NVLAP TESTING
NVLAP LAB CODE 200707-0

BACL Bay Area Compliance Labs Corp.

FCC PART 15B, CLASS B

TEST REPORT

For

Beijing Sansec Technology Development Co.,Ltd.

Room 1406, NO.2 Building, NO.16 Guangshun North Street, Chaoyang District, Beijing, China

FCC ID: 2AOJ5-SECHSM

Report Type:	**Product Type:**
Original Report	Sansec HSM

Report Number:	RSZ171129001-00
Report Date:	2018-01-29
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Beijing Sansec Technology Development Co.,Ltd.'s* product, model number: secHSM V2 *(FCC ID: 2AOJ5-SECHSM)* or the "EUT" in this report was a *Sansec HSM,* which was measured approximately: 52 cm (L) × 44 cm (W) × 8.9 cm (H), rated with input voltage: AC 120V/60 Hz. The highest operating frequency is 3.3 GHz.

**All measurement and test data in this report was gathered from production sample serial number: 2017091313700931 (Assigned by Customer). The EUT supplied by the applicant was received on 2017-11-29.*

Objective

This test report is prepared on behalf of *Beijing Sansec Technology Development Co.,Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of the EUT with FCC Part 15 B.

Related Submittal(s)/Grant(s)

No Related Submittal(s)/Grant(s).

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.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		uncertainty
Conducted Emissions		±1.95dB
Emissions, radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 382179, the FCC Designation No.: CN5001.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

EUT operation mode: Running

EUT Exercise Software

Software "PL2303_Prolific_DriverInstaller_v10518.exe " was used to test.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

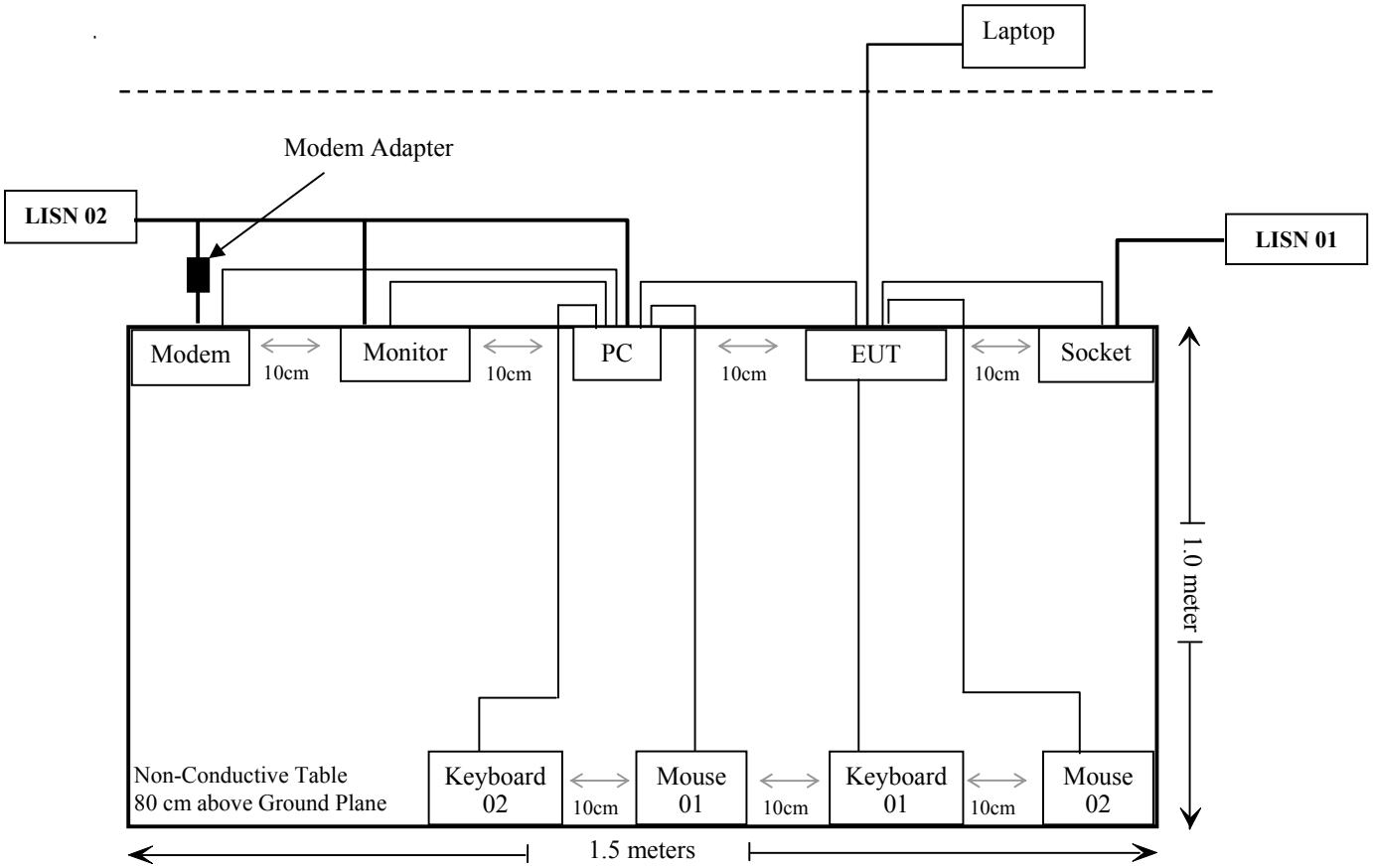
Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-415K	5503290068073
DELL	PC	VOSTRO 220S	127BP2X
TCL	Monitor	TFT1560PS	ALA560806C160409
SAST	Modem	AEM-2100	0293
DELL	Keyboard 01	L100	CNORH656658907BL05DC
Microsoft	Keyboard 02	1406	0200706128743
DELL	Mouse 01	MOC5UO	G1900NKD
Microsoft	Mouse 02	1405	0204608630856
LISTED	Modem Adapter	TYP60-1207000Z	326703
DELL	Laptop	Compaq CQ45	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Un-detachable AC cable	1.2	LISN 01	Socket
Unshielded Un-detachable AC cable 01	1.0	EUT	Socket
Unshielded Un-detachable AC cable 02	1.0	EUT	Socket
Shielding Detachable K/B Cable With Magnet Ring	1.5	EUT	Keyboard 01
Un-Shielded Detachable USB Cable	1.5	EUT	Mouse 02
Shielded Detachable RS232 Cable	1.2	PC	EUT
Unshielded Un-detachable RJ45 cable	1.0	Laptop	EUT
Shielded Detachable K/B Cable With Magnet Ring	1.5	PC	Keyboard 02
Shielded Detachable K/B Cable With Magnet Ring	1.5	PC	Mouse 01
Shielded Detachable VGA Cable	1.0	PC	Monitor
Shielded Detachable RS232 Cable	1.2	PC	Modem
Unshielded Detachable AC Cable	1.2	PC	LISN 02
Unshielded Detachable AC Cable	1.2	Monitor	LISN 02
Unshielded Un-detachable DC Cable	0.5	Modem Adapter	Modem
Unshielded Detachable AC Cable	1.2	LISN 02	Modem Adapter

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Spurious Emissions	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-07	2018-12-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2017-11-21	2018-05-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A	Conducted Emission Cable	N/A	UF A210B-1-0720-504504	2017-11-12	2018-05-12
Radiated Emission Test					
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2017-12-17	2020-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-02-14	2018-02-14
HP	Amplifier	HP8447E	1937A01046	2017-11-21	2018-05-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2017-12-07	2018-12-07
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-11-21	2018-05-19
Ducommun technologies	RF Cable	104PEA	218124002	2017-11-21	2018-05-19
Ducommun technologies	RF Cable	RG-214	1	2017-11-21	2018-05-19
Ducommun technologies	RF Cable	RG-214	2	2017-11-22	2018-05-22
R&S	Auto test Software	EMC32	V9.10	NCR	NCR

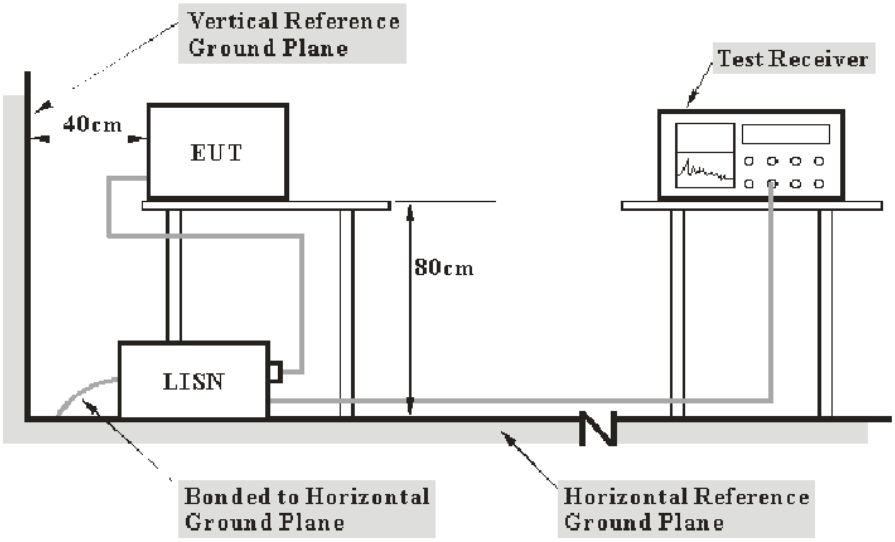
*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.107

EUT Setup



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 measurement procedure of EUT setup is according with per ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

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 host PC was connected to the first LISN and the other relevant equipments were conncected to the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL., $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

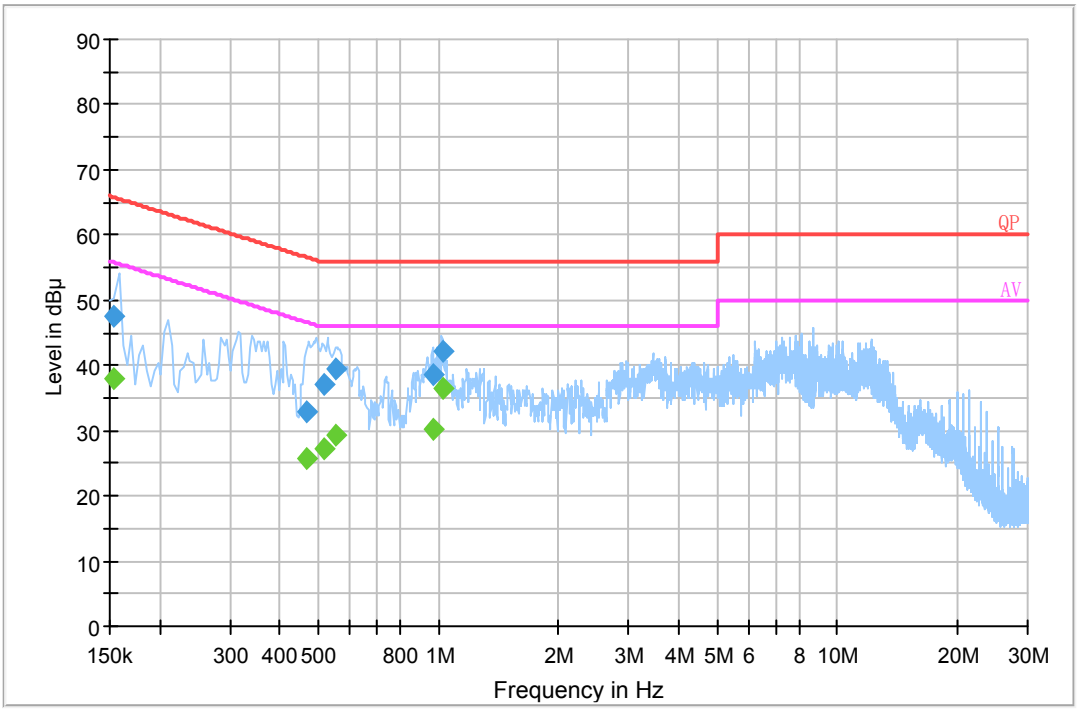
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Huang on 2017-12-16.

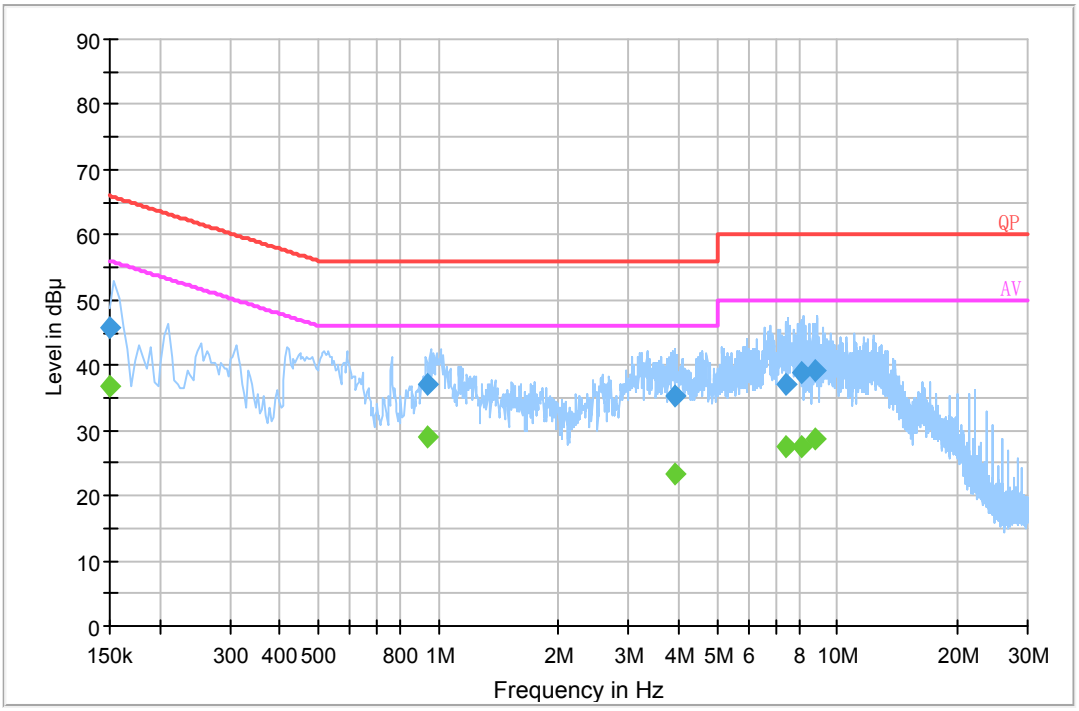
EUT Operation Mode: Running

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.153500	47.5	20.2	65.8	18.3	QP
0.466890	32.8	20.2	56.6	23.8	QP
0.518110	37.0	20.2	56.0	19.0	QP
0.553690	39.4	20.1	56.0	16.6	QP
0.967510	38.6	20.1	56.0	17.4	QP
1.026730	42.1	20.1	56.0	13.9	QP
0.153500	38.1	20.2	55.8	17.7	Ave.
0.466890	25.6	20.2	46.6	21.0	Ave.
0.518110	27.3	20.2	46.0	18.7	Ave.
0.553690	29.3	20.1	46.0	16.7	Ave.
0.967510	30.2	20.1	46.0	15.8	Ave.
1.026730	36.5	20.1	46.0	9.5	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	45.7	20.2	66.0	20.3	QP
0.943630	37.0	20.1	56.0	19.0	QP
3.930990	35.2	20.1	56.0	20.8	QP
7.436750	37.2	20.0	60.0	22.8	QP
8.099150	38.7	20.0	60.0	21.3	QP
8.780650	39.3	20.0	60.0	20.7	QP
0.150000	36.8	20.2	56.0	19.2	Ave.
0.943630	29.1	20.1	46.0	16.9	Ave.
3.930990	23.4	20.1	46.0	22.6	Ave.
7.436750	27.4	20.0	50.0	22.6	Ave.
8.099150	27.6	20.0	50.0	22.4	Ave.
8.780650	28.6	20.0	50.0	21.4	Ave.

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

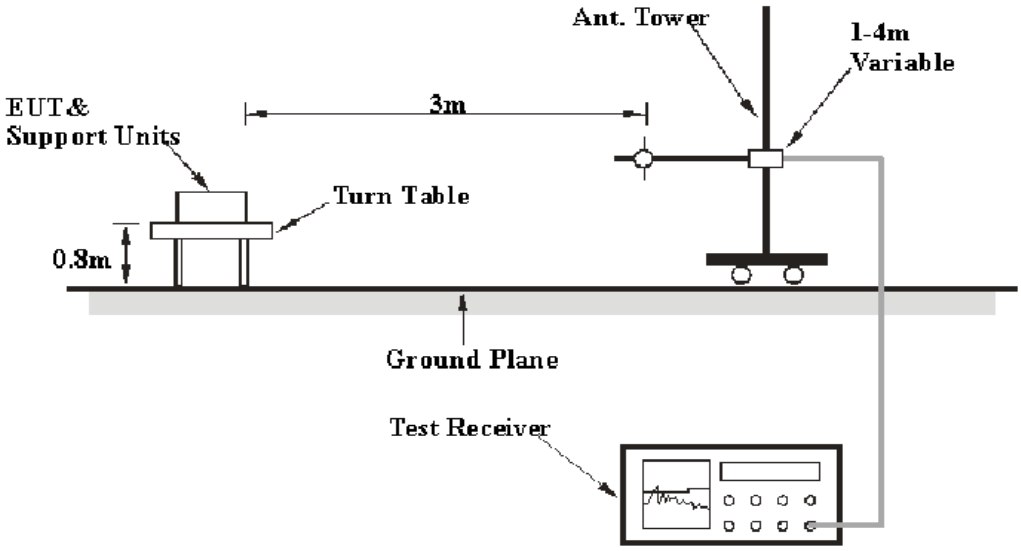
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

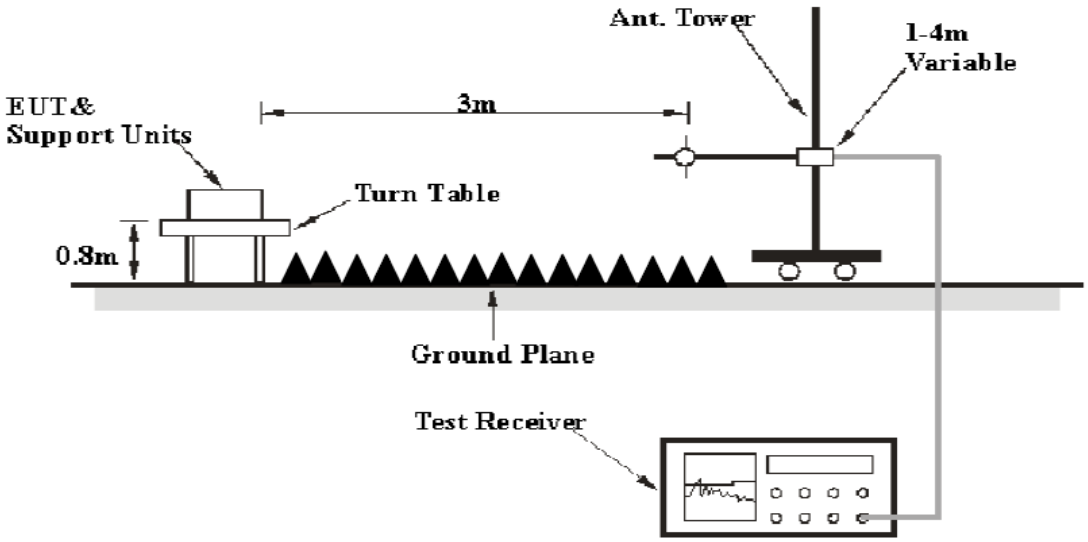
FCC §15.109

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

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.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 17 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

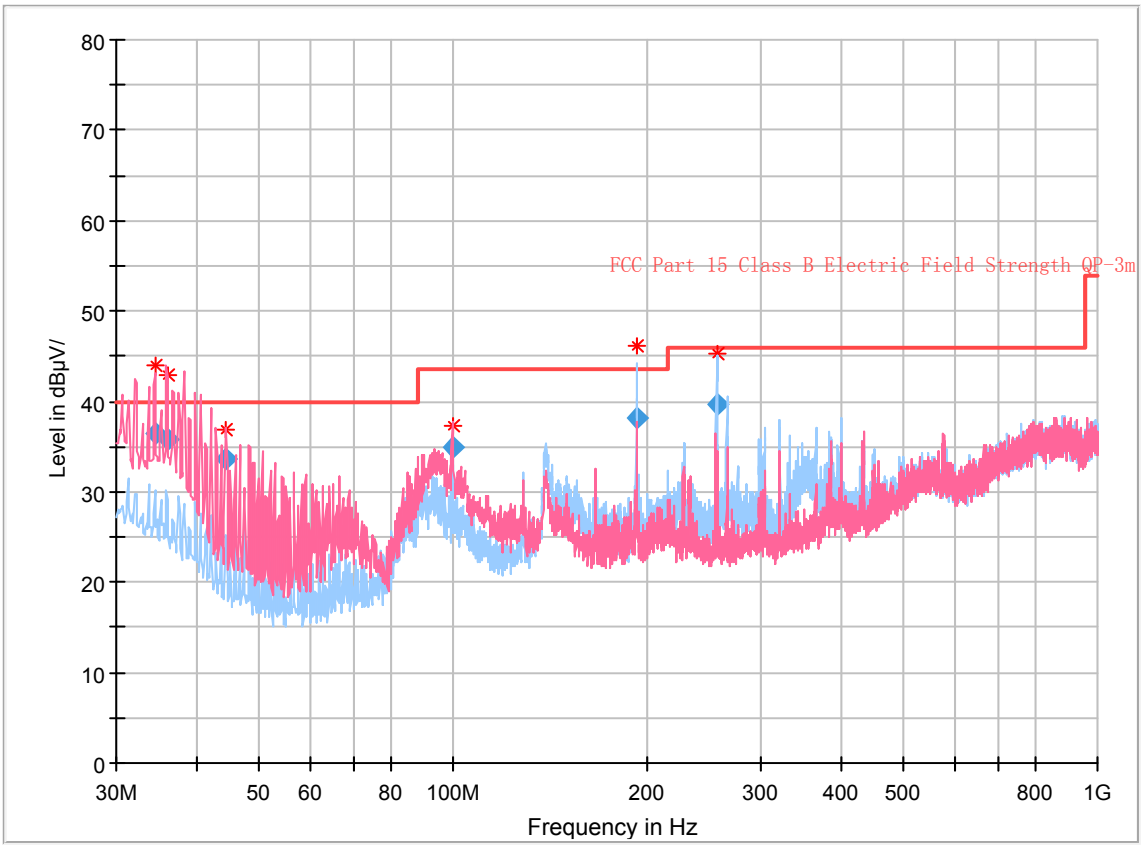
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Huang on 2018-01-29.

EUT Operation Mode: Running

30 MHz~1 GHz:



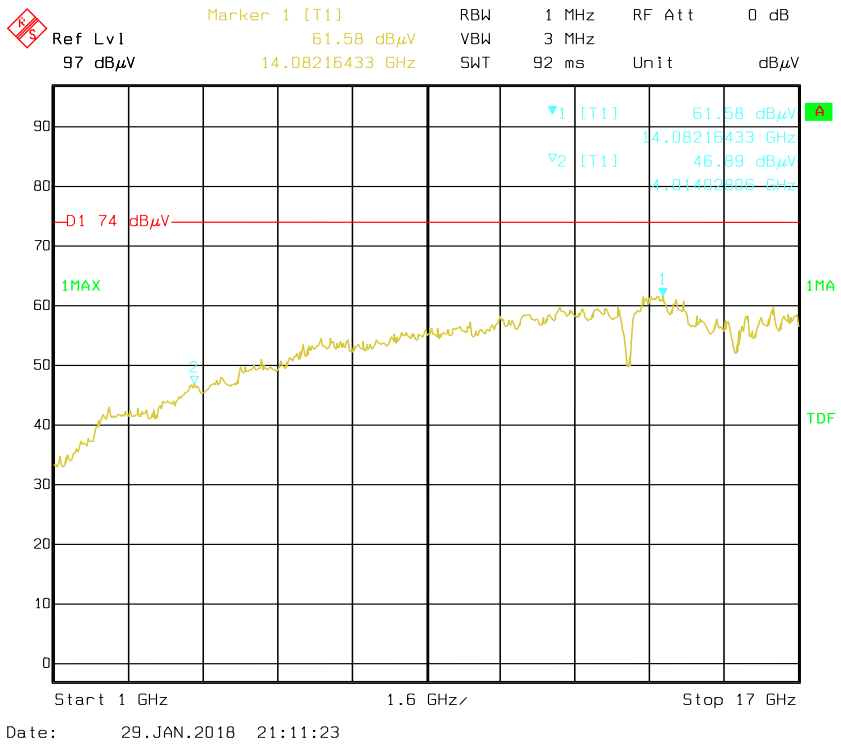
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
34.475250	36.35	102.0	V	312.0	-2.6	40.00	3.65
36.004500	35.89	103.0	V	314.0	-3.6	40.00	4.11
44.420625	33.74	105.0	V	87.0	-9.4	40.00	6.26
99.620500	35.03	117.0	V	232.0	-9.4	43.50	8.47
192.341250	38.19	175.0	H	270.0	-5.5	43.50	5.31
256.951250	39.75	125.0	H	281.0	-4.5	46.00	6.25

1 GHz – 17 GHz:

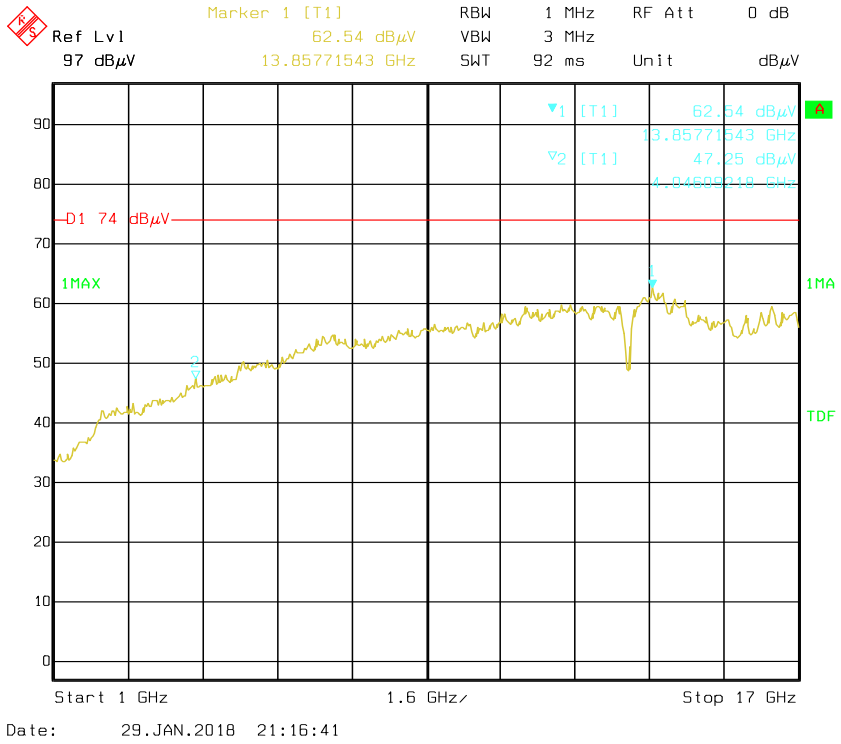
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1656.44	48.34	PK	304	2.1	H	-5.23	43.11	74	30.89
1656.44	32.25	Ave.	304	2.1	H	-5.23	27.02	54	26.98
4014.02	43.25	PK	136	2.1	H	3.06	46.31	74	27.69
4014.02	29.35	Ave.	136	2.1	H	3.06	32.41	54	21.59
1574.35	48.66	PK	161	1.3	V	-5.35	43.31	74	30.69
1574.35	32.34	Ave.	161	1.3	V	-5.35	26.99	54	27.01
4046.09	44.28	PK	209	1.4	V	3.06	47.34	74	26.66
4046.09	30.12	Ave.	209	1.4	V	3.06	33.18	54	20.82

Note:
1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
2) Corrected Amplitude = Correction Factor + Reading
3) Margin = Limit - Corrected Amplitude

Pre-scan and worst case for Horizontal as below



Pre-scan and worst case for vertical as below



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