



## FCC PART 15 CLASS B

# MEASUREMENT AND TEST REPORT

For

## Skspruce Technologies Inc.

1732 N, First Street, Suit 220, San Jose, CA

**FCC ID: 2ACKD-WIA3280**

<b>This Report Concerns:</b> Original Report	<b>Equipment Name:</b> Indoor Access Point
<b>Test Engineer:</b> Kevin Tao	<i>Kevin Tao</i>
<b>Report Number:</b> RSC141011005	
<b>Report Date:</b> 2015-03-06	
<b>Reviewed By:</b> Harry Wu	<i>Harry Wu</i>
<b>Prepared By:</b>	Technical Leader
Bay Area Compliance Laboratories Corp. (Chengdu) 5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: +86-28-65525123 Fax: +86-28-65525125 www.baclcorp.com	

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## **GENERAL INFORMATION**

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### **Product Description for Equipment under Test (EUT)**

The *Skspruce Technologies Inc.*'s product, model number: *WIA3200-80* (FCC ID: *2ACKD-WIA3280*) (the "EUT") in this report was an Indoor Access Point, which was measured approximately: 200mm (W) x 200mm (D) x 45mm (H),

POE:

Input: AC 100 - 240V, 50/60Hz

Output: DC 48 - 56V

AC ADAPTER:

Input: AC 100 - 240V, 50/60Hz

Output: DC12V

*\*All measurement and test data in this report were gathered from final production sample, serial number: 8112014062300026 (provided by Applicant). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2014-12-30, and EUT complied with test requirement.*

### **Objective**

The following Class B report was prepared on behalf of **Skspruce Technologies Inc.**, in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC Part 15 Class B limits.

### **Related Submittal(s)/Grant(s)**

FCC Part 15.407 submissions with FCC ID: 2ACKD-WIA3280.

FCC Part 15.247 submissions with FCC ID: 2ACKD-WIA3280.

### **Test Methodology**

All measurements contained in this report are conducted with ANSI C63.4-2003, 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. All radiated and conducted emissions measurement is performed at BACL. The radiated testing is performed at an antenna-to-EUT distance of 3 Meters.

### **Test Facility**

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on July 31, 2009. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Justification

The system is configured for testing in a typical fashion (as a normally used by a typical user).

### EUT Exercise Software

Software name: tfgen.exe

### Special Accessories

No special accessories were supplied by BACL.

### Equipment Modifications

No modification to the EUT was made by BACL to make sure the EUT comply with applicable limits.

### Equipment under Test (EUT) General Description

Applicant	Description	Model Number	Serial Number
Skspruce Technologies Inc.	Indoor Access Point	WIA3200-80	8112014062300026

### Local Support Equipment List and Details

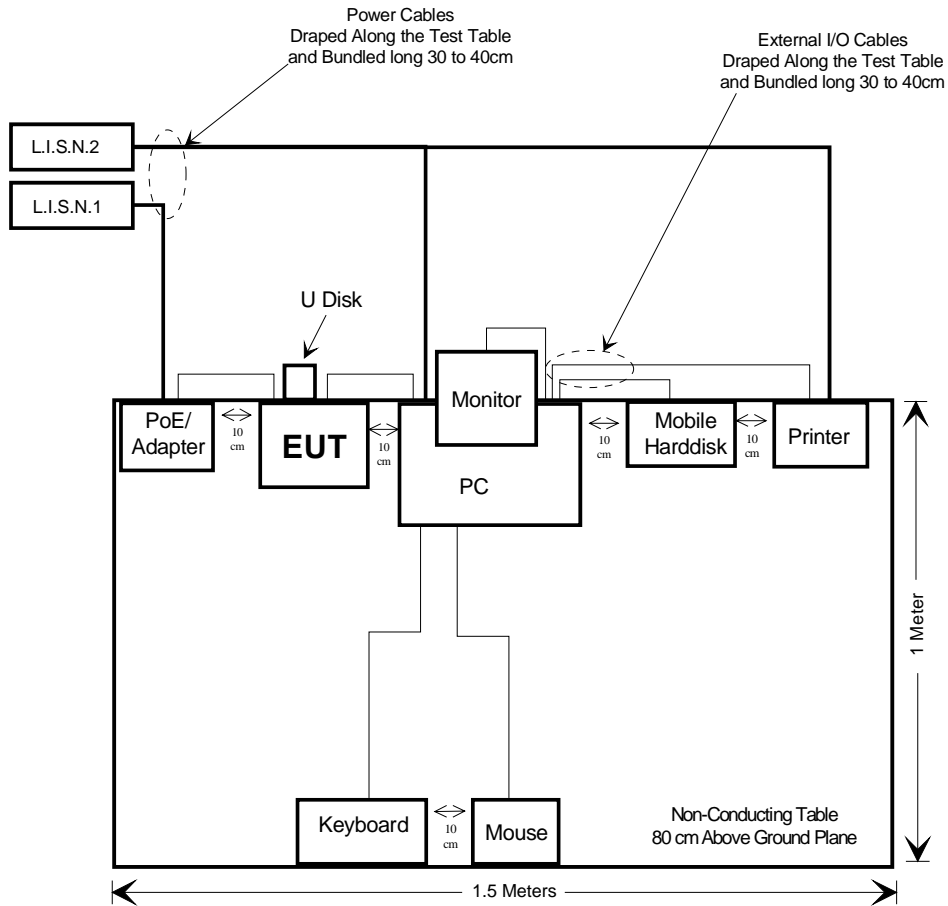
Manufacturer	Description	Model	Serial Number
IBM	PC	8176	99Y7315
DELL	Monitor	SK-8815	9161649
IBM	Keyboard	KM-110X	XBK133000993
Logitech	Mouse	M-U0004	810-001808
Antek	Voip Gateway	EGW802	050830054-1B
EPSON	Printer	B261A	GXSK285854
GIGADIT	PoE Injector	NONE	NONE
LITEON	AC Adapter	PA-1051-0	L21133000100
KINGSTONE	U Disk	NONE	NONE

### External I/O Cable

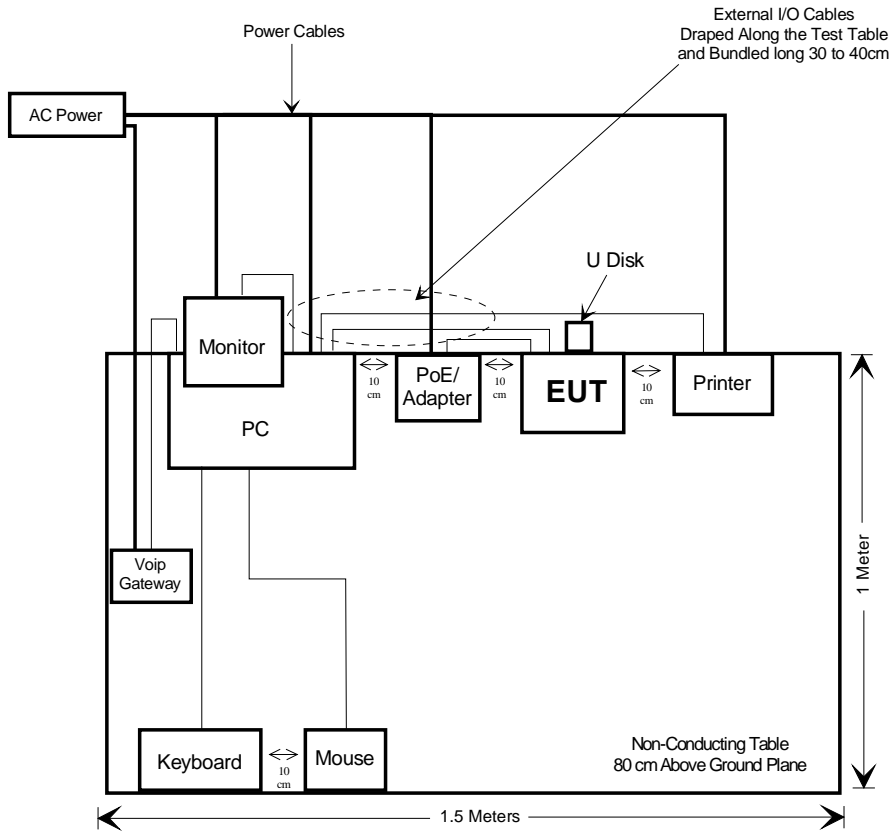
Cable Description	Length (m)	From	To
Unshielded LAN/Power cable	1.0	PoE Injector/AC Adapter	EUT
Shielded VGA cable	1.5	PC	Monitor
Unshielded LAN cable	1.0	PC	EUT
Shielded Mouse cable	1.5	PC	Mouse
Shielded Keyboard cable	1.5	PC	Keyboard
Shielded LPT Cable	1.5	PC	Printer
Shielded RS232 Cable	0.5	PC	Voip Gateway

## Block Diagram of Test Setup

Conducted emission:



Radiated emission:





## **SUMMARY OF TEST RESULTS**

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<b>Standard</b>	<b>Description</b>	<b>Result</b>
FCC §15.107	Conducted Emission	Compliance
FCC §15.109	Radiated Emission	Compliance

## FCC §15.107 CONDUCTED EMISSION TEST

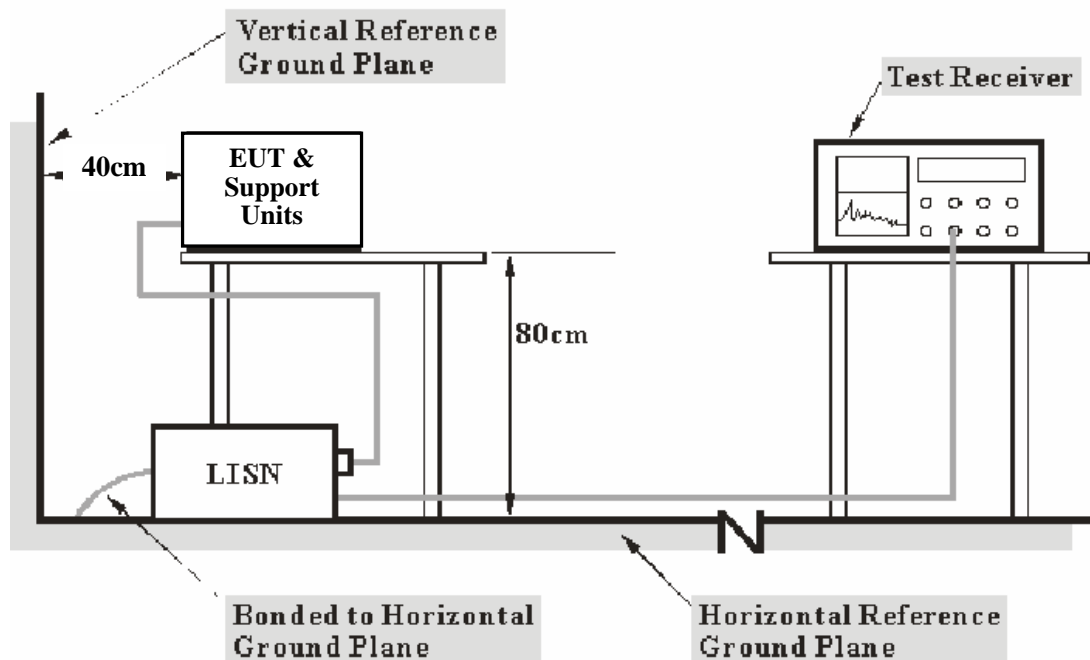
### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. The factors contributing to uncertainties are EMI Test Receiver, cable loss, and L.I.S.N.

Based on CISPR 16-4-2, the Treatment of Uncertainty in EMI Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Chengdu) is  $\pm 3.17$  dB.

### EUT Setup

The setup of EUT was in accordance with ANSI C63.4-2003 measurement procedure. The specification used was the FCC Part 15 Class B limits.



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The power cables and excess cables shall be folded at the cable center into a bundle no longer than 40 cm.

The spacing between the peripherals unit & EUT was 10 cm.

DC 48V was used by the EUT through POE injector.  
DC12V was used by the EUT through AC adapter.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<u>Frequency Range</u>	<u>IF B/W</u>
150 kHz – 30 MHz	9 kHz

## Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data are recorded in the Quasi-peak and Average detection mode. Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with an "AV".

The EUT is in the normal operating mode during the final qualification test to represent the worst cases results.

## Test Equipment List and Details

Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
EMI Test Receiver	Rohde & Schwarz	ESCS 30	836858/0016	2014-06-23	2015-06-22
L.I.S.N.	Rohde & Schwarz	ENV216	3560.6550.06	2014-06-23	2015-06-22
L.I.S.N.	Rohde & Schwarz	ENV216	3560.6550.12	2014-02-08	2015-02-07

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Environment Conditions

Temperature:	15 °C
Relative Humidity:	63 %
ATM Pressure:	96.1 kPa

*The testing was performed by Kevin Tao on 2015-01-12.*

## Summary of Test Results

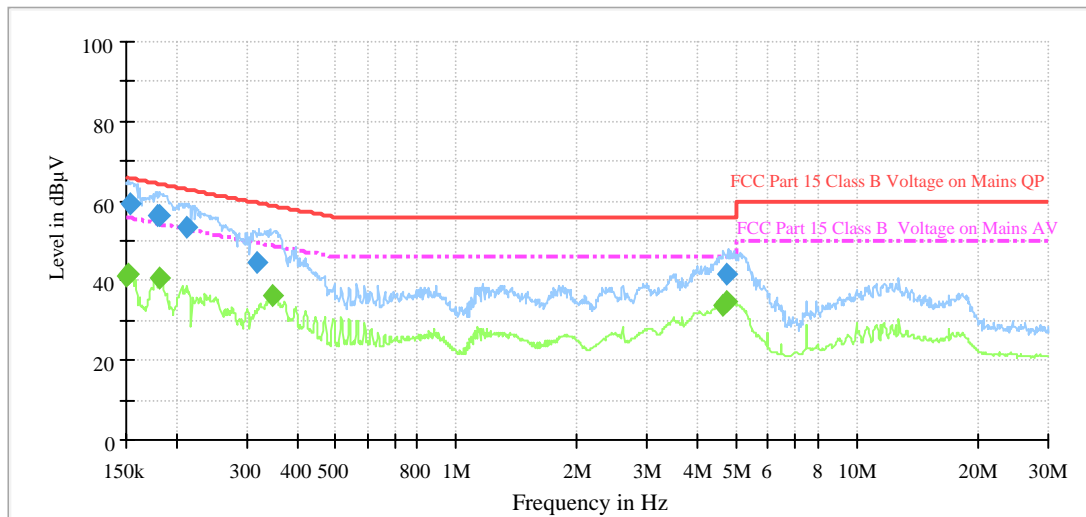
According to the data in the following, the EUT complied with the FCC Part 15 for a Class B device, with the *worst* margin reading of:

**6.3 dB at 0.153636 MHz in the Line conducted mode.**

**For POE**

Test Mode: PC Link

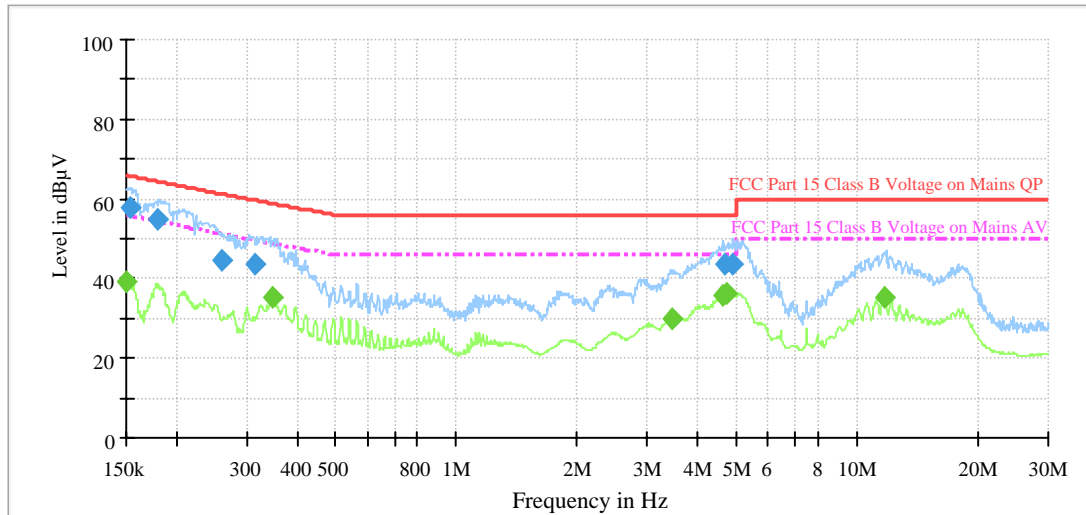
**Line**



Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.153636	59.5	9.000	Off	L1	18.8	6.3	65.8
0.178947	56.5	9.000	Off	L1	19.0	7.9	64.4
0.181386	56.6	9.000	Off	L1	19.0	7.7	64.3
0.211763	53.7	9.000	Off	L1	19.3	9.3	63.0
0.318890	44.7	9.000	Off	L1	19.9	14.8	59.5
4.751466	41.6	9.000	Off	L1	20.5	14.4	56.0

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	41.1	9.000	Off	L1	18.7	14.9	56.0
0.151807	41.7	9.000	Off	L1	18.7	14.2	55.9
0.181386	40.6	9.000	Off	L1	19.0	13.7	54.3
0.348942	36.4	9.000	Off	L1	19.9	12.4	48.8
4.619278	33.9	9.000	Off	L1	20.5	12.1	46.0
4.731991	34.6	9.000	Off	L1	20.5	11.4	46.0

**Neutral**



Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Neutral	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.153636	58.0	9.000	Off	N	18.8	7.8	65.8
0.178776	55.0	9.000	Off	N	19.0	9.4	64.4
0.259059	44.6	9.000	Off	N	19.5	16.7	61.3
0.314858	43.8	9.000	Off	N	19.8	15.8	59.6
4.675114	43.9	9.000	Off	N	20.4	12.1	56.0
4.906948	43.6	9.000	Off	N	20.4	12.4	56.0

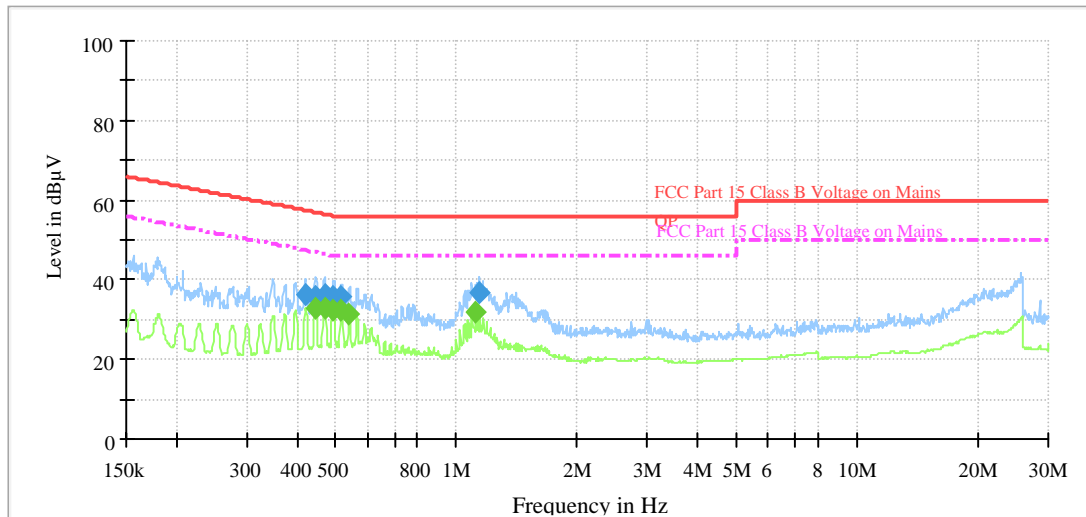
Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Neutral	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150600	39.1	9.000	Off	N	18.7	16.9	56.0
0.348942	35.1	9.000	Off	N	19.9	13.7	48.8
3.440435	30.0	9.000	Off	N	20.4	16.0	46.0
4.617455	36.0	9.000	Off	N	20.4	10.0	46.0
4.731991	36.1	9.000	Off	N	20.4	9.9	46.0
11.685206	35.3	9.000	Off	N	20.5	14.7	50.0

Note: EUT transmitting simultaneously with 2.4G and 5G radio frequency and supports intelligent radio frequency management functionalities.

**For AC Adapter**

Test Mode: PC Link

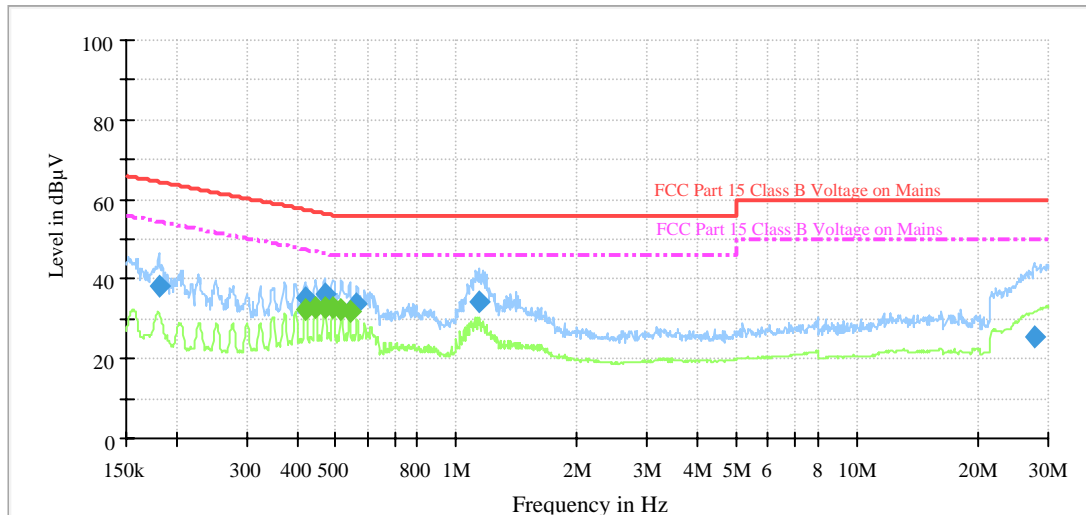
**Line**



Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.420135	36.3	9.000	Off	L1	20.1	21.1	57.4
0.446062	35.8	9.000	Off	L1	20.1	21.1	56.9
0.467950	36.3	9.000	Off	L1	20.1	20.2	56.5
0.492876	35.7	9.000	Off	L1	20.1	20.4	56.1
0.517062	35.6	9.000	Off	L1	20.1	20.4	56.0
1.139770	37.0	9.000	Off	L1	20.2	19.0	56.0

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.444284	32.9	9.000	Off	L1	20.1	14.1	47.0
0.469822	32.7	9.000	Off	L1	20.1	13.8	46.5
0.492876	32.4	9.000	Off	L1	20.1	13.7	46.1
0.517062	32.2	9.000	Off	L1	20.1	13.8	46.0
0.540273	31.4	9.000	Off	L1	20.1	14.6	46.0
1.117246	31.7	9.000	Off	L1	20.2	14.3	46.0

**Neutral**



Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Neutral	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.180957	38.1	9.000	Off	N	19.0	26.4	64.3
0.418461	35.4	9.000	Off	N	20.1	22.0	57.4
0.469822	36.4	9.000	Off	N	20.1	20.1	56.5
0.564526	33.9	9.000	Off	N	20.1	22.1	56.0
1.139770	34.3	9.000	Off	N	20.2	21.7	56.0
27.672851	25.7	9.000	Off	N	20.8	34.3	60.0

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Neutral	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.420135	32.2	9.000	Off	N	20.1	15.2	47.4
0.444284	33.0	9.000	Off	N	20.1	14.0	47.0
0.469822	32.7	9.000	Off	N	20.1	13.8	46.5
0.492876	32.9	9.000	Off	N	20.0	13.2	46.1
0.517062	32.5	9.000	Off	N	20.1	13.5	46.0
0.542434	31.7	9.000	Off	N	20.1	14.3	46.0

Note: EUT transmitting simultaneously with 2.4G and 5G radio frequency and supports intelligent radio frequency management functionalities.

## FCC §15.109 RADIATED EMISSION TEST

### Measurement Uncertainty

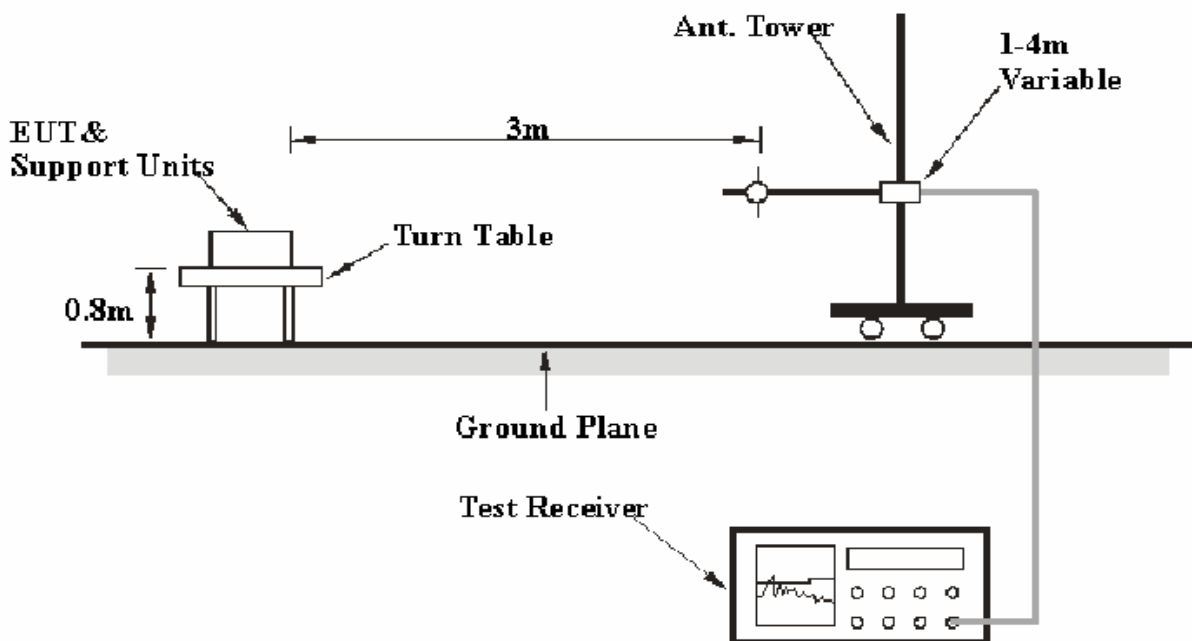
All measurements involve certain levels of uncertainties, especially in the field of EMI. The factors contributing to uncertainties are EMI Test Receiver, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2, the Treatment of Uncertainty in EMI Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is 30M~200MHz:  $\pm 4.7$  dB ; 200M~1GHz:  $\pm 6.0$  dB ; 1G-6GHz:  $\pm 5.13$ dB.

### EUT Setup

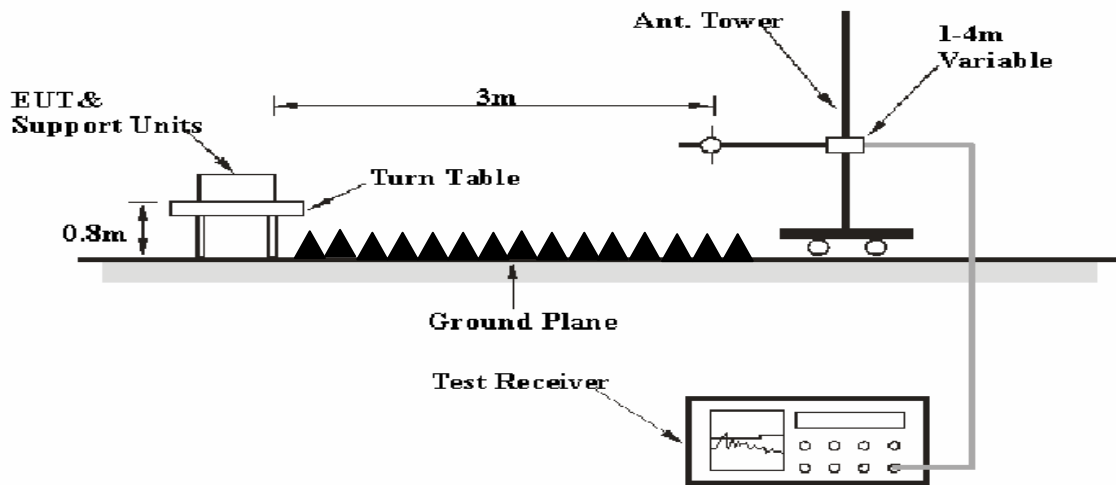
The radiated emission tests were performed in the 3 meter Semi Anechoic Chamber, using the setup in accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 Class B limits.

#### Below 1GHz:





**Above 1GHz:**



The excess cables shall be folded at the cable center into a bundle no longer than 40 cm.

The spacing between the peripherals unit & EUT was 10 cm.

DC 48V was used by the EUT through POE injector.  
DC12V was used by the EUT through AC adapter.

**EMI Test Receiver Setup**

According to FCC Rules, so the frequency range to be tested from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver is set with the following configurations:

<i>Frequency</i>	<i>RB/W</i>	<i>VB/W</i>	<i>IF B/W</i>	<i>Detector</i>
30 MHz-1 GHz	120 kHz	300 kHz	120 kHz	Quasi-peak
Above 1 GHz	1 MHz	3 MHz		Peak
	1 MHz	10 Hz		Average

**Test Procedure**

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data were recorded in the quasi-peak detection mode.

The EUT was in the normal operating mode during the final qualification test to represent the worst case results.

### Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7 dB $\mu$ V/m below the maximum limit for FCC Part 15 Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{FCC Part 15 Class B Limit} - \text{Corr. Ampl.}$$

### Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2014-06-23	2015-06-22
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2014-06-23	2015-06-22
Sunol Sciences	Broadband Antenna	JB3	A101808	2013-04-10	2015-04-09
Rohde & Schwarz	Spectrum Analyzer	FSL18	100180	2014-06-23	2015-06-22
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2014-10-17	2015-10-16
EM TEST	Horn Antenna	3115	003-6076	2014-04-09	2015-04-08
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2014-11-18	2015-11-17
EMCT	Semi-Anechoic Chamber	966	N/A	2013-03-13	2016-03-12

\* **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

### Test Software

Description	Manufacturer	Version
EMC32	R&S	V 8.52.0

### Summary of Test Results

According to the data in the following, the EUT complied with the FCC Part 15 Class B standards, and had the worst margin of:

**5.6 dB at 35.378877 MHz** in the **Vertical** polarization for Normal Operating Mode

## Radiated Emission Test Data

### Test Environment Conditions

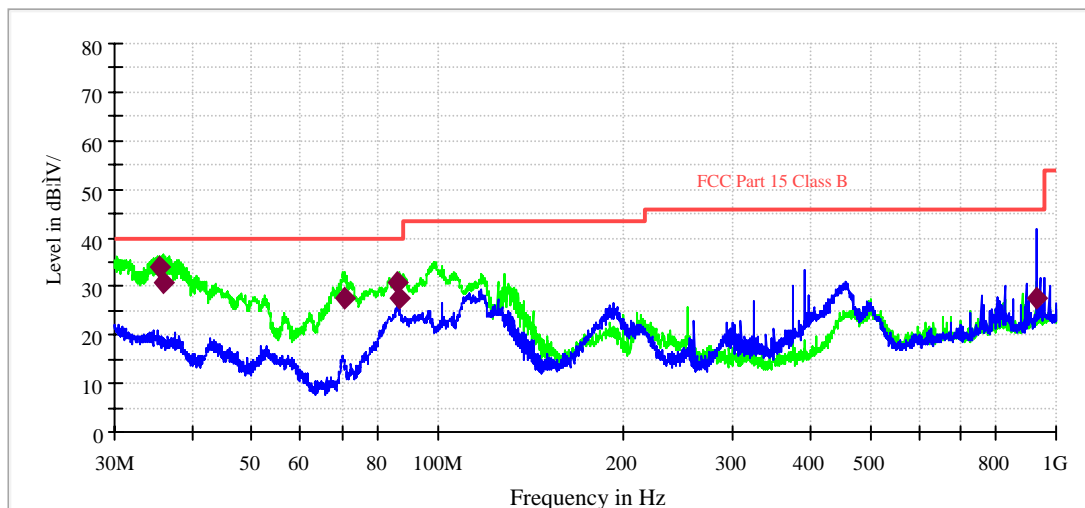
Temperature:	16 °C
Relative Humidity:	62 %
ATM Pressure:	97.5 kPa

The testing was performed by Kevin Tao on 2015-03-06.

### Below 1 GHz:

#### For POE

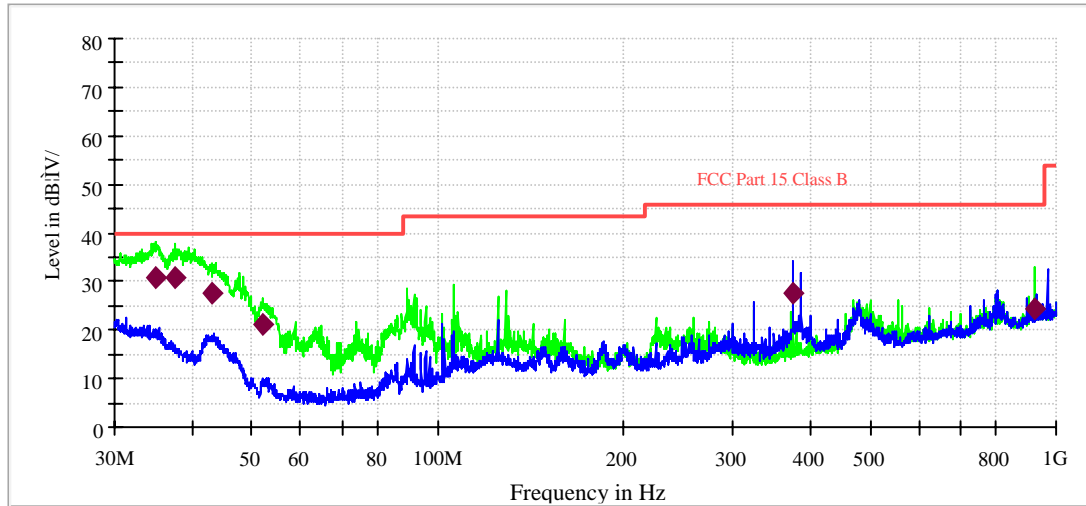
Electric Field Strength with Scans



Frequency (MHz)	MaxPeak-MaxHold (dB µ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB µ V/m)
35.378877	34.4	100.0	V	270.0	-8.4	5.6	40.0
35.877413	32.4	100.0	V	270.0	-8.8	7.6	40.0
70.511102	28.8	100.0	V	270.0	-19.6	11.2	40.0
85.856022	30.2	100.0	V	180.0	-18.7	9.8	40.0
86.286162	27.9	100.0	V	180.0	-18.7	12.1	40.0
929.345919	21.7	100.0	H	0.0	-2.4	24.3	46.0

**For Adapter**

Electric Field Strength with Scans



Frequency (MHz)	MaxPeak-MaxHold (dB µ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB µ V/m)
35.027026	30.2	100.0	V	270.0	-8.1	9.8	40.0
37.565458	30.7	100.0	V	0.0	-10.3	9.3	40.0
42.992148	27.8	100.0	V	180.0	-14.5	12.2	40.0
52.087321	21.4	100.0	V	0.0	-19.1	18.6	40.0
375.003262	27.2	100.0	H	90.0	-10.5	18.8	46.0
921.944497	21.2	100.0	V	180.0	-2.5	24.8	46.0

**Above 1 GHz:**

Frequency	Result	Polarity	Detector	Limit	Antenna Height	Turntable Position	Margin
MHz	(dB $\mu$ V/m)	V/H	QP/Ave.	(dB $\mu$ V/m)	(cm)	(deg)	(dB)
2143.000	46.60	H	PK	74	100	95	27.40
2143.000	35.02	H	AV	54	100	95	18.98
1803.000	55.32	V	PK	74	110	235	18.68
1803.000	41.03	V	AV	54	110	235	12.97
4159.000	49.63	H	PK	74	100	160	24.37
4159.000	34.87	H	AV	54	100	160	19.13

**Test Result: Pass**

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