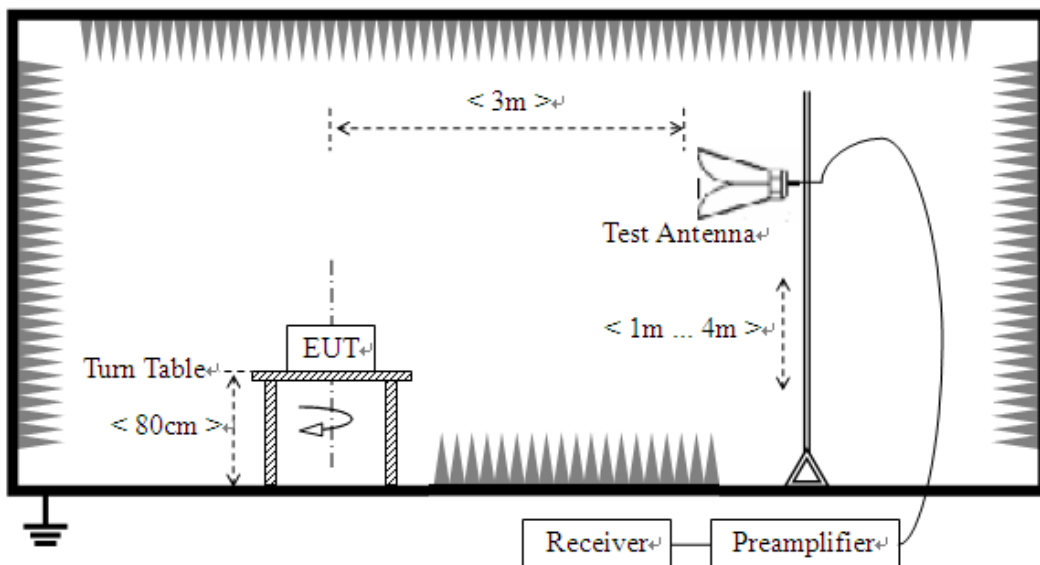
2.3.1 Radiated Emission

A. Test Setup:

- 1) For radiated emissions from 30MHz to 1GHz



- 2) For radiated emissions above 1GHz



**B. Test Procedure**

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

- 1) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
EMI Test Receiver	ROHDE&SCHWARZ	ESIB7	A0501375	2024.02.29	2025.02.28
Broadband Ant.	ETC	MCTD2786	A240204135	2024.01.19	2025.01.18
3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2024.02.28	2027.02.27
EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2024.05.24	2025.05.23
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2023.08.02	2026.08.01
EMI Horn Ant.	ROHDE&SCHWARZ	HF906	A0304225	2022.04.12	2025.04.11
Cable(9kHz-30MHz)	/	/	C230800587	2023.08.21	2026.08.20
Cable(30MHz~18GHz)	/	XSMA750-S MN M(RA)-12M	C230800588	2023.08.21	2026.08.20
Cable(18GHz~40GHz)	/	sUCOFLEX10 2	c230800590	2023.08.21	2026.08.20

3. 47 CFR PART 15B REQUIREMENTS

3.1 Radiated Emission

3.1.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency range (MHz)	Field Strength		Field Strength Limitation at 3m Measurement Dist	
	$\mu\text{V/m}$	Dist	($\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)
30.0 - 88.0	100	3m	100	20log 100
88.0 - 216.0	150	3m	150	20log 150
216.0 - 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

Frequency range (MHz)	Field Strength Limitation at 3m Measurement Dist	
	Class A(3m) QP ($\text{dB}\mu\text{V/m}$)	Class B(3m) QP ($\text{dB}\mu\text{V/m}$)
30 - 88	49.0	40.0
88 - 216	53.5	43.5
216 - 230	56.5	46.0
230 - 960	56.5	46.0
960-1000	59.5	54.0
Frequency range (MHz)	Field Strength Limitation at 3m Measurement Dist	
	Class A(3m) ($\text{dB}\mu\text{V/m}$)	Class B(3m) ($\text{dB}\mu\text{V/m}$)
Above 1G	60(AV) /80(PK)	54(AV) /74(PK)

- For frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.
- Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.
- For below 1G: QP detector RBW 120 kHz, VBW 300 kHz.



For Above 1G: PK detector RBW 1MHz, VBW 3MHz for PK value; AV detector RBW 1MHz, VBW 10Hz for AV value.

Note:

- 1) The tighter limit shall apply at the boundary between two frequency ranges.
- 2) Limitation expressed in dBuV/m is calculated by $20\log$ Emission Level (uV/m).
- 3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$.

Example:

F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as

$$Ld1 = L1 = 30\text{uV/m} * (10)^2 = 100 * 30\text{uV/m}.$$

3.1.2 Test Description

See section 2.3.2 of this report.

3.1.3 Test Result

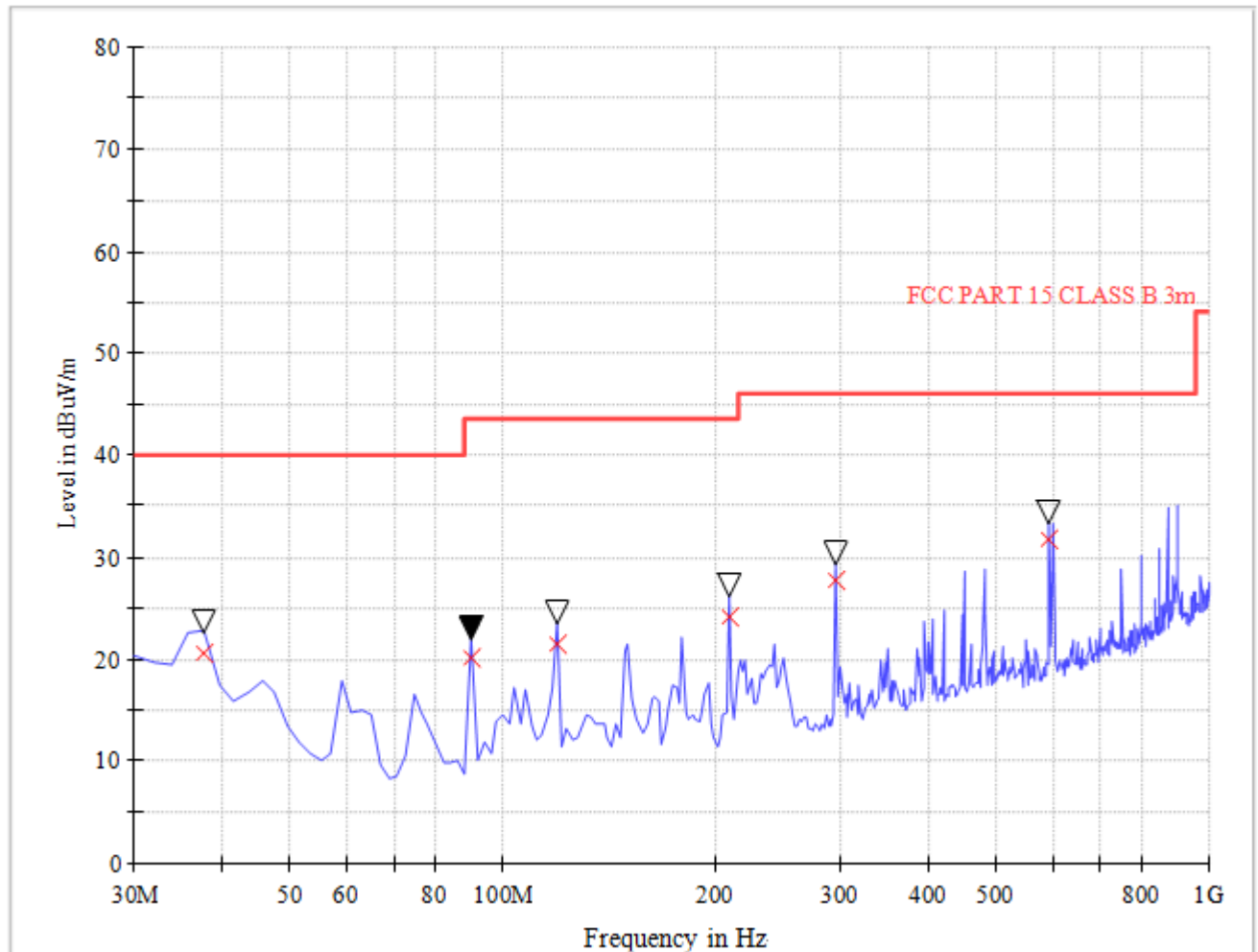
The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

Note:

1. All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

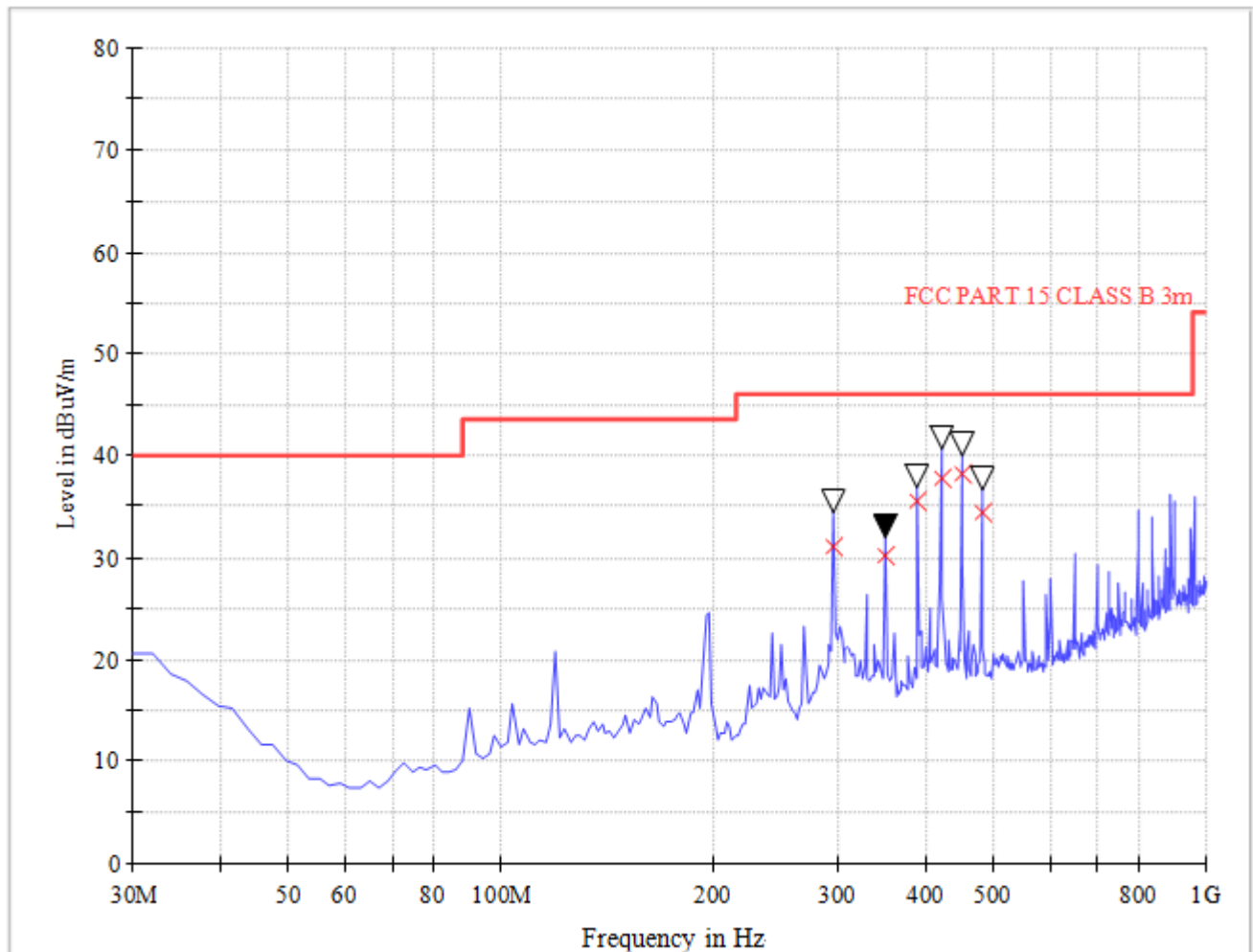
A. Radiation disturbances, antenna polarization: Vertical, Setup1



(Plot C: Test Antenna Vertical 30M - 1G)

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBμV/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
37.76	20.50	120.000	103	40.0	40.0	Vertical	0.5	14.2	Pass
90.28	20.14	120.000	107	43.5	43.5	Vertical	0.8	9.2	Pass
119.40	21.35	120.000	102	43.5	43.5	Vertical	1.0	11.2	Pass
208.84	24.05	120.000	106	43.5	43.5	Vertical	1.2	10.8	Pass
296.32	27.81	120.000	101	46.0	46.0	Vertical	1.3	14.2	Pass
593.72	31.71	120.000	105	46.0	46.0	Vertical	1.5	18.4	Pass

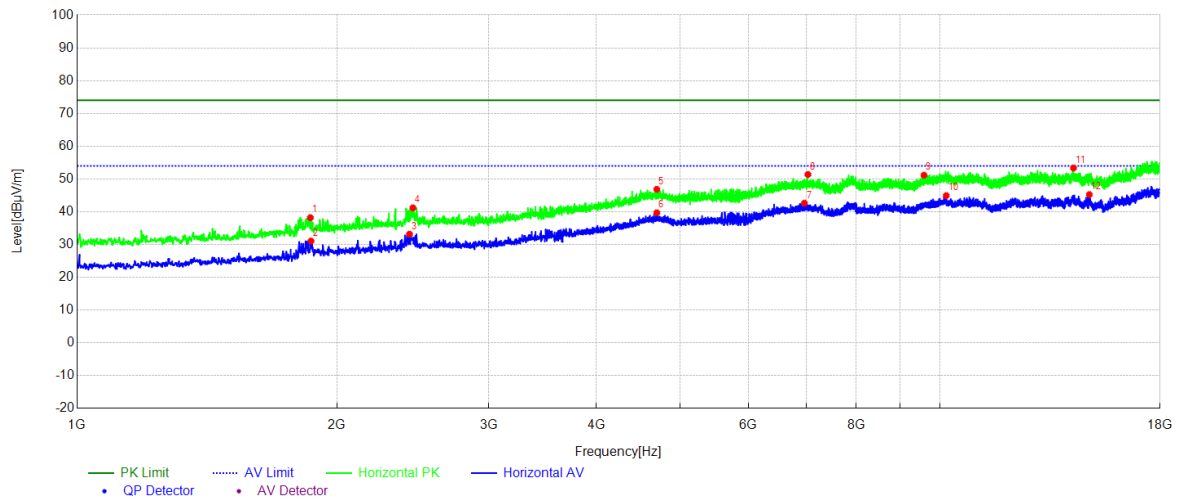
B. Radiation disturbances, antenna polarization: Horizontal, Setup1



(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB μ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB μ V/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
296.32	31.01	120.000	103	46.0	14.99	Horizontal	1.3	14.2	Pass
350.76	30.16	120.000	106	46.0	15.84	Horizontal	1.4	15.6	Pass
389.60	35.44	120.000	102	46.0	10.56	Horizontal	1.4	16.1	Pass
420.72	37.78	120.000	105	46.0	8.22	Horizontal	1.5	16.8	Pass
449.88	38.24	120.000	103	46.0	7.76	Horizontal	1.5	17.3	Pass
481.00	34.43	120.000	107	46.0	11.57	Horizontal	1.5	17.7	Pass

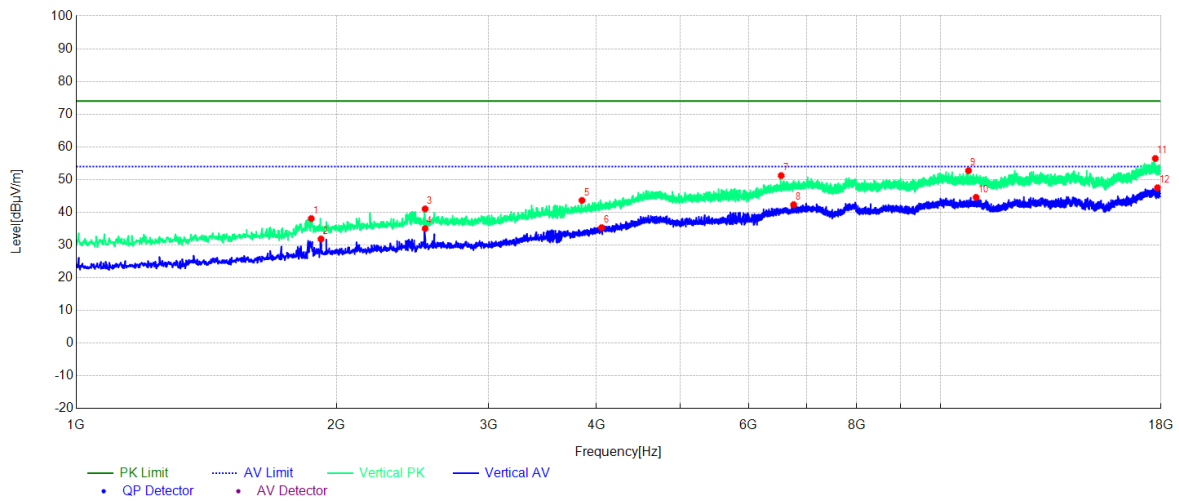
A. Radiation disturbances, antenna polarization: Horizontal, Setup1



(Plot M: Test Antenna Horizontal 1G – 18G)

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin[dB μV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1863.69	38.19	-11.82	74.00	35.81	PK	102	237	Horizontal
2	1867.09	31.07	-11.79	54.00	22.93	AV	107	241	Horizontal
3	2428.14	33.16	-9.66	54.00	20.84	AV	104	32	Horizontal
4	2450.25	41.19	-9.56	74.00	32.81	PK	105	65	Horizontal
5	4697.87	46.85	0.34	74.00	27.15	PK	103	33	Horizontal
6	4697.87	39.68	0.34	54.00	14.32	AV	106	7	Horizontal
7	6967.60	42.62	4.20	54.00	11.38	AV	101	215	Horizontal
8	7032.20	51.38	4.23	74.00	22.62	PK	102	322	Horizontal
9	9585.86	51.15	6.79	74.00	22.85	PK	108	118	Horizontal
10	10172.42	44.92	7.17	54.00	9.08	AV	105	324	Horizontal
11	14286.83	53.34	10.16	74.00	20.66	PK	106	256	Horizontal
12	14902.29	45.24	9.34	54.00	8.76	AV	102	223	Horizontal

B. Radiation disturbances, antenna polarization: Vertical, Setup1



(Plot N: Test Antenna Vertical 1G – 18G)

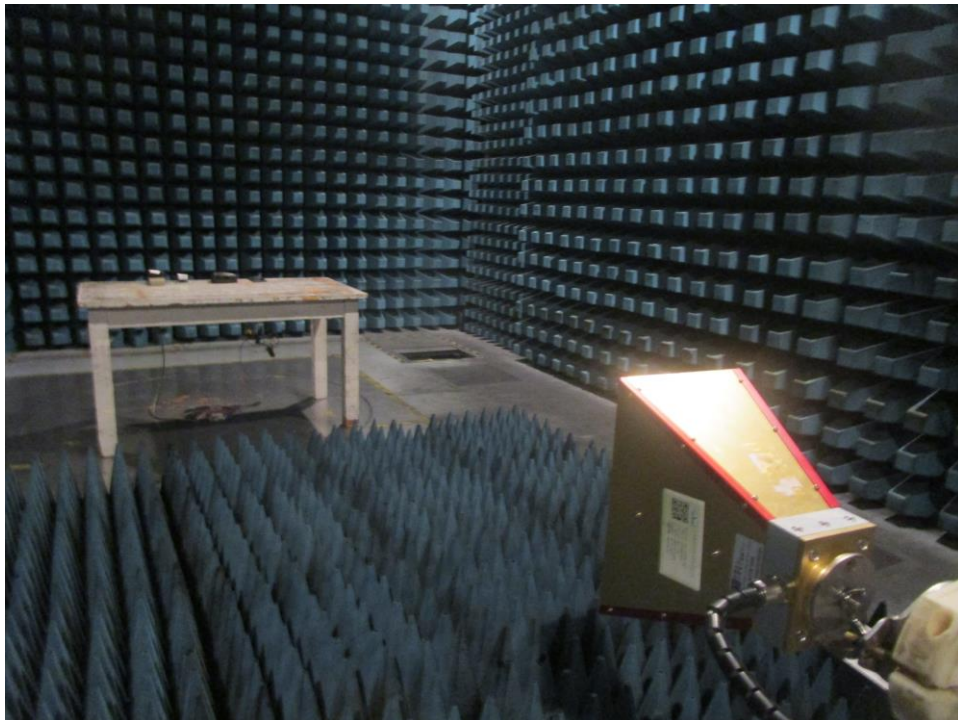
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin[dB μV/m]	Trace	Height [cm]	Angle [°]	Polarity
1	1870.49	38.09	-11.79	74.00	35.91	PK	102	147	Vertical
2	1919.79	31.85	-11.50	54.00	22.15	AV	109	283	Vertical
3	2533.55	41.05	-9.30	74.00	32.95	PK	103	155	Vertical
4	2533.55	35.05	-9.30	54.00	18.95	AV	105	146	Vertical
5	3847.78	43.64	-4.36	74.00	30.36	PK	101	261	Vertical
6	4055.21	35.32	-3.23	54.00	18.68	AV	107	194	Vertical
7	6542.55	51.23	3.53	74.00	22.77	PK	106	212	Vertical
8	6763.58	42.35	3.79	54.00	11.65	AV	104	327	Vertical
9	10777.68	52.74	7.22	74.00	21.26	PK	102	360	Vertical
10	10998.70	44.57	7.36	54.00	9.43	AV	106	235	Vertical
11	17727.97	56.45	14.69	74.00	17.55	PK	103	163	Vertical
12	17833.38	47.51	14.46	54.00	6.49	AV	105	135	Vertical

Appendix I: Photographs of EMC Test Configuration

1. Radiated Emission Measurement below 1GHz



2. Radiated Emission Measurement above 1GHz



-----End of Report-----