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, P. R. China

FCC ID: 2AHKT-SKV4000

Model Number: SKV4000

Report Type:	**Equipment Name:**
Original Report	Network Management System

Test Engineer:	Wei Fan
Report Number:	RSC150907005
Report Date:	2015-11-27
Reviewed By:	Fidel Zhou Engineering Leader
Prepared By:	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

Product Description for Equipment under Test (EUT)

The **SKSpruce Technologies Co., Ltd.**'s product, model number: **SKV4000 (FCC ID: 2AHKT-SKV4000**) or the "EUT" as referred to in this report was the **Network Management System,** which has the plastic enclosure, The highest frequency is 2.2 GHz.

Mechanical Description of EUT

The EUT was measured approximately 650mm L x 430mm W x 90mm H.

Rated input voltage: AC120V/60Hz.

** All measurement and test data in this report were gathered from final production sample, serial number: 150907005/01 (Assigned by BACL), It may have deviation from other sample. The EUT supplied by the applicant was received on 2015-08-19, and the EUT complied with test requirement.*

Objective

The following Class B 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)

No Related Submittals.

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 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 C63.4-2014.

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

N/A.

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.

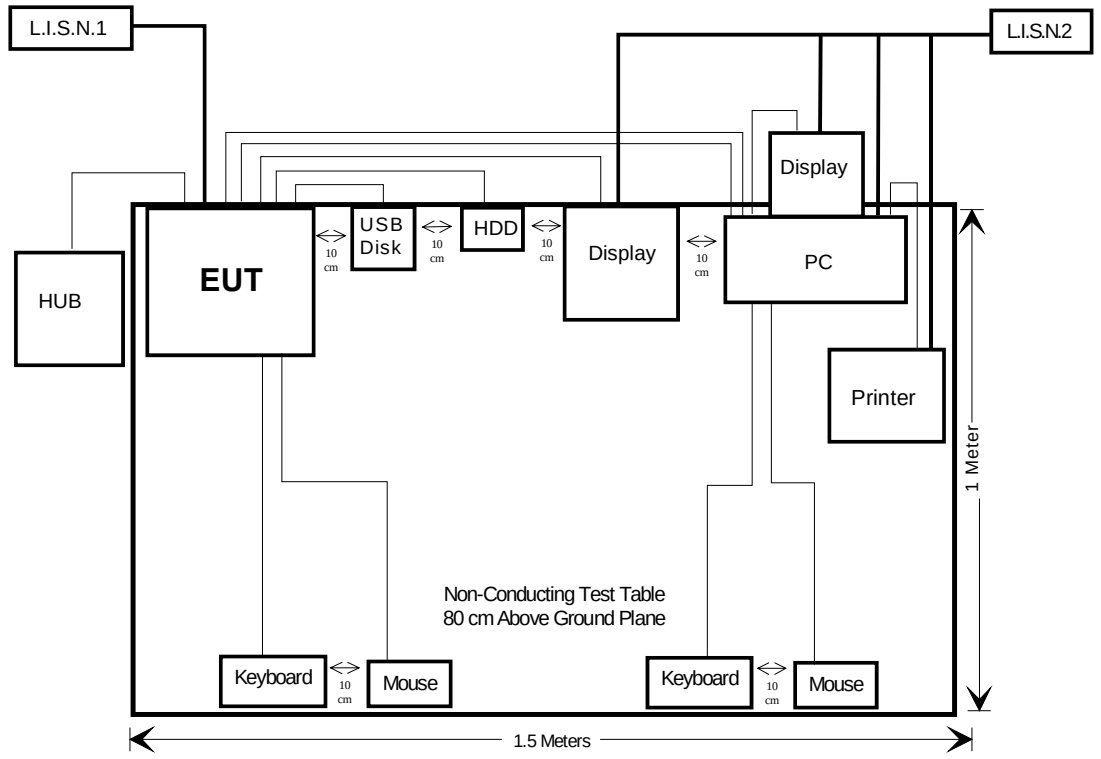
Local Support Equipment List and Details

Manufacturer	Description	Model Number	Serial Number
LG	Display	L15NS-7	511NTTQ25137
ADATA	USB Disk	None	None
TOSHIBA	HDD	V63700-A	1297FHOYSRE8
LAPOP	Keyboard	JT-505	JT505VB
Logitech	Mouse	M100	810-001808
DL	HUB	S10005PM	2000000839D00030
IBM	PC	8176	99Y7315
EPSON	Printer	PHOTO700	A2V0002196
DELL	Display	E157FPb	CN-OWH339-74261
IBM	Keyboard	SK8815	89P8800
IBM	Mouse	M028VO	None

External I/O Cable

Cable Description	Length (m)	From	To
Unshielded USB Cable	1	EUT/USB Port	Keyboard
Unshielded USB Cable	1	EUT / USB Port	Mouse
Unshielded USB Cable	1	EUT/ USB Port	USB Disk
Unshielded USB Cable	1	EUT/ USB Port	HDD
Unshielded VGA Cable	1	EUT/ VGA Port	Display
Unshielded RJ45 Cable	3	EUT/RJ45 Port	HUB
Unshielded RJ45 Cable	1	EUT/RJ45 Port	PC
Unshielded RJ232 Cable	1	EUT/RS232	PC
Unshielded LPT Cable	1	PC/ LPT Port	Printer
Unshielded VGA Cable	1	PC/ VGA Port	Display
Unshielded USB Cable	1	PC/ USB Port	Keyboard
Unshielded USB Cable	1	PC/ USB Port	Mouse

Block Diagram of Test Setup



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

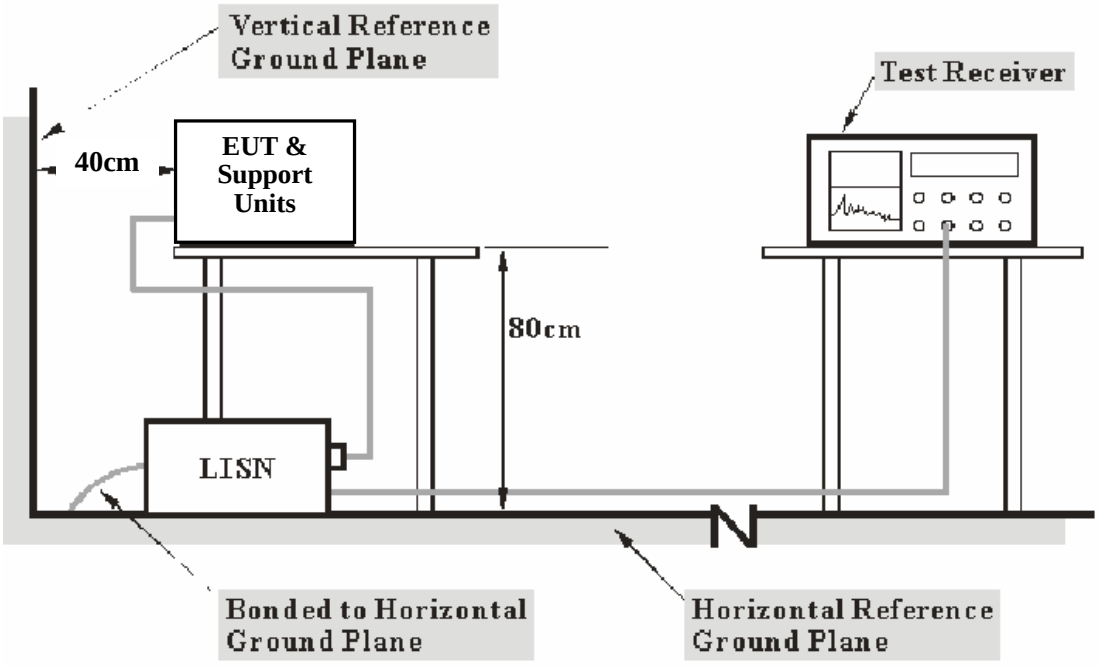
Measurement Uncertainty

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 ±3.17 dB.

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.

AC 120V/60Hz power source was provided to EUT.

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

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

Manufacturer	Description	Model Number	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2015-06-23	2016-06-22
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.06	2015-06-23	2016-06-22
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.12	2015-02-08	2016-02-07
N/A	Conduct Cable	NO.1	N/A	2015-11-10	2016-11-11

*** 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

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

9.0 dB at **16.679331 MHz** in the **Neutra**l Phase

Conducted Emission Test Data and Plots

Test Environment Conditions

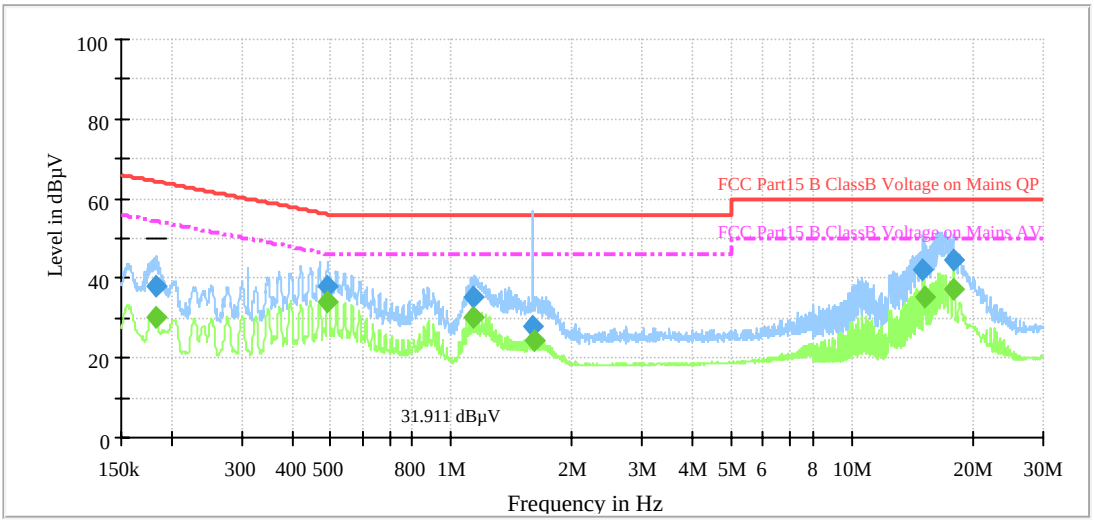
Temperature:	18 °C
Relative Humidity:	69 %
ATM Pressure:	101.6 kPa

The testing was performed by Wei Fan on 2015-11-13.

Test Mode: Running Mode

0.15 MHz – 30 MHz

Line



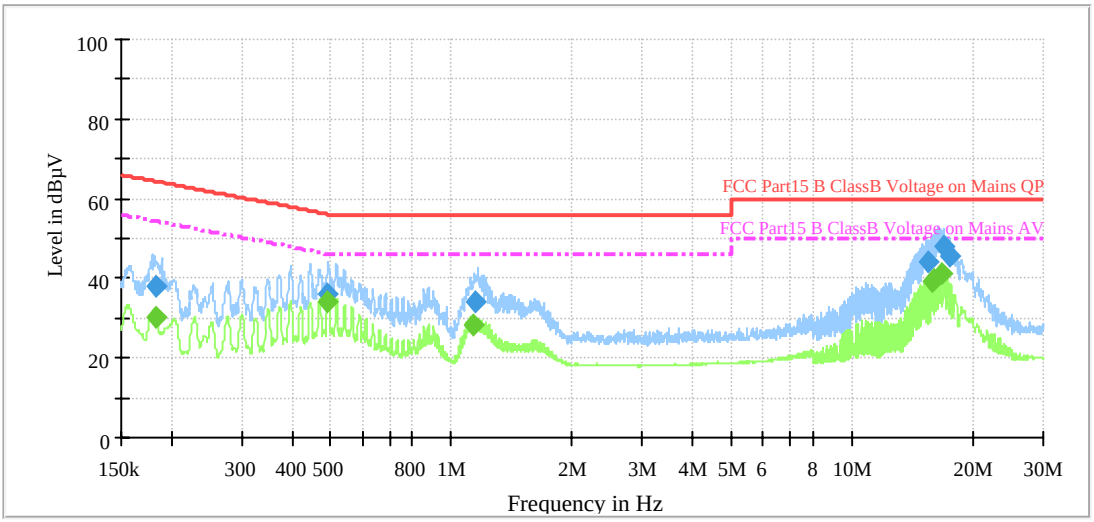
Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.183540	37.1	9.000	L1	18.8	27.2	64.3
0.492477	38.5	9.000	L1	19.4	17.6	56.1
1.144364	35.2	9.000	L1	19.5	20.8	56.0
1.597620	28.0	9.000	L1	20.3	28.0	56.0
15.063463	42.3	9.000	L1	20.7	17.7	60.0
17.887469	44.7	9.000	L1	20.8	15.3	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.183540	30.2	9.000	L1	18.8	24.1	54.3
0.492477	35.3	9.000	L1	19.4	10.8	46.1
1.144364	30.5	9.000	L1	19.5	15.5	46.0
1.597620	24.7	9.000	L1	20.3	21.3	46.0
15.184333	35.5	9.000	L1	20.7	14.5	50.0
17.887469	37.4	9.000	L1	20.8	12.6	50.0

** Within Measurement Uncertainty*

0.15 MHz – 30 MHz

Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.178477	38.6	9.000	N	18.8	26.0	64.6
0.492477	34.9	9.000	N	19.4	21.2	56.1
1.165128	34.2	9.000	N	195	21.8	56.0
15.521749	44.3	9.000	N	20.7	15.7	60.0
16.914247	47.8	9.000	N	20.7	12.2	60.0
17.533623	45.4	9.000	N	20.7	14.6	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.180991	31.7	9.000	N	18.8	22.7	54.4
0.491494	34.2	9.000	N	19.4	11.9	46.1
1.155853	29.4	9.000	N	19.5	16.6	46.0
16.058017	39.8	9.000	N	20.7	10.2	50.0
16.679331	41.0	9.000	N	20.7	9.0	50.0
16.948076	40.6	9.000	N	20.7	9.4	50.0

FCC §15.109 RADIATED EMISSION TEST

Applicable Standard

FCC §15.109

Measurement Uncertainty

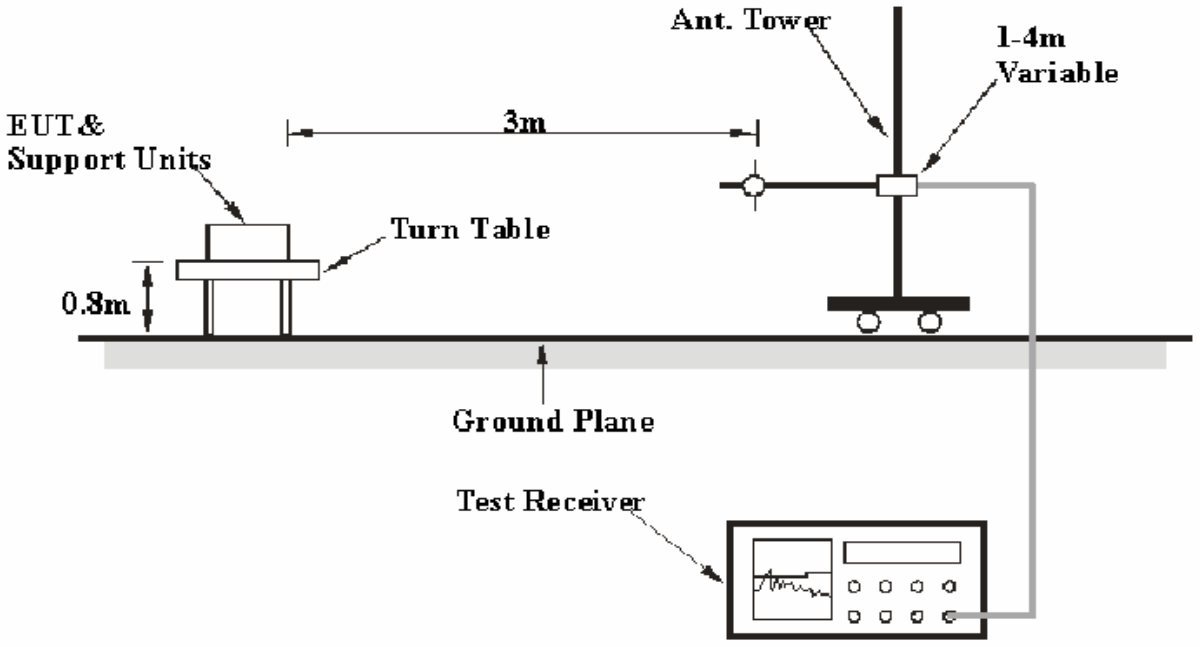
All measurements involve certain levels of uncertainties, especially in the field of EMI. The factors contributing to uncertainties are EMI Test Receiver, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor 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: ±4.7 dB ; 200M~1GHz: ±6.0 dB ; 1G-6GHz: ±5.13dB.

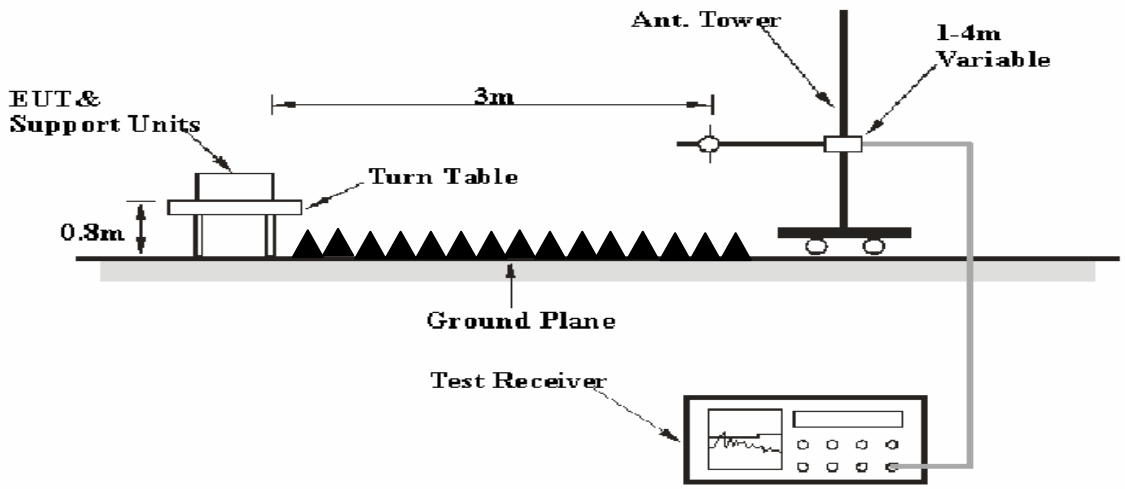
EUT Setup

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.

AC 120V/60Hz power source was provided to EUT.

EMI Test Receiver Setup

According to FCC Rules, the highest frequency in the device is 2.2 GHz, so the frequency range to be tested from 30 MHz to 11 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

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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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 dBμV/m below the maximum limit for FCC Part 15 Class B. The equation for margin calculation is as follows:

Margin = FCC Part 15 Class B Limit – Corr. Ampl.

Test Equipment List and Details

Manufacturer	Description	Model Number	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2015-06-23	2016-06-22
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2015-06-23	2016-06-22
Sunol Sciences	Broadband Antenna	JB3	A101808	2013-04-10	2016-04-09
Rohde & Schwarz	Spectrum Analyzer	FSL18	100180	2015-06-23	2016-06-22
EM TEST	Horn Antenna	3115	003-6076	2013-04-09	2016-04-08
HP	Amplifier	8449B	3008A00277	2015-06-23	2016-06-22
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2015-11-10	2016-11-11
N/A	RF Cable (below 1GHz)	NO.3	N/A	2015-11-10	2016-11-11
N/A	RF Cable (above 1GHz)	NO.2	N/A	2015-11-10	2016-11-11

*** 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 8.54.0

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:

3.7 dB at **937.556250 MHz** in the **Vertical** polarization

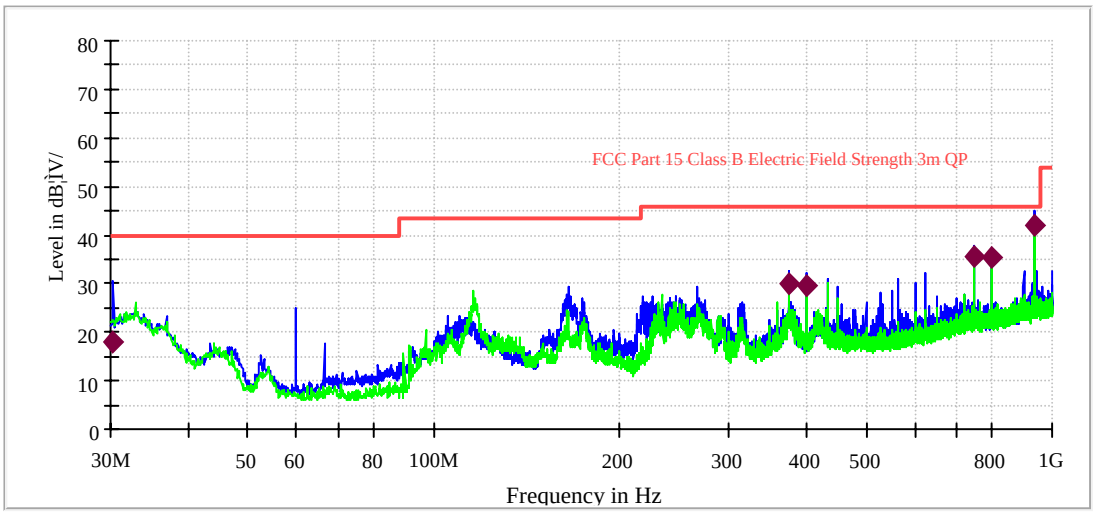
Radiated Emission Test

Test Environment Conditions

Temperature:	20 °C
Relative Humidity:	68 %
ATM Pressure:	101.6 kPa

The testing was performed by Wei Fan on 2015-11-13.

Below 1 GHz:



Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.242500	17.6	120.000	100.0	V	354.0	-4.9	22.4	40.0
374.956250	29.9	120.000	200.0	V	356.0	-10.5	16.1	46.0
399.933750	29.2	120.000	200.0	V	69.0	-10.5	16.8	46.0
749.982500	36.6	120.000	100.0	V	0.0	-5.1	9.4	46.0
800.058750	35.1	120.000	100.0	V	208.0	-4.1	10.9	46.0
937.556250	42.3	120.000	200.0	V	0.0	-2.2	*3.7	46.0

***** *Within Measurement Uncertainty*

Above 1 GHz:

Frequency	Result	Polarity	Detector	Corrected factor	Limit	Antenna Height	Turntable Position	Margin
(MHz)	(dBµV/m)	V/H	PK/Ave.	(dB)	(dBµV/m)	(cm)	(deg)	(dB)
7455	59.20	H	PK	15.12	74	110	57	14.80
7455	45.11	H	AV	15.12	54	110	57	8.89
10514	57.35	V	PK	18.90	74	100	135	16.65
10514	48.30	V	AV	18.90	54	100	135	5.70
8853	58.62	V	PK	17.70	74	110	151	15.38
8853	46.52	V	AV	17.70	54	110	151	7.48

Test Result: Compliance

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