

FCC Part 15B

Measurement and Test Report

For

KZ Broadband Technologies, Ltd.

1601 Tower C, Skyworth Building, High-Tech Industrial Park

Nanshan District, Shenzhen, Guangdong, China

FCC ID: A28AIRMMASTER4000D

Test Rule(s):	<u>FCC Part 15 Subpart B</u>
Product Description:	<u>LTE Outdoor CPE</u>
Tested Model:	<u>AirMaster 4000D</u>
Report No.:	<u>STR15038046I-2</u>
Tested Date:	<u>2015-03-09 to 2014-03-23</u>
Issued Date:	<u>2015-03-24</u>
Tested By:	<u>Seven Song / Engineer</u> <i>Seven Song</i>
Reviewed By:	<u>Lahm Peng / EMC Manager</u> <i>Lahm peng</i>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
Prepared By:	
<p>Shenzhen SEM.Test Technology Co., Ltd. 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101) Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn</p>	

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION.....3

1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....3

1.2 TEST STANDARDS.....4

1.3 TEST METHODOLOGY4

1.4 TEST FACILITY4

1.5 EUT SETUP AND OPERATION MODE5

2. SUMMARY OF TEST RESULTS6

3. CONDUCTED EMISSIONS7

3.1 MEASUREMENT UNCERTAINTY7

3.2 TEST EQUIPMENT LIST AND DETAILS7

3.3 TEST PROCEDURE.....7

3.4 BASIC TEST SETUP BLOCK DIAGRAM.....7

3.5 ENVIRONMENTAL CONDITIONS8

3.6 SUMMARY OF TEST RESULTS/PLOTS8

3.7 CONDUCTED EMISSIONS TEST DATA.....8

4. RADIATED EMISSIONS.....11

4.1 MEASUREMENT UNCERTAINTY11

4.2 TEST EQUIPMENT LIST AND DETAILS11

4.3 TEST PROCEDURE.....11

4.4 TEST RECEIVER SETUP12

4.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....12

4.6 ENVIRONMENTAL CONDITIONS12

4.7 SUMMARY OF TEST RESULTS/PLOTS12

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: KZ Broadband Technologies, Ltd.
 Address of applicant: 1601 Tower C, Skyworth Building, High-Tech Industrial Park Nanshan District, Shenzhen, Guangdong, China

Manufacturer: KZ Broadband Technologies, Ltd.
 Address of manufacturer: 1601 Tower C, Skyworth Building, High-Tech Industrial Park Nanshan District, Shenzhen, Guangdong, China

General Description of EUT	
Product Name:	LTE Outdoor CPE
Brand Name:	AirMaster
Model No.:	AirMaster 4000D
Adding Model:	WF820, WF820+, AirMaster 4000X, AM4000D, AM4000x (x – any character), WF820x (x – any character) TLRD-UE-xxx (x – any character)
IMEI:	864423020016878
Rated Voltage:	DC 48V Adapter by PoE port
Adapter Model:	G0549-480-032
Device Category:	Fixed
<p><i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model AirMaster 4000D, but the circuit and the electronic construction do not change, declared by the manufacturer.</i></p>	

Technical Characteristics of EUT	
Rated Voltage:	PoE(DC 48V)
Rated Current:	0.32A
Lowest Internal Frequency:	32.768 kHz
Classification of ITE:	CLASS B

1.2 Test Standards

The following report is prepared on behalf of the KZ Broadband Technologies, Ltd. in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart B, and section 15.205, 15.107, and 15.109 rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology 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 and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Operating	Connected to PC, PING IP
TM2	/	/

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Power Cable	0.8	Unshielded	Without Core
RJ45	2.0	Unshielded	Without Core

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
			/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
PC	DELL	OPTIPLEX 380	/

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.107 (a)	Conducted Emissions	Compliant
§ 15.109 (a)	Radiated Emissions	Compliant

3. Conducted Emissions

3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

3.2 Test Equipment List and Details

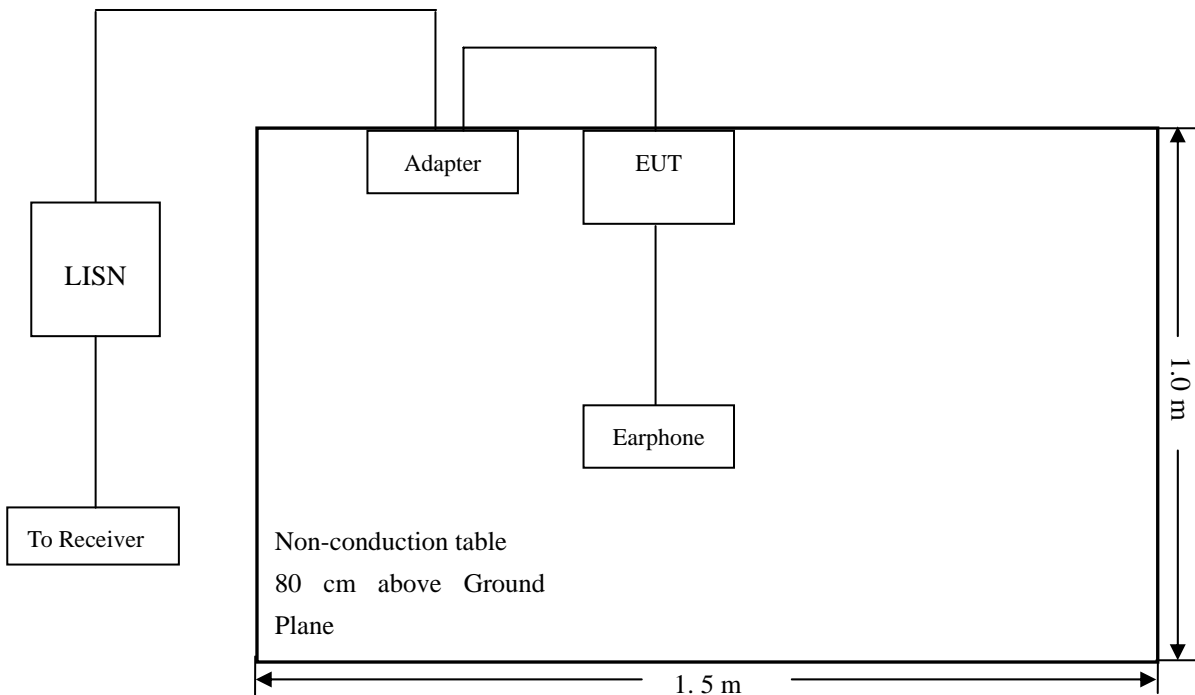
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2014-05-28	2015-05-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2014-05-28	2015-05-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2014-05-28	2015-05-27

3.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

Note: Base on the calibrated result, for the impedance characteristic and insertion loss, the effect shall be ignored from the placed multiple outlet power strip between the device and LISN.

3.4 Basic Test Setup Block Diagram



3.5 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

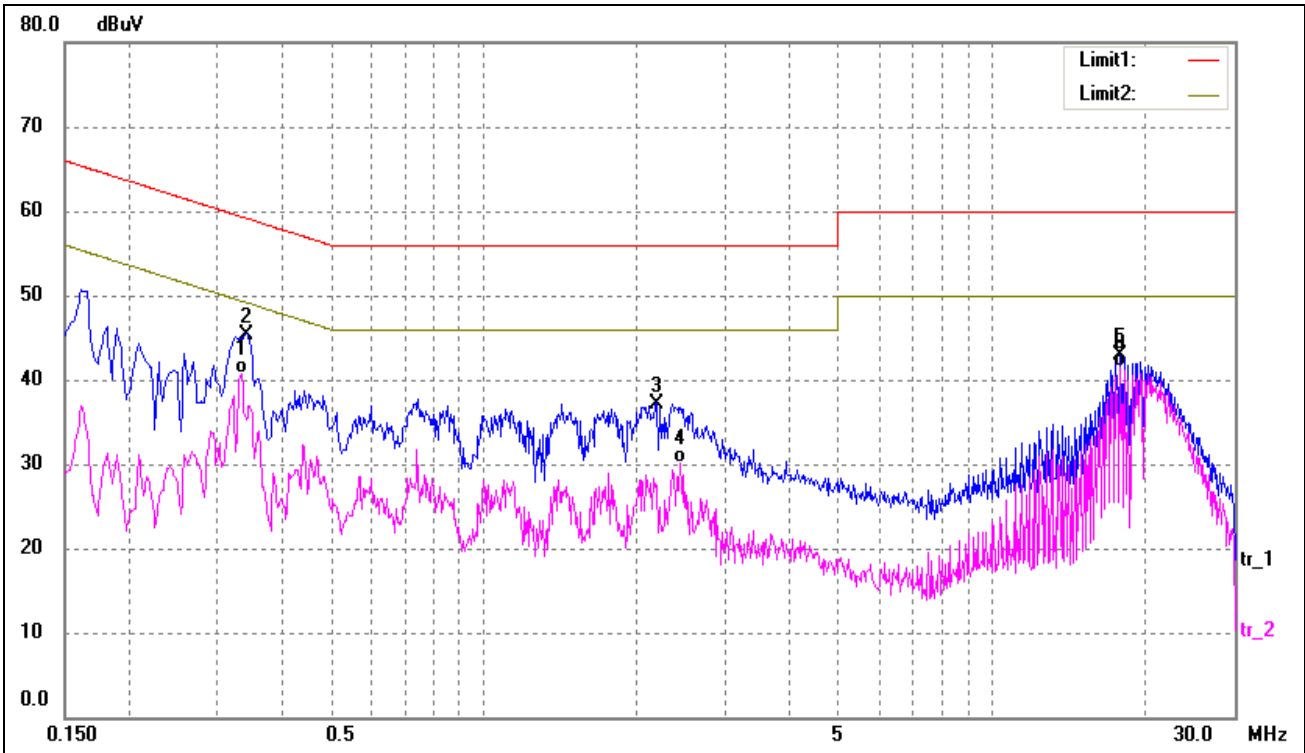
-6.14 dB at 17.8660 MHz in the Line mode, AVG detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

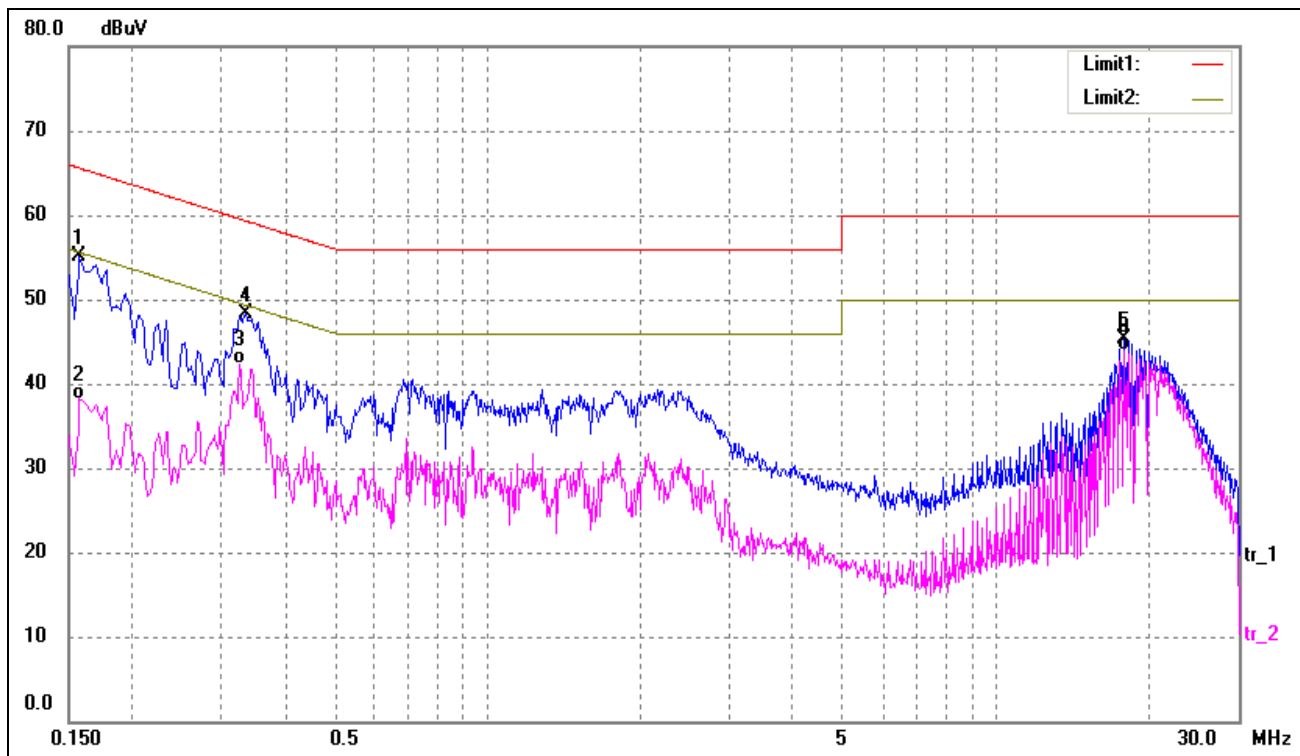
EUT: *LET Outdoor CPE*
 Tested Model: *AirMaster 4000D*
 Operating Condition: *TM1*
 Comment: *AC 120V/60Hz; 48V DC(PoE)*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3340	31.20	9.50	40.70	49.35	-8.65	AVG
2	0.3420	35.90	9.50	45.40	59.15	-13.75	peak
3	2.1980	27.20	10.00	37.20	56.00	-18.80	peak
4	2.4460	20.05	10.00	30.05	46.00	-15.95	AVG
5	17.8700	31.41	11.57	42.98	60.00	-17.02	peak
6*	17.8700	29.91	11.57	41.48	50.00	-8.52	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1580	45.65	9.50	55.15	65.57	-10.42	peak
2	0.1580	28.70	9.50	38.20	55.57	-17.37	AVG
3	0.3260	32.85	9.50	42.35	49.55	-7.20	AVG
4	0.3340	38.74	9.50	48.24	59.35	-11.11	peak
5	17.8660	33.70	11.57	45.27	60.00	-14.73	peak
6*	17.8660	32.29	11.57	43.86	50.00	-6.14	AVG

4. Radiated Emissions

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

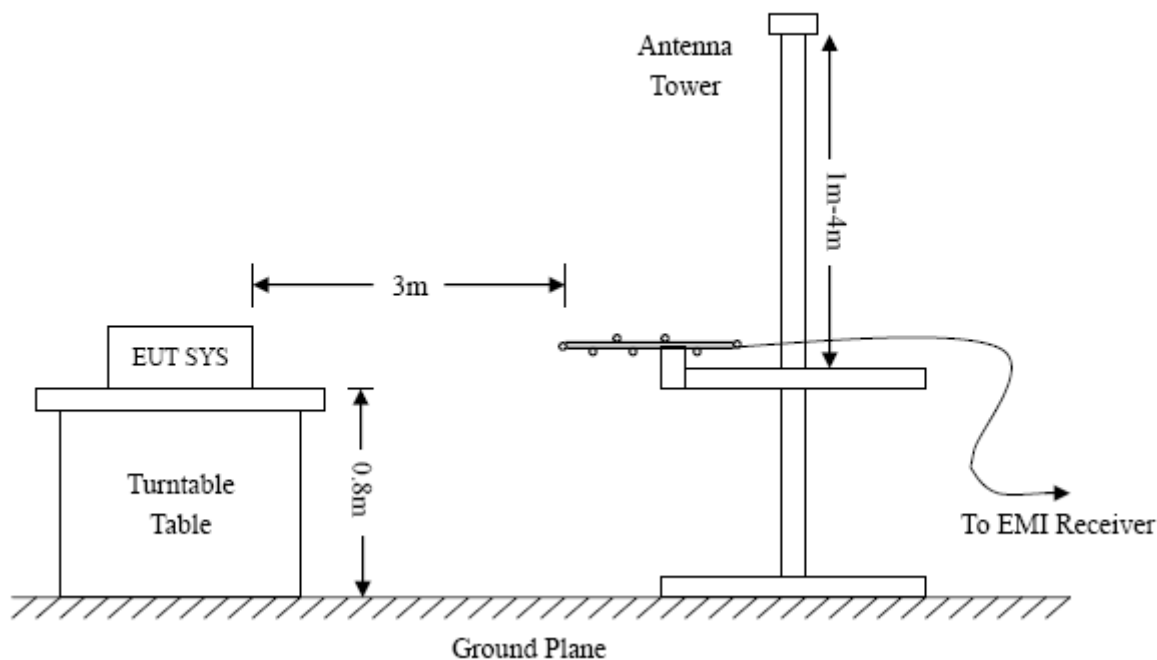
4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2014-05-28	2015-05-27
EMI Test Receiver	R&S	ESVB	825471/005	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	2015-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086197	2014-05-24	2015-05-23
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2014-05-28	2015-05-27

4.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.109 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.



4.4 Test Receiver Setup

Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for a Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.109(a) Limit}$$

4.6 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

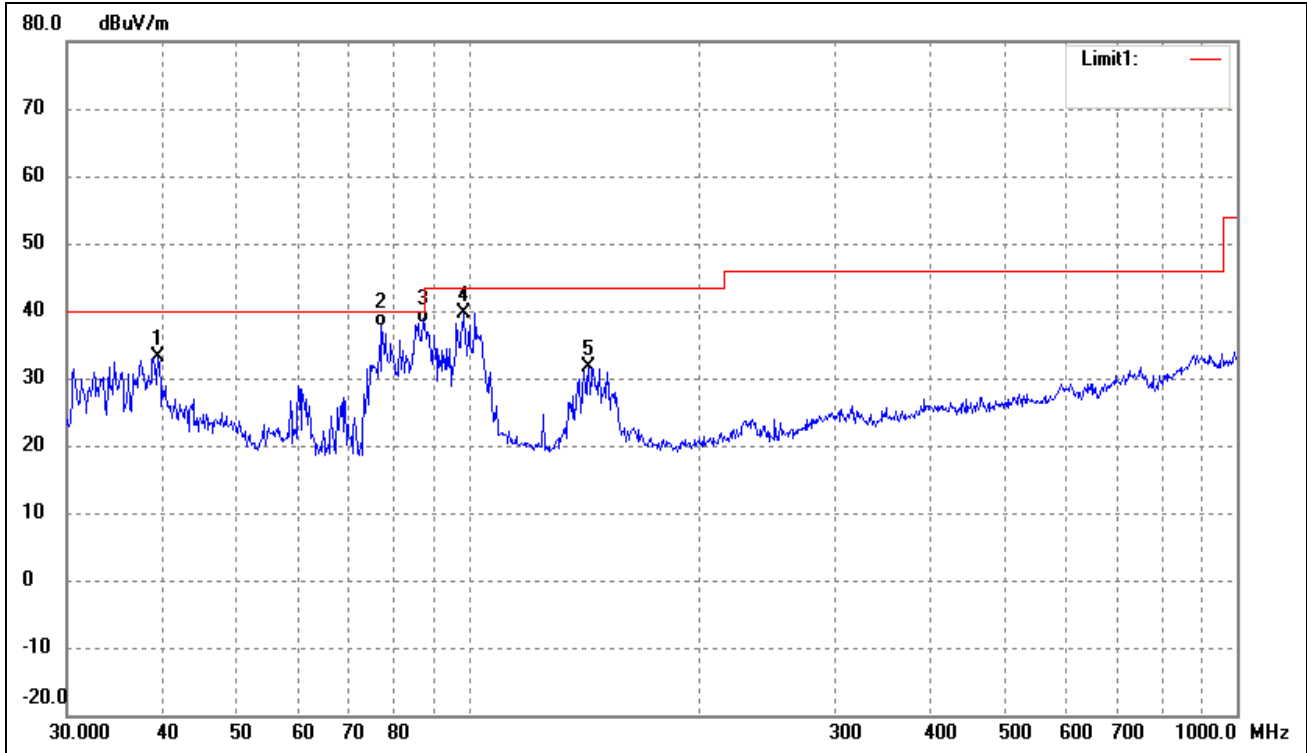
4.7 Summary of Test Results/Plots

According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-4.83 dB at 43.6585 MHz in the Vertical polarization, TM1 mode, 9 kHz to 6 GHz, 3Meters

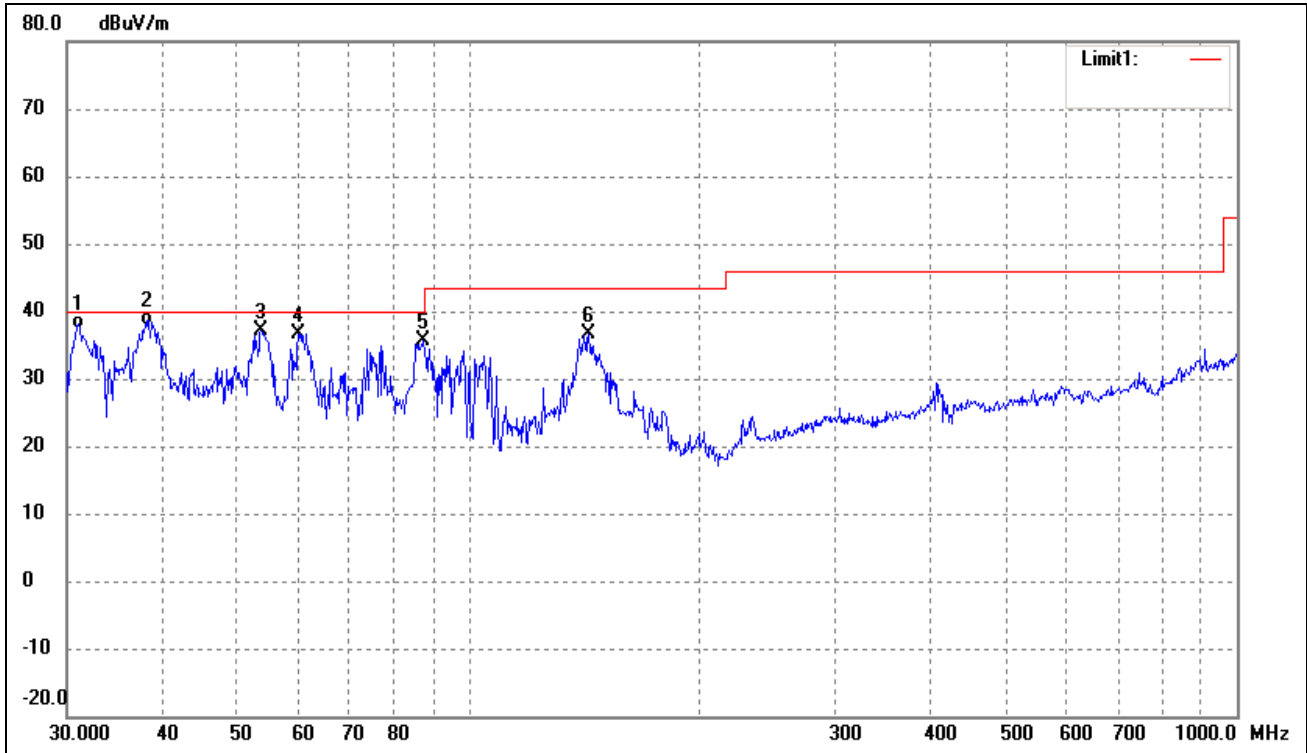
Plot of Radiated Emissions Test Data

EUT: *LET Outdoor CPE*
 Tested Model: *AirMaster 4000D*
 Operating Condition: *TM1*
 Comment: *AC 120V/60Hz; 48V DC(PoE)*
 Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	39.4371	26.04	7.10	33.14	40.00	-6.86	226	100	peak
2	77.0504	36.30	1.35	37.65	40.00	-2.35	360	100	QP
3	87.1116	35.20	2.86	38.06	40.00	-1.94	360	200	QP
4	98.4865	33.94	5.75	39.69	43.50	-3.81	134	100	peak
5	143.3260	29.23	2.45	31.68	43.50	-11.82	221	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	31.0704	29.50	7.80	37.30	40.00	-2.70	330	100	QP
2	38.2120	28.90	8.94	37.84	40.00	-2.16	271	100	QP
3	53.6931	31.12	5.94	37.06	40.00	-2.94	164	100	peak
4	60.0690	31.38	5.36	36.74	40.00	-3.26	182	100	peak
5	87.1115	32.79	2.86	35.65	40.00	-4.35	360	100	peak
6	143.3259	34.30	2.45	36.75	43.50	-6.75	360	100	peak

Note: Testing is carried out with frequency rang 9kHz to the 6GHz, which above 1GHz is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

The measurements greater than 20dB below the limit from 9kHz to 30MHz and test data are not provided.

***** END OF REPORT *****