



FCC PART 15 CLASS B

MEASUREMENT AND TEST REPORT

For

SKSpruce Technologies Co., Ltd.

A1, Tianfu Software Park, 1129 Century City Road, Hi-tech Zone,
Chengdu, Sichuan, China

FCC ID: 2AHKT-WIA3300-20

Report Type: Original Report	Equipment Name: Indoor Access Point
Report Number: RSC170718001B	
Report Date: 2017-07-28	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **SKSpruce Technologies Co., Ltd.**, model number: **WIA3300-20** (FCC ID: 2AHKT-WIA3300-20) or the "EUT" as referred to in this report was one **Indoor Access Point**. The highest frequency used in the device is 5850 MHz.

Mechanical Description of EUT

The EUT was measured approximately: 200mm (L) x 200 mm (W) x 45 mm (H).

Rated input voltage: DC 12V from Adapter or DC 48V from POE.

POE Information

Manufacturer: SKSpruce Technologies Co., Ltd.

Model: PSE802G

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

Output: DC48-56V

**All measurement and test data in this report were gathered from final production sample, serial number: 170718001/01 (assigned by BACL). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-07-07, and EUT complied with test requirement.*

Objective

The report was prepared on behalf of **SKSpruce Technologies Co., Ltd.** 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 NII submissions with FCC ID: 2AHKT-WIA3300-20.

FCC Part 15.247 DTS submissions with FCC ID: 2AHKT-WIA3300-20.

Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.71 dB
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.57dB
		V	4.81dB
	200MHz-1GHz	H	5.69dB
		V	6.07dB
	1GHz-6GHz		5.49dB
	6GHz-18GHz		5.57dB
	18GHz-40GHz		5.48 dB

Test Methodology

All measurements contained in this report are 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. 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 No. 5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China

BACL(Chengdu) is accredited by A2LA in accordance with the recognized international standard ISO/IEC 17025, A2LA cert No.: 4324.01. The Federal communications commission has on file and is listed under FCC Test Firm Registration No.: 910975.

BACL(Chengdu) has been fully described in reports on file and registered with the Innovation, Science and Economic Development Canada under Registration Numbers: 3062C-1.

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

The software "Tfgen traffic generator vers 1.00" was used during test.

Special Accessories

No special accessories were supplied by BACL.

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	PC	8176	99Y7315
DELL	Display	E157FPL	060229-11
ANTER	Gateway	EGW802	050835W5F-1B
Lenovo	Keyboard	KB-US19EB	IMHYX01107106460
Lenovo	Mouse	MU-513U	IMJS011041409259
Kingston	U Disk	101G2	N/A
EPSON	Printer	R23U	U026070WW
GPE	Adapter	GPE048A-120350-D	GMA-W3322-EA-002

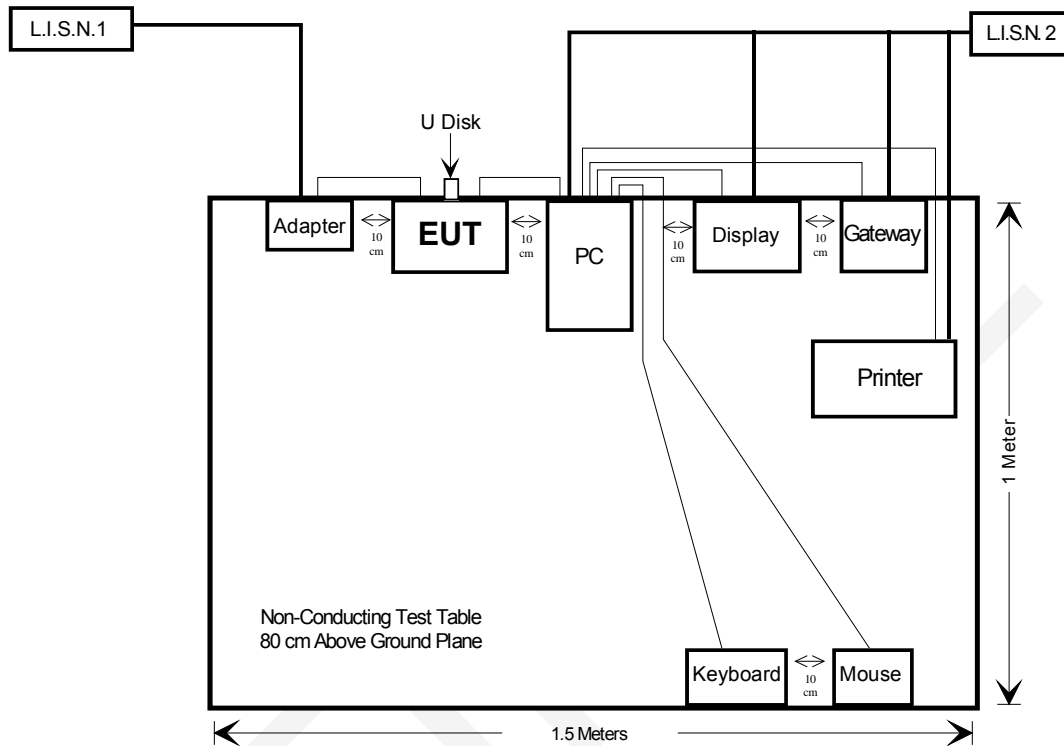
External I/O Cable

Cable Description	Length (m)	From	To
Unshielded RJ45 Cable	0.8	EUT	PC
Shielded VGA Cable	1.5	PC	Display
Unshielded Serial Cable	1.6	PC	Gateway
Unshielded Serial Cable	1.8	PC	Printer
Unshielded Mouse Cable	1.4	PC	Mouse
Unshielded Keyboard Cable	1.3	PC	Keyboard
Unshielded RJ45 Cable	1.2	EUT	POE

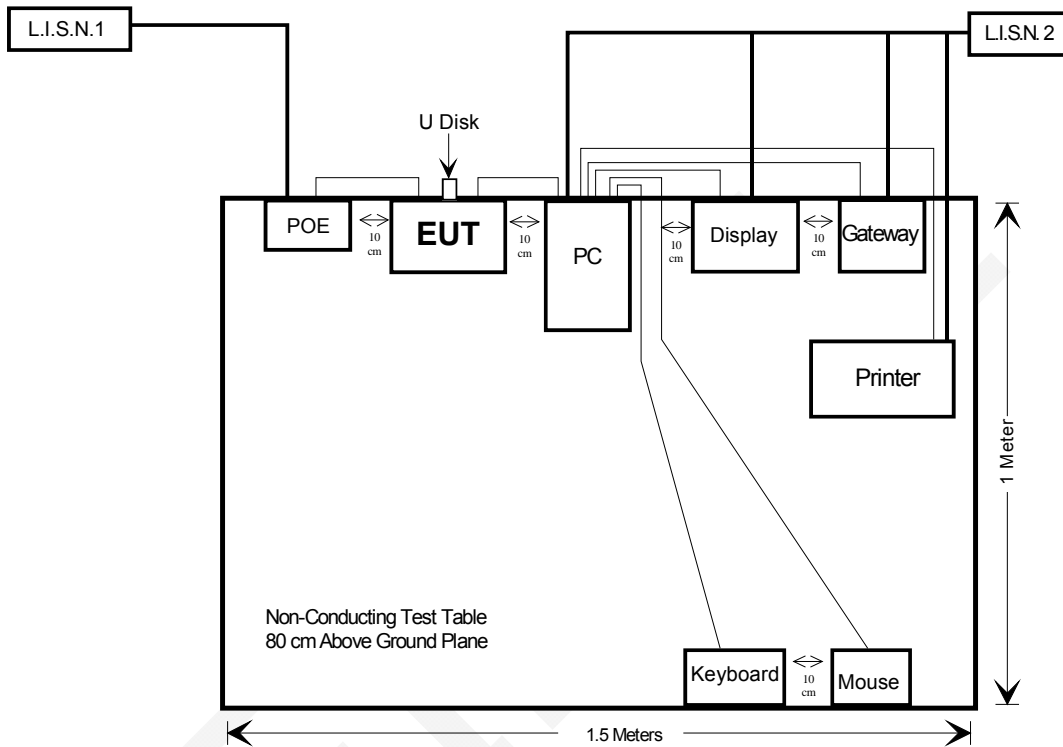
Block Diagram of Test Setup

AC power line conducted emissions test:

Adapter Mode



POE Mode



Test Equipments List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2017-05-20	2018-05-19
EMCO	L.I.S.N.	3810-2/NM	9803-1907	2016-10-31	2017-10-30
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-11-10	2017-11-09
N/A	Conducted Cable	NO.5	N/A	N/A	N/A
Rohde & Schwarz	EMC32	N/A	V 8.52.0	N/A	N/A
Radiated Emissions Test					
Agilent	Pre-Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2017-05-20	2018-05-19
Sunol Sciences	Broadband Antenna	JB3	A121808	2017-05-18	2020-05-17
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2017-05-18	2018-05-17
Agilent	Spectrum Analyzer	8564E	3943A01781	2016-10-06	2017-10-05
ETS	Horn Antenna	3115	003-6076	2017-05-19	2020-05-18
A.H.Systems,inc	Horn Antenna	SAS-574	505	2016-12-02	2017-12-01
Mini-circuits	Pre-Amplifier	ZVA-183-S+	771001215	2017-05-20	2018-05-19
Quinstar	Pre-Amplifier	QLW-18405536-JO	15964004001	2017-05-20	2018-05-19
INMET	Attenuator	N-6dB	/	2016-11-10	2017-11-09
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
Rohde & Schwarz	EMC32	N/A	V 8.52.0	N/A	N/A

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

SUMMARY OF TEST RESULTS

Standard	Description	Result
FCC §15.107	Conducted Emission	Compliance
FCC §15.109	Radiated Emission	Compliance

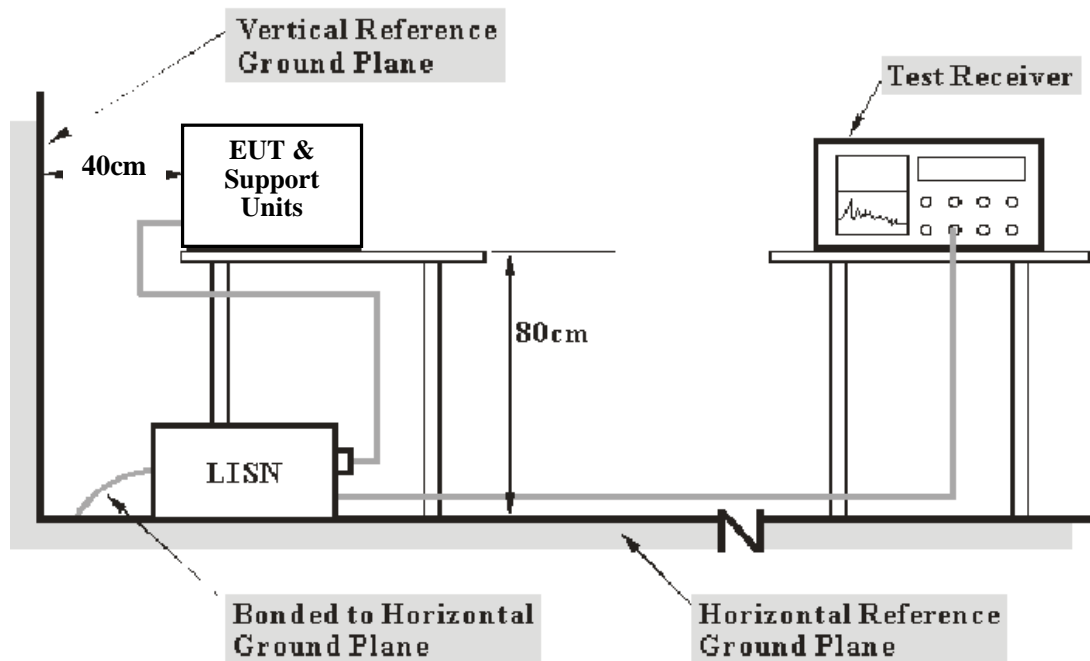
FCC §15.107 CONDUCTED EMISSION TEST

Applicable Standard

FCC §15.107

EUT Setup

The setup of EUT was in accordance with ANSI C63.4-2014 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.

The Adapter was connected to AC120V/60Hz.

The POE was connected to AC120V/60Hz.

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:

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

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

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.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF : voltage division factor of AMN or ISN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Summary of Test Results

According to the data in the following, the EUT complied with the FCC PART 15 CLASS B limit.

Test Data

Test Environment Conditions

Temperature:	30 °C
Relative Humidity:	55 %
ATM Pressure:	95.2 kPa

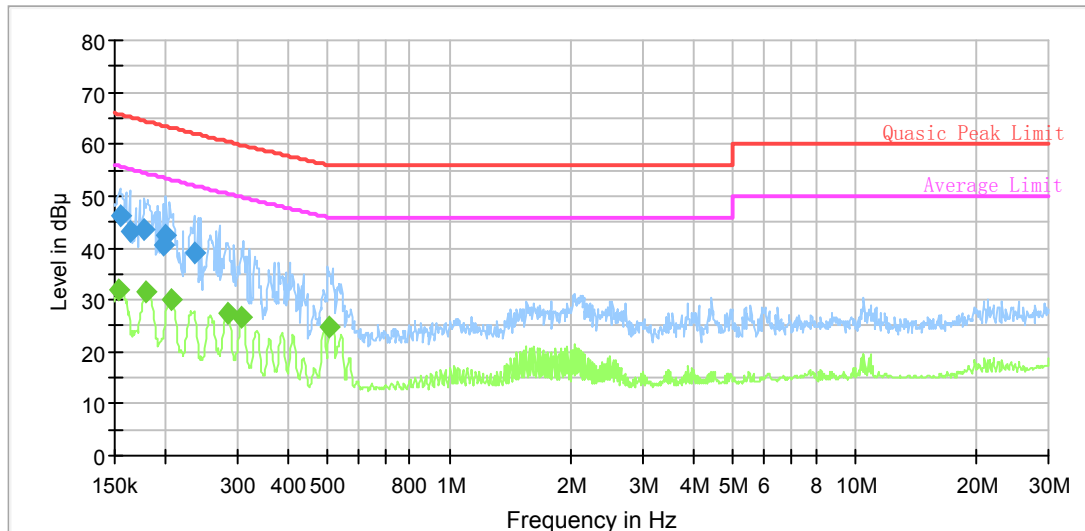
The testing was performed by Tom Tang on 2017-07-21.

Test Mode: Running

FINAL

Adapter Mode

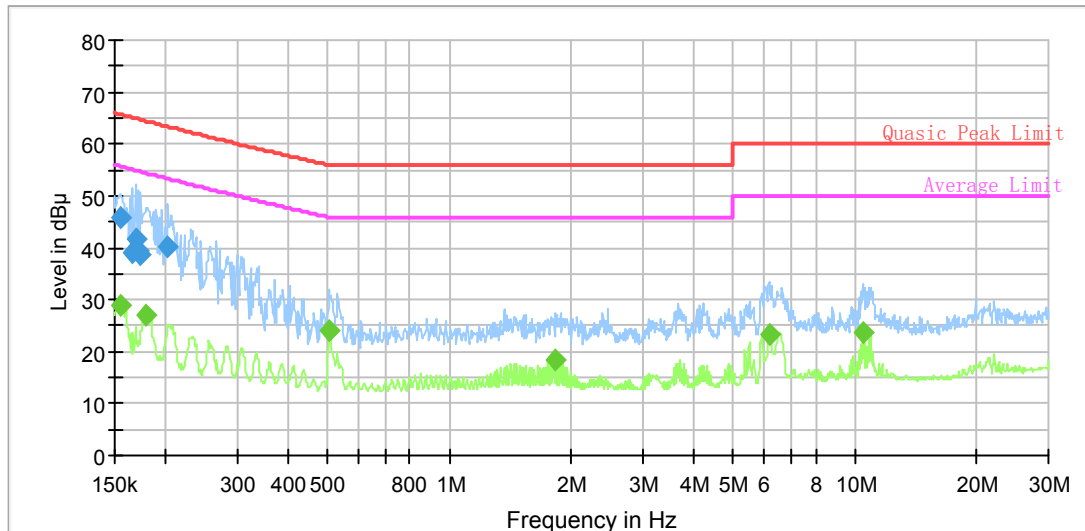
AC120V/60Hz, Line



Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.154251	46.2	9.000	L1	19.7	19.5	65.7
0.163117	43.1	9.000	L1	19.7	22.1	65.2
0.177381	43.4	9.000	L1	19.7	21.1	64.5
0.197569	40.6	9.000	L1	19.7	23.0	63.6
0.200749	42.3	9.000	L1	19.7	21.1	63.4
0.235506	39.1	9.000	L1	19.7	23.0	62.1

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.153024	31.9	9.000	L1	19.7	23.9	55.8
0.179518	31.5	9.000	L1	19.7	22.9	54.4
0.206437	30.3	9.000	L1	19.7	22.9	53.2
0.285246	27.4	9.000	L1	19.7	23.0	50.4
0.307723	26.5	9.000	L1	19.7	23.3	49.8
0.506844	24.6	9.000	L1	19.8	21.4	46.0

AC120V/60Hz, Neutral



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154251	45.7	9.000	N	19.6	20.0	65.7
0.165743	39.2	9.000	N	19.6	25.9	65.1
0.169084	41.6	9.000	N	19.6	23.3	64.9
0.171806	39.6	9.000	N	19.6	25.2	64.8
0.173876	38.7	9.000	N	19.6	26.0	64.7
0.203167	40.3	9.000	N	19.5	23.0	63.3

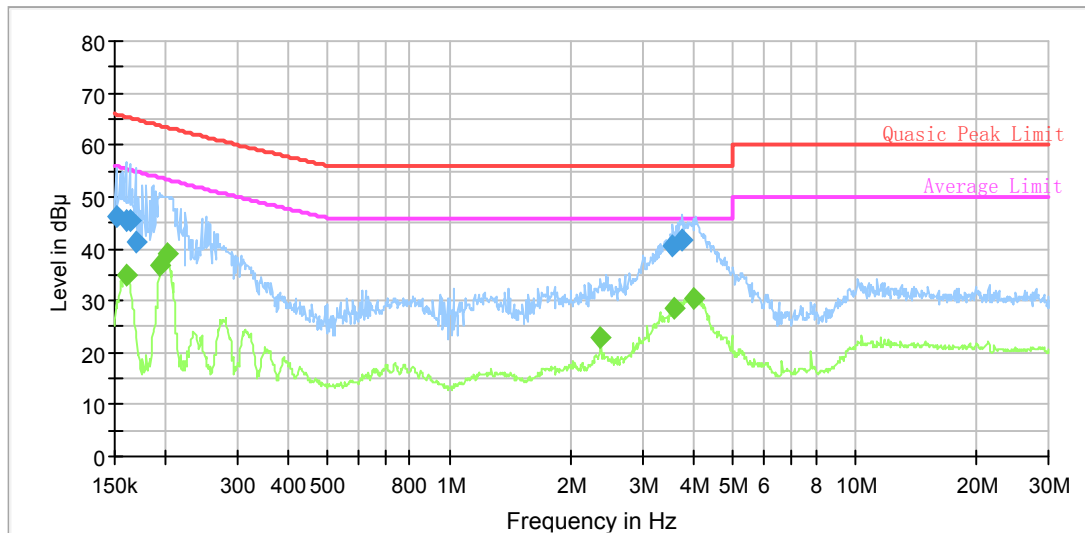
Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.155487	28.8	9.000	N	19.6	26.9	55.7
0.178803	27.1	9.000	N	19.6	27.3	54.4
0.508871	24.0	9.000	N	19.6	22.0	46.0
1.832861	18.5	9.000	N	19.6	27.5	46.0
6.143905	23.5	9.000	N	19.7	26.5	50.0
10.447882	23.8	9.000	N	19.8	26.2	50.0

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter
- 3) Margin = Limit – Corrected Amplitude

POE Mode

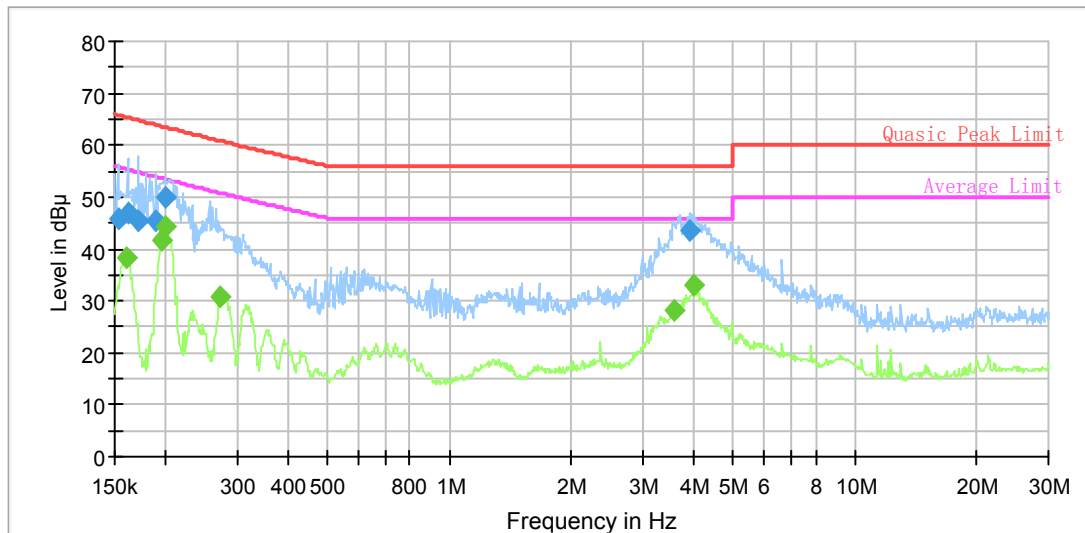
AC120V/60Hz, Line



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.151203	46.2	9.000	L1	19.7	19.7	65.9
0.159894	45.3	9.000	L1	19.7	20.1	65.4
0.163117	45.4	9.000	L1	19.7	19.8	65.2
0.169084	41.4	9.000	L1	19.7	23.5	64.9
3.555706	40.4	9.000	L1	19.9	15.6	56.0
3.745106	41.8	9.000	L1	19.9	14.2	56.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.159894	34.9	9.000	L1	19.7	20.5	55.4
0.194439	36.7	9.000	L1	19.7	17.0	53.7
0.202358	38.9	9.000	L1	19.7	14.4	53.3
2.366394	23.0	9.000	L1	19.9	23.0	46.0
3.598545	28.6	9.000	L1	19.9	17.4	46.0
4.024120	30.6	9.000	L1	19.9	15.4	46.0

AC120V/60Hz, Neutral



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.153024	45.8	9.000	N	19.6	20.0	65.8
0.161820	47.0	9.000	N	19.6	18.3	65.3
0.171121	45.3	9.000	N	19.6	19.5	64.8
0.189837	45.5	9.000	N	19.6	18.4	63.9
0.199152	50.1	9.000	N	19.5	13.4	63.5
3.928879	43.7	9.000	N	19.6	12.3	56.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.159894	38.5	9.000	N	19.6	16.9	55.4
0.195217	41.6	9.000	N	19.5	12.0	53.6
0.200749	44.2	9.000	N	19.5	9.2	53.4
0.274083	30.8	9.000	N	19.5	19.9	50.7
3.584208	28.1	9.000	N	19.6	17.9	46.0
4.024120	33.0	9.000	N	19.6	13.0	46.0

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter
- 3) Margin = Limit – Corrected Amplitude

FCC §15.109 RADIATED EMISSION TEST

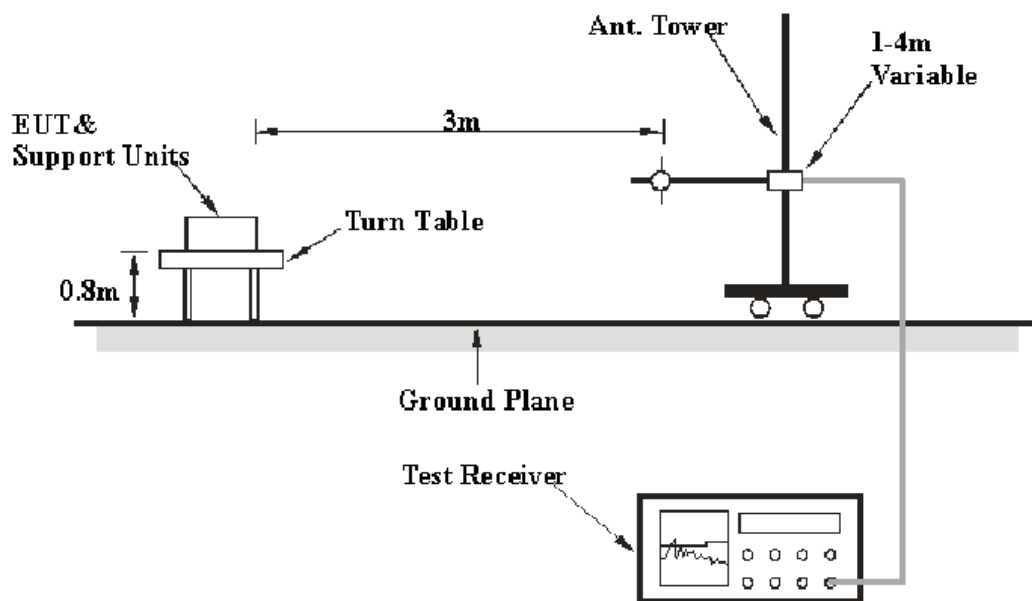
Applicable Standard

FCC §15.109

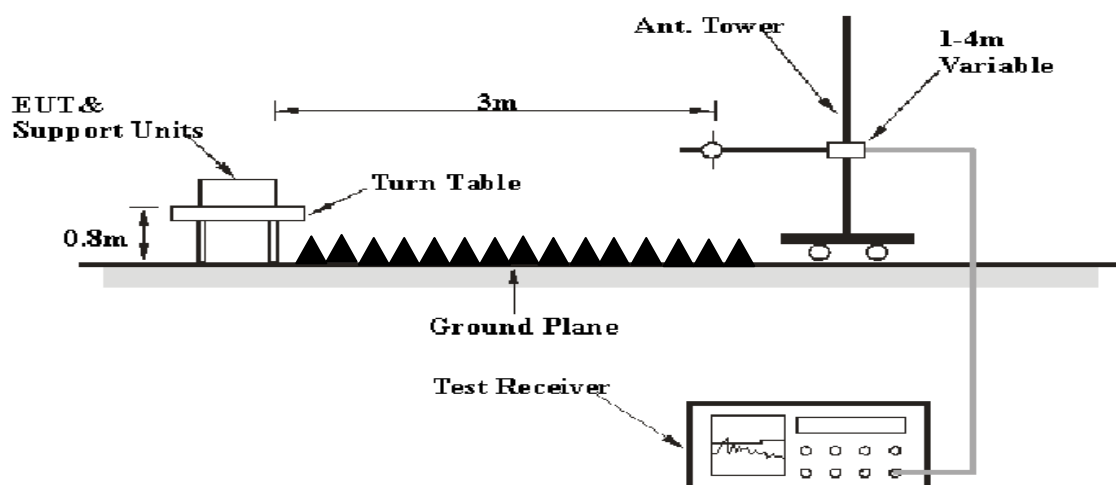
EUT Setup

The radiated emission tests were performed in the 3 meter Semi Anechoic Chamber, using the setup in accordance with the ANSI C63.4-2014. 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.

The POE was connected to AC 120V/60Hz.

The Adapter was connected to AC 120V/60Hz.

EMI Test Receiver Setup

Per FCC 15.33 requirement, the frequency range is investigated from 30 MHz to 30 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Ave.

Test Procedure

During the radiated emissions, the adapter was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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 from 30 MHz to 1 GHz. Peak and average detection mode above 1 GHz.

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 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

Summary of Test Results

According to the data in the following, the EUT complied with the FCC PART 15 CLASS B limit.

Please refer to the Test Data and Plots.

Test Data

Test Environment Conditions

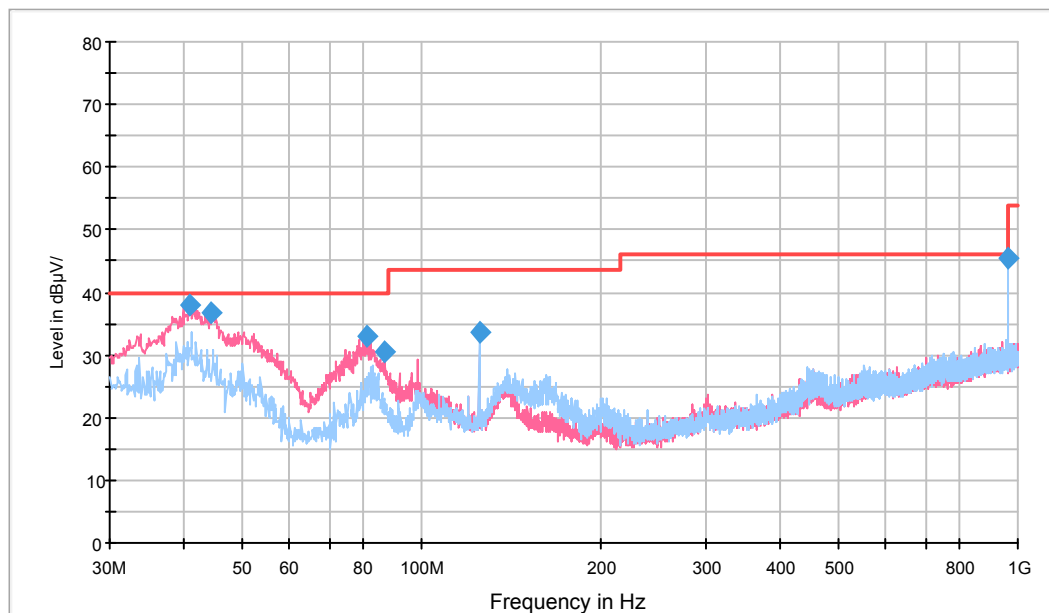
Temperature:	30 °C
Relative Humidity:	60 %
ATM Pressure:	95.1 kPa

The testing was performed by Tom Tang on 2017-07-24.

Test Mode: Running

Adapter Mode

1) 30MHz-1GHz:



Frequency (MHz)	Quasi-peak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
40.791250	37.9	100.0	V	128.0	-7.7	*2.1	40.0
44.428750	36.8	145.0	V	286.0	-9.8	*3.2	40.0
81.288750	33.0	200.0	V	277.0	-12.8	7.0	40.0
86.623750	30.4	100.0	V	206.0	-13.2	9.6	40.0
124.938750	33.6	170.0	H	251.0	-7.1	9.9	43.5
960.108750	45.3	100.0	H	298.0	4.4	8.6	53.9

*Within measurement uncertainty!

Above 1GHz:

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBμV	PK/QP/AV	H/V	dB(1/m)	dB	dB	dBμV/m	dBμV/m	dB
1368	59.58	PK	V	24.68	2.49	26.46	60.29	74.00	13.71
1368	36.44	AV	V	24.68	2.49	26.46	37.15	54.00	16.85
1789	50.67	PK	V	26.45	2.89	26.61	53.40	74.00	20.60
1789	32.96	AV	V	26.45	2.89	26.61	35.69	54.00	18.31
2059	47.57	PK	V	27.68	3.04	26.83	51.46	74.00	22.54
2059	32.74	AV	V	27.68	3.04	26.83	36.63	54.00	17.37
1368	59.03	PK	H	24.68	2.49	26.46	59.74	74.00	14.26
1368	38.28	AV	H	24.68	2.49	26.46	38.99	54.00	15.01
1789	48.87	PK	H	26.45	2.89	26.61	51.60	74.00	22.40
1789	27.84	AV	H	26.45	2.89	26.61	30.57	54.00	23.43
2207	45.72	PK	H	28.12	3.03	26.85	50.02	74.00	23.98
2207	28.27	AV	H	28.12	3.03	26.85	32.57	54.00	21.43

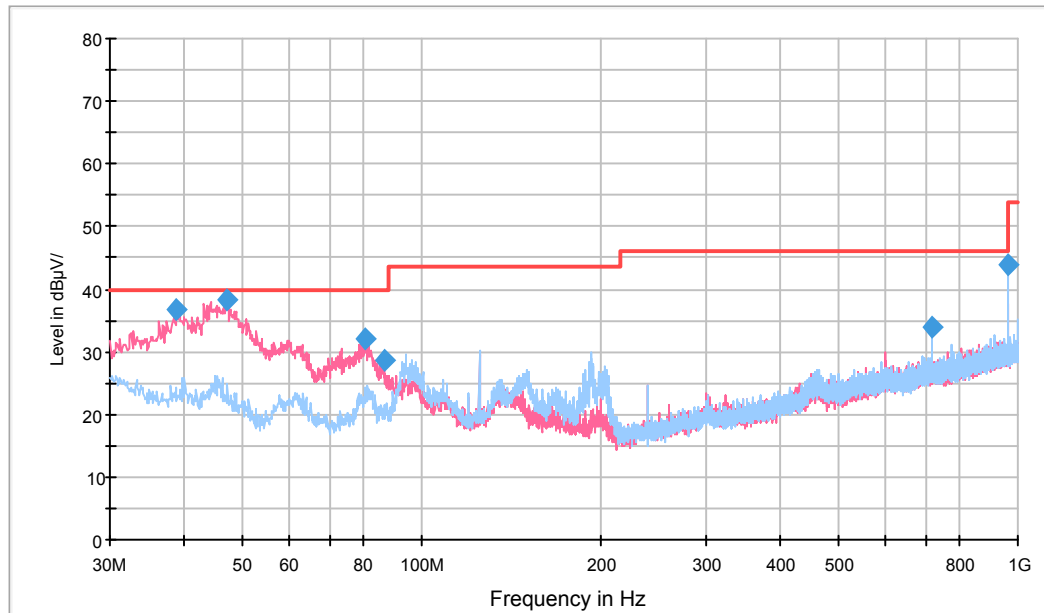
Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit- Corr. Amplitude

POE Mode



Frequency (MHz)	Quasi-peak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.851250	36.8	100.0	V	264.0	-6.6	*3.2	40.0
46.975000	38.2	100.0	V	207.0	-11.3	*1.8	40.0
80.561250	32.1	200.0	V	81.0	-12.7	7.9	40.0
86.623750	28.8	155.0	V	259.0	-13.2	11.2	40.0
720.155000	34.0	150.0	H	232.0	0.9	12.0	46.0
960.108750	43.9	100.0	H	269.0	4.4	10.0	53.9

**Within measurement uncertainty!*

Above 1GHz:

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBµV	PK/QP/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
1368	58.70	PK	V	24.68	2.49	26.46	59.41	74.00	14.59
1368	35.38	AV	V	24.68	2.49	26.46	36.09	54.00	17.91
1897	49.36	PK	V	26.99	2.97	26.72	52.60	74.00	21.40
1897	31.95	AV	V	26.99	2.97	26.72	35.19	54.00	18.81
2059	46.15	PK	V	27.68	3.04	26.83	50.04	74.00	23.96
2059	32.04	AV	V	27.68	3.04	26.83	35.93	54.00	18.07
1368	57.98	PK	H	24.68	2.49	26.46	58.69	74.00	15.31
1368	37.67	AV	H	24.68	2.49	26.46	38.38	54.00	15.62
1798	48.34	PK	H	26.49	2.90	26.62	51.11	74.00	22.89
1798	27.67	AV	H	26.49	2.90	26.62	30.44	54.00	23.56
2159	44.77	PK	H	27.98	3.03	26.84	48.94	74.00	25.06
2159	27.02	AV	H	27.98	3.03	26.84	31.19	54.00	22.81

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit- Corr. Amplitude

****END OF REPORT****