

# FCC Part 15B Measurement and Test Report

For

**CEED LTD**

**499-505 Hackney Road, London**

**FCC ID: 2AF9IMK1**

<b>Test Rule(s):</b>	<u>FCC Part 15 Subpart B</u>
<b>Product Description:</b>	<u>pi-topCEED</u>
<b>Tested Model:</b>	<u>Model 1</u>
<b>Report No.:</b>	<u>STR16048141I</u>
<b>Tested Date:</b>	<u>2016-04-18 to 2016-04-29</u>
<b>Issued Date:</b>	<u>2016-04-29</u>
<b>Tested By:</b>	<u>Rode Liu / Engineer</u> <i>Rode Liu</i>
<b>Reviewed By:</b>	<u>Silin Chen / EMC Manager</u> <i>Silin Chen</i>
<b>Approved &amp; Authorized By:</b>	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
<b>Prepared By:</b>	

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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.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: CEED LTD  
Address of applicant: 499-505 Hackney Road, London

Manufacturer: Shenzhen Zealfull Technology Co., Ltd  
Address of manufacturer: 2<sup>nd</sup> Floor East, B1 Building, Shunheda Area, Liuxiandong Industrial Zone, Nanshan, Shenz

General Description of EUT	
Product Name:	Pi-topCEED
Trade Name:	pi-top
Model No.:	Model 1
Adding Model(s):	/
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Rated Voltage:	AC120V/60HZ Adapter DC 18V
Rated Current:	1A
Rated Power:	18W
Power Adapter Model:	YHY-18001000
Highest Internal Frequency:	1GHz
Classification of ITE:	CLASS B

## 1.2 Test Standards

The following report is prepared on behalf of the CEED 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 2<sup>nd</sup> 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	WORKING	Connect to PC
TM2		
TM3		
TM4		

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
HDMI	0.3	Unshielded	Without Core

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
PC	Dell	VOSTRO 260S	J1XTC3X
Keyboard	Dell	L100	/
Mouse	Dell	M120	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

## 1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	$\pm 2.88\text{dB}$
Transmitter Spurious Emissions	Radiated	$\pm 5.1\text{dB}$

## 1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

## 2. SUMMARY OF TEST RESULTS

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

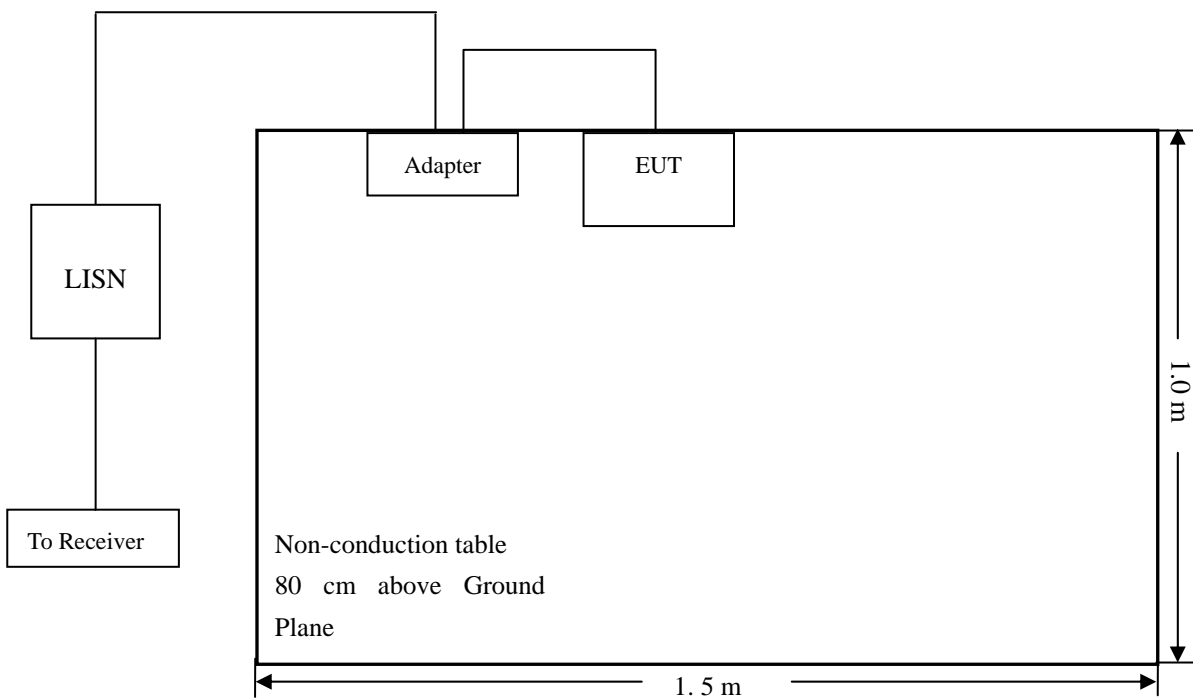
N/A: not applicable

### 3. Conducted Emissions

#### 3.1 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.

#### 3.2 Basic Test Setup Block Diagram



#### 3.3 Environmental Conditions

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

#### 3.4 Summary of Test Results/Plots

According to the data in section 3.5, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

**-7.10 dB at 14.6740 MHz in the Line, AVG detector, 0.15-30MHz**

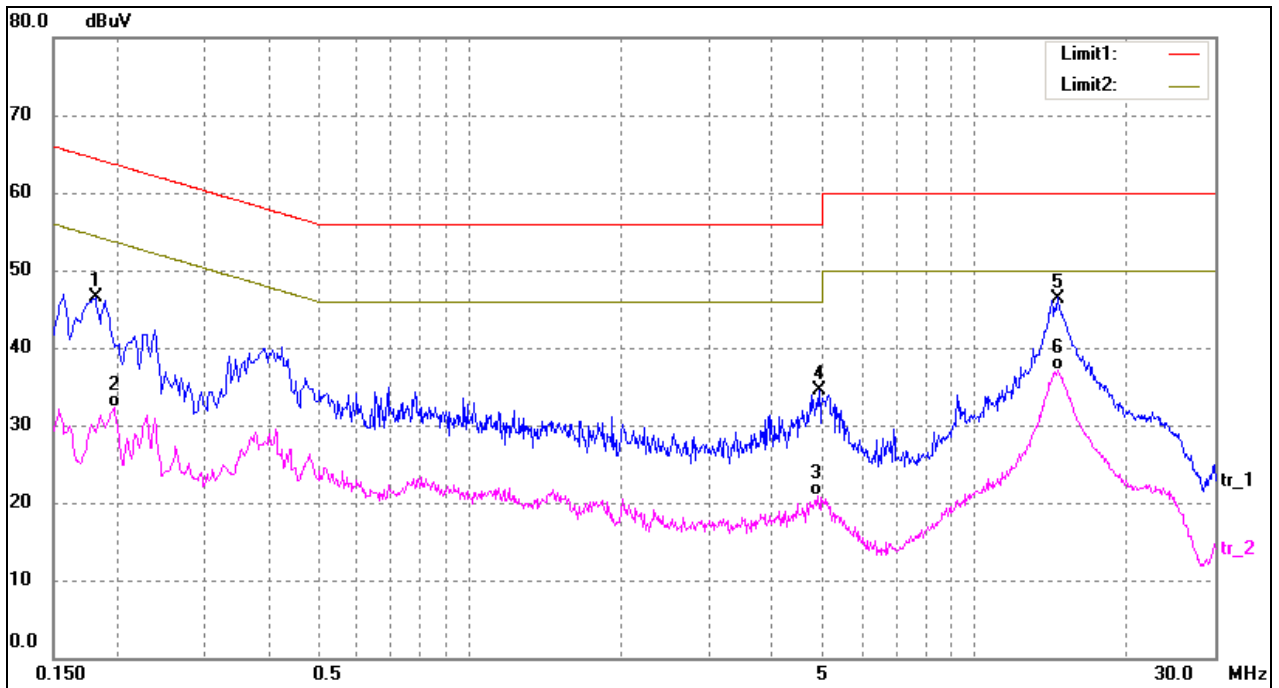


### 3.5 Conducted Emissions Test Data

#### Plot of Conducted Emissions Test Data

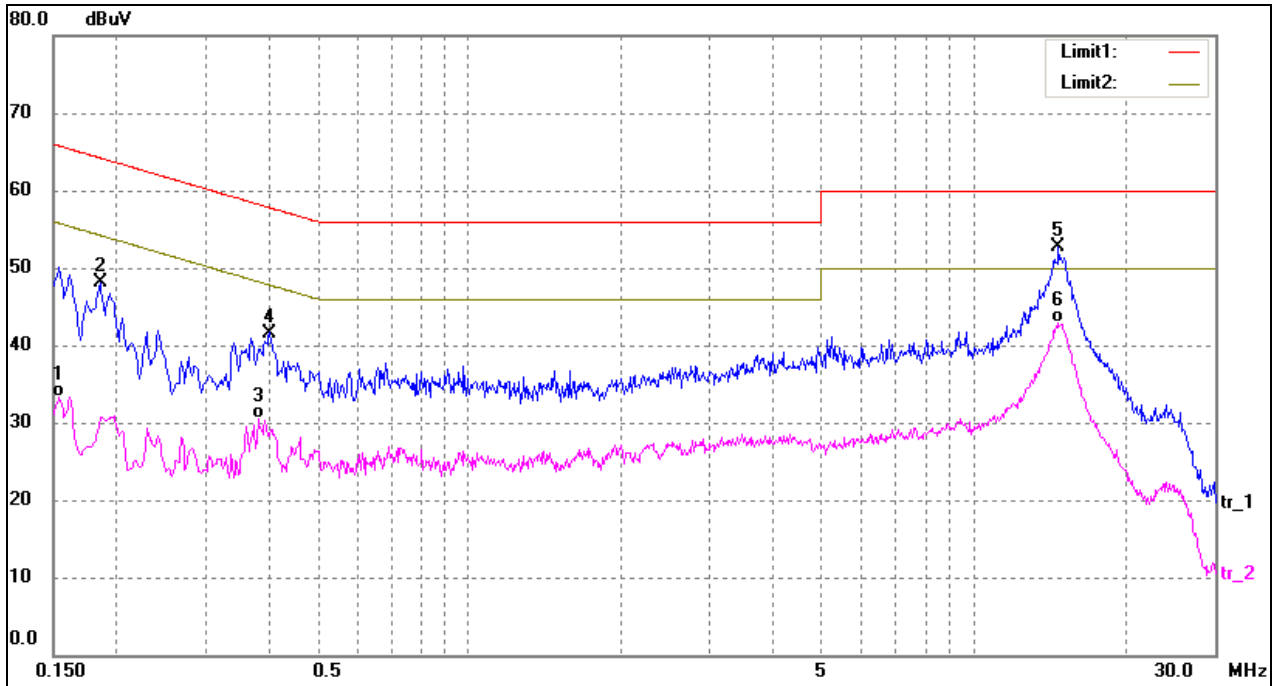
EUT: *Pi-topCEED*  
 Tested Model: *Model 1*  
 Operating Condition: *TM1*  
 Comment: *AC120V/60Hz Adapter DC 18V*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1820	36.99	9.50	46.49	64.39	-17.90	peak
2	0.1980	22.90	9.50	32.40	53.69	-21.29	AVG
3	4.9139	10.61	10.23	20.84	46.00	-25.16	AVG
4	4.9499	24.21	10.23	34.44	56.00	-21.56	peak
5	14.6619	35.98	10.42	46.40	60.00	-13.60	peak
6*	14.6619	26.67	10.42	37.09	50.00	-12.91	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1540	23.82	9.50	33.32	55.78	-22.46	AVG
2	0.1860	38.57	9.50	48.07	64.21	-16.14	peak
3	0.3820	20.98	9.50	30.48	48.24	-17.76	AVG
4	0.4020	32.10	9.50	41.60	57.81	-16.21	peak
5	14.6740	42.27	10.42	52.69	60.00	-7.31	peak
6*	14.6740	32.48	10.42	42.90	50.00	-7.10	AVG

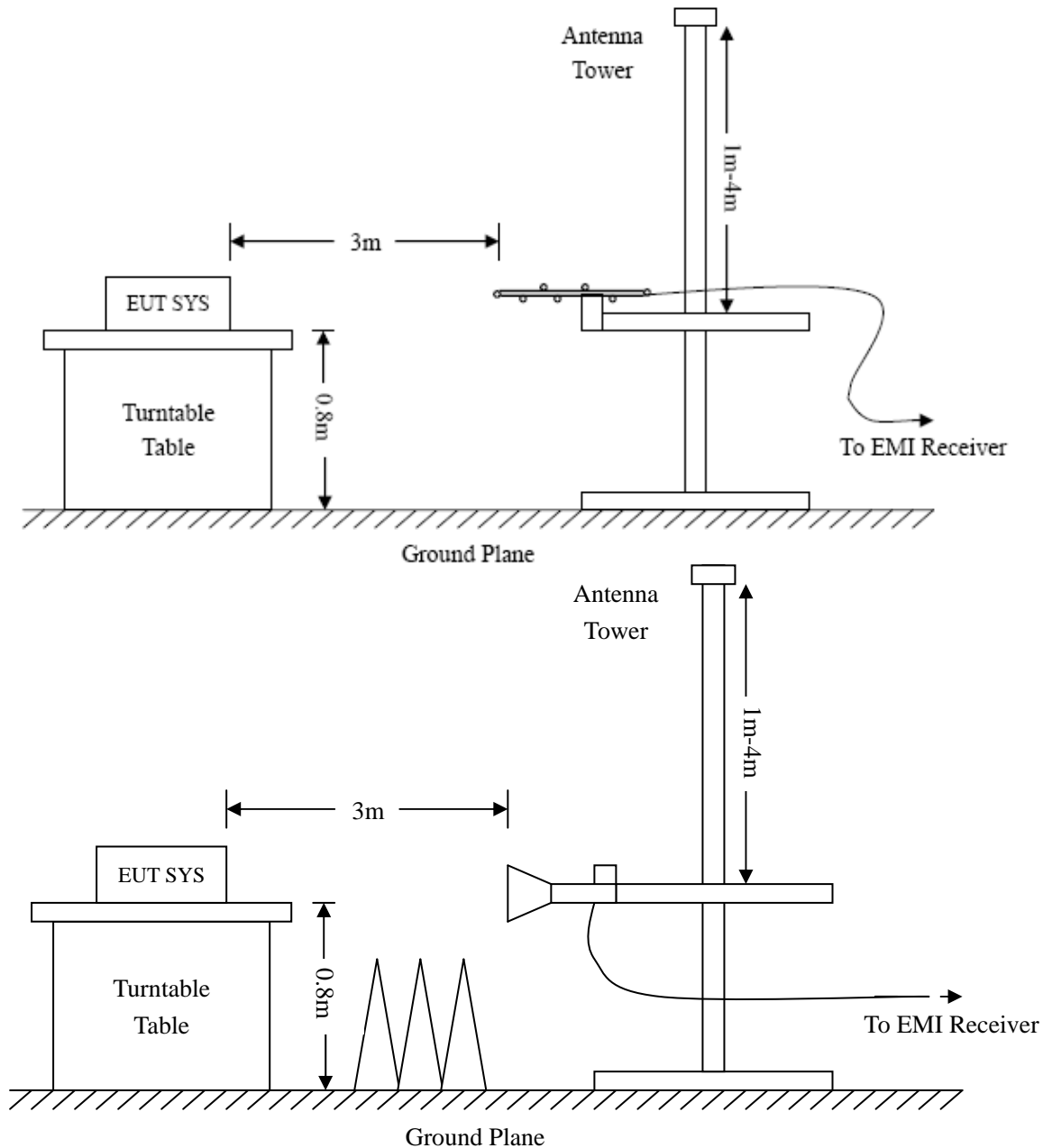
## 4. Radiated Emissions

### 4.1 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.



### 4.2 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

### 4.3 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:

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

### 4.4 Environmental Conditions

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

### 4.5 Summary of Test Results/Plots

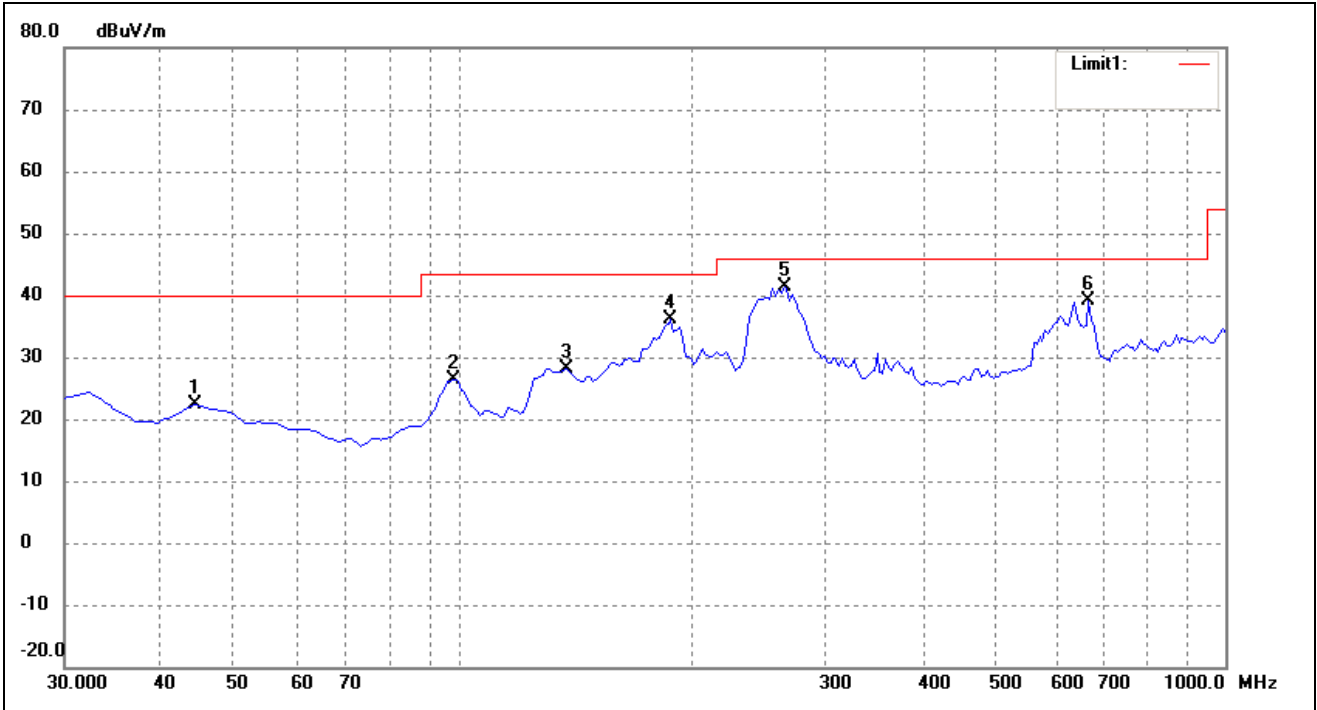
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

**-2.82 dB at 32.4249 MHz in the Vertical polarization, 30MHz to 5 GHz, 3Meters**

**Plot of Radiated Emissions Test Data**

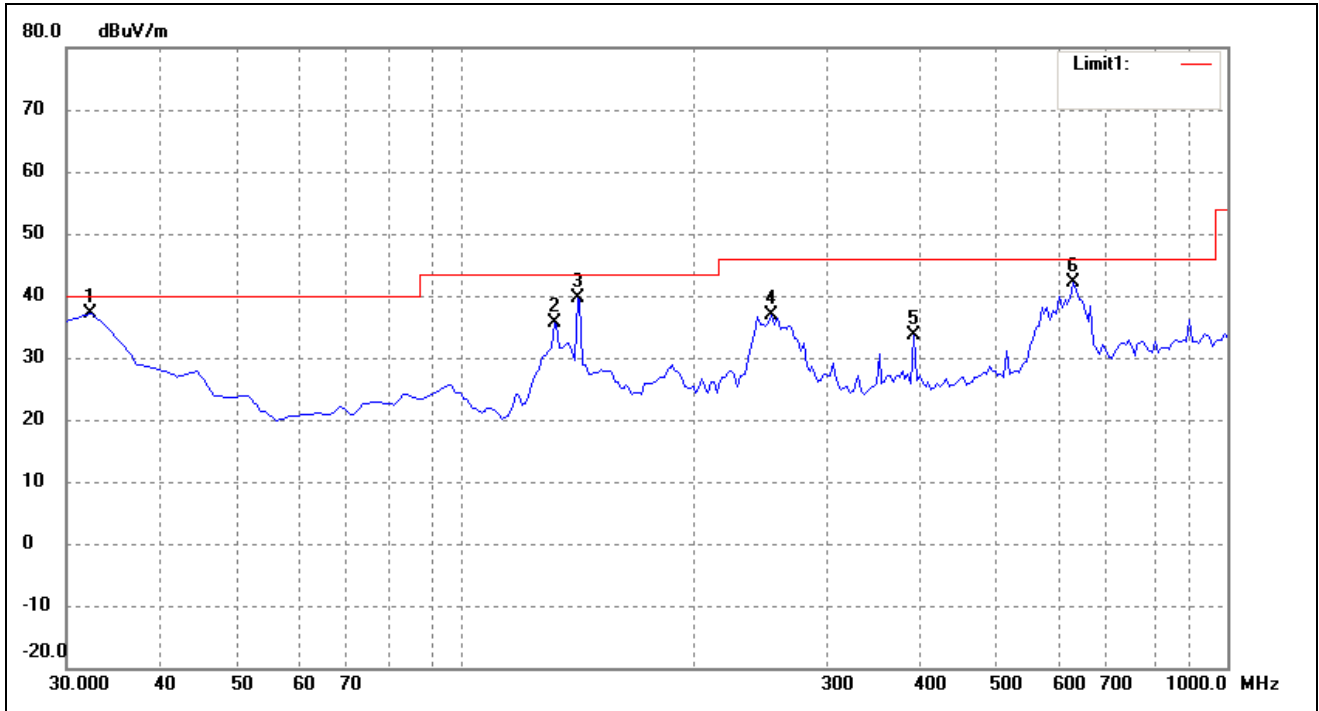
EUT: *Pi-topCEED*  
 Tested Model: *Model 1*  
 Operating Condition: *TM1*  
 Comment: *AC120V/60Hz Adapter DC 18V*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	44.5499	30.30	-7.96	22.34	40.00	-17.66	58	200	peak
2	97.9000	37.74	-11.33	26.41	43.50	-17.09	326	200	peak
3	136.6999	40.61	-12.38	28.23	43.50	-15.27	100	200	peak
4	187.6250	46.50	-10.33	36.17	43.50	-7.33	209	200	peak
5	265.2250	48.04	-6.73	41.31	46.00	-4.69	100	100	peak
6	667.7749	38.98	0.23	39.21	46.00	-6.79	100	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.4249	46.87	-9.69	37.18	40.00	-2.82	100	100	peak
2	131.8499	47.71	-12.11	35.60	43.50	-7.90	308	100	peak
3	141.5500	52.17	-12.55	39.62	43.50	-3.88	120	100	peak
4	253.0999	44.36	-7.42	36.94	46.00	-9.06	359	100	peak
5	391.3249	36.20	-2.69	33.51	46.00	-12.49	100	100	peak
6	633.8250	41.14	0.87	42.01	46.00	-3.99	100	100	peak

Note: Testing is carried out with frequency rang 30MHz to the 5GHz, which above 1GHz is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

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