

FCC PART 15B, CLASS B
MEASUREMENT AND TEST REPORT

For

INVOXIA

87 rue du Gouverneur General Eboue Issy les Moulineaux, France

FCC ID: ZVS-NVX320

Report Type: Original Report	Product Type: NVX320 (Loudspeaker Box)
Test Engineer: Joson Xiao	<i>Joson Xiao</i>
Report Number: RSZ130729005-00	
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Reviewed By: EMC Leader	Dick Zhang <i>Dick Zhang</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *INVOXIA*'s product, model number: *NVX320* (*FCC ID: ZVS-NVX320*) or the "EUT" as referred to in this report was a *Loudspeaker Box*, named as *NVX320* by applicant, which was measured approximately: 29.0 cm (L) x 11.4 cm (W) x 6.0 cm (H), rated input voltage: DC 12V from adapter. The highest operating frequency is 800 MHz.

Adapter information: AC ADAPTER
Model: KSAP0361200300D5
Input: AC100-240V, 50/60Hz, 0.8A
Output: DC 12V, 3.0A

** All measurement and test data in this report was gathered from production sample serial number: 0231330010005DD (Assigned by the applicant). The EUT supplied by the applicant was received on 2013-07-29.*

Objective

This report is prepared on behalf of *INVOXIA* in accordance with Part 2-Subpart J, Part 15- Subparts A and B of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Facility

The test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. 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

Description of Test Configuration

The system was configured for testing in a typical mode which is provided by manufacture.

EUT Exercise Software

No exercise software was used.

Equipment Modifications

No modification was made to the EUT tested.

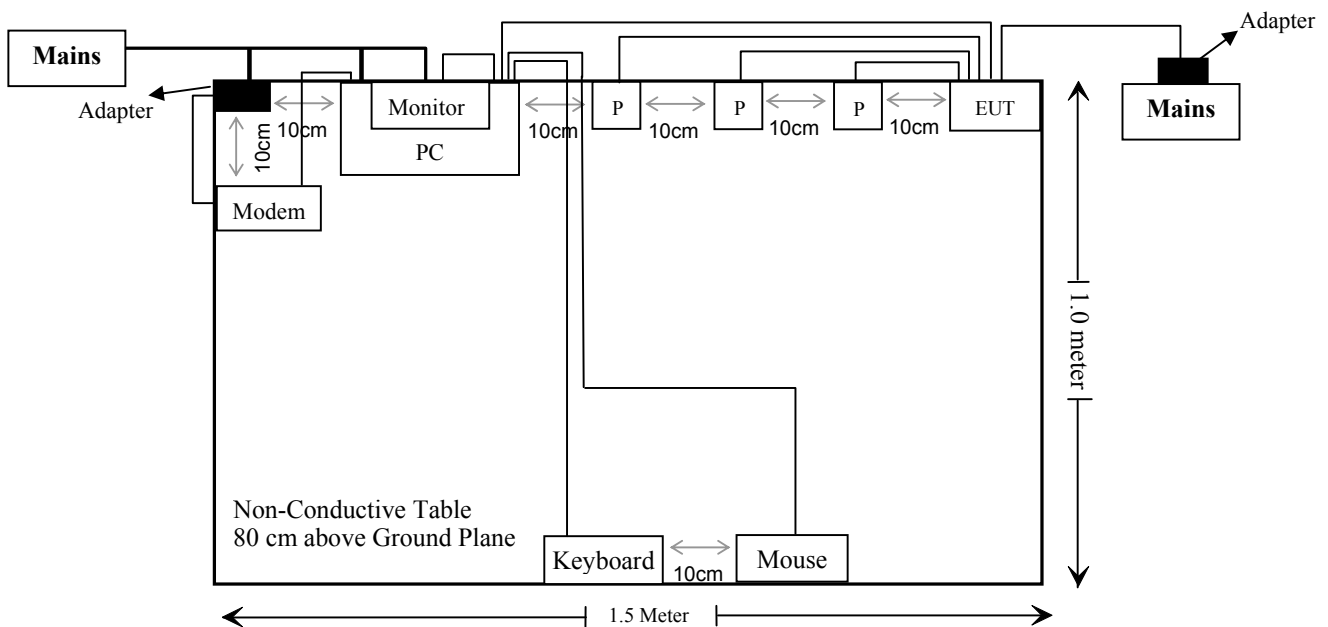
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
MI	Mobile phone	MIS	N/A
RTX	Mobile phone	RTX8111	RTX120200178
RTX	Mobile phone	8252	RTX131000011
DELL	Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
DELL	PC	127BPX2	N/A
DELL	Keyboard	L100	CNORH656658907BL04TY
N/A	Mouse	MO-011	N/A
ECOM	Modem	5600pbs	N/A
LISTED	Adapter	TYP60-1207000Z	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded undetachable DC Cable	1.0	Adapter	EUT
Shielded Detachable USB Cable	3.0	PC	EUT
Unshielded Detachable audio Cable	1.2	Mobile phone	EUT
Shielded Detachable USB Cable	1.8	Mobile phone	EUT
Shielded Detachable USB Cable	1.8	Mobile phone	EUT
Shielded Undetachable Mouse Cable	1.5	Mouse	PC
Shielded Undetachable Keyboard Cable	1.5	Keyboard	PC
Shielded Detachable VGA Cable	1.0	Monitor	EUT
Unshielded Detachable AC Cable	1.8	Mains	Monitor
Unshielded Detachable AC Cable	1.8	Mains	PC
Unshielded Detachable AC Cable	1.2	Adapter	Mains
Unshielded Detachable RS232 Cable	1.7	Modem	PC
Unshielded Undetachable DC Cable	1.2	Modem	Adapter

Block Diagram of Test Setup



Remark:

P means Mobile Phone

SUMMARY OF TEST RESULTS

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

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.107

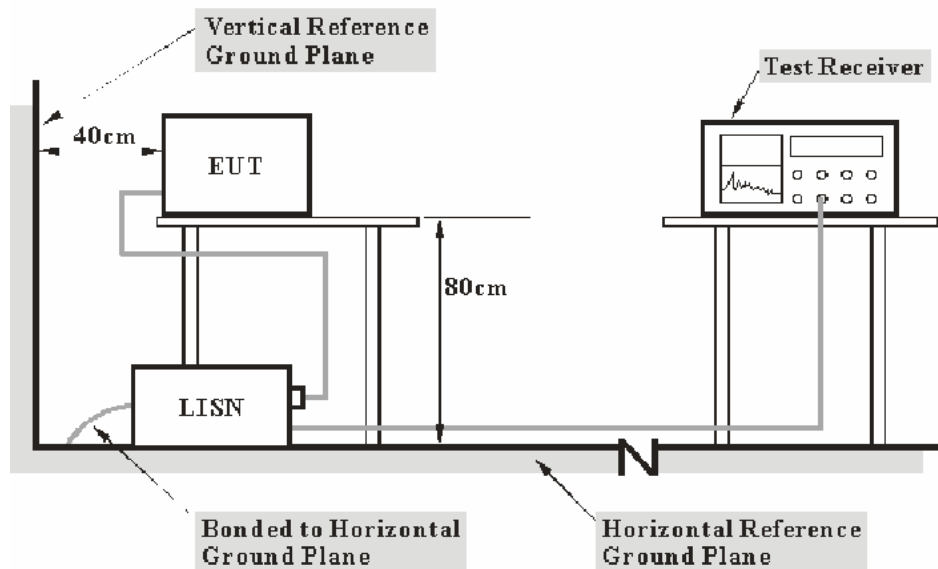
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements may be receiver reading, attenuation of the connection between AMN/ISN and receiver, AMN/ISN voltage division factor, AMN/ISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

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 ANSI C63.4-2009. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

The adapter was connected to an AC 120V/60 Hz power source

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 emissions, the host adapter was connected to the 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2013-06-17	2014-06-17
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2012-08-22	2013-08-22
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2012-08-09	2013-08-09
Rohde & Schwarz	CE Test software	EMC 32	V8.53	-	-
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6650.12-101613-Yb	2013-05-07	2014-05-07

* **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).

Corrected Factor & Margin Calculation

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

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Pulse Limiter Attenuation}$$

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

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

Test Results Summary

According to the recorded data in following table, with the worst margin reading of:

3.2 dB at 2.370000 MHz in the **Line** conducted mode for Playing and charging-Mobile phone

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

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

in BAACL, $U_{(L_m)}$ 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

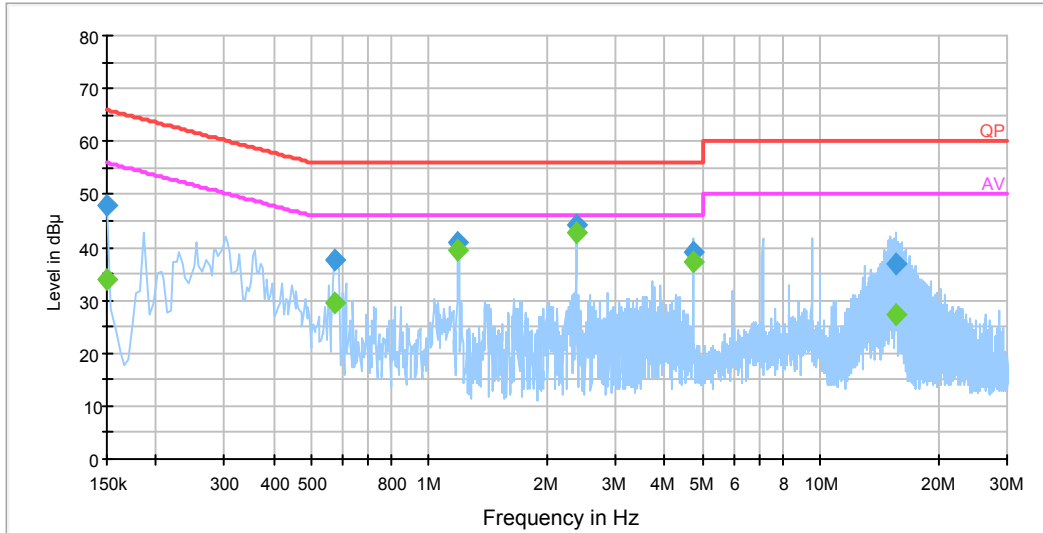
Temperature:	26 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Joson Xiao on 2013-08-08.

EUT operation mode: Playing and charging- Mobile phone

AC 120V/60 Hz, Line

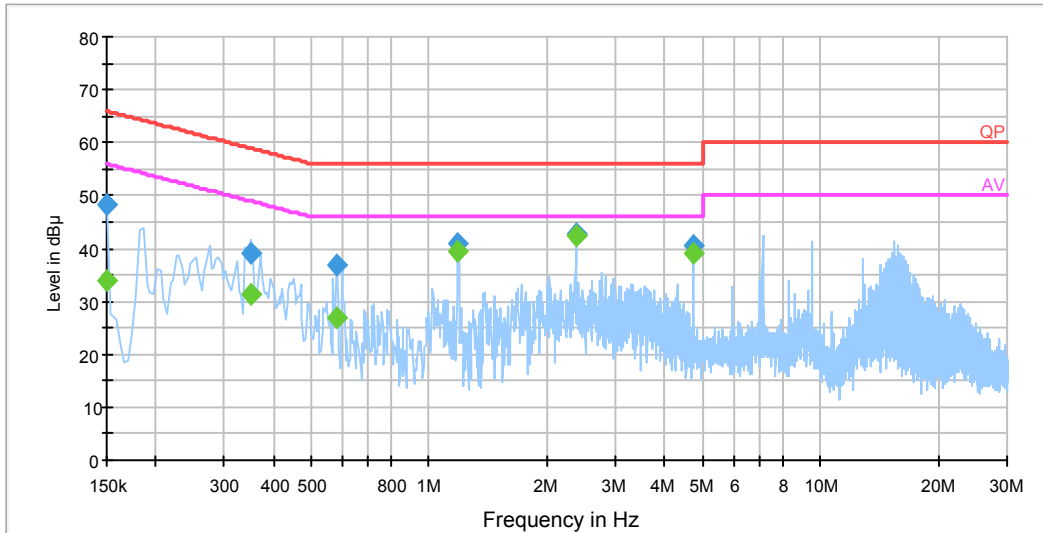
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/ QP/Ave.)
2.370000	42.8	19.5	46.0	3.2*	Ave.
1.186000	39.4	19.5	46.0	6.6	Ave.
4.746000	37.4	19.6	46.0	8.6	Ave.
2.370000	44.2	19.5	56.0	11.8	QP
1.186000	40.9	19.5	56.0	15.1	QP
0.574000	29.6	19.5	46.0	16.4	Ave.
4.746000	39.0	19.6	56.0	17.0	QP
0.150000	47.9	19.5	66.0	18.1	QP
0.574000	37.5	19.5	56.0	18.5	QP
0.150000	34.0	19.5	56.0	22.0	Ave.
15.670000	27.4	20.0	50.0	22.6	Ave.
15.670000	36.9	20.0	60.0	23.1	QP

AC 120V/60 Hz, Neutral

EMI Auto Test N

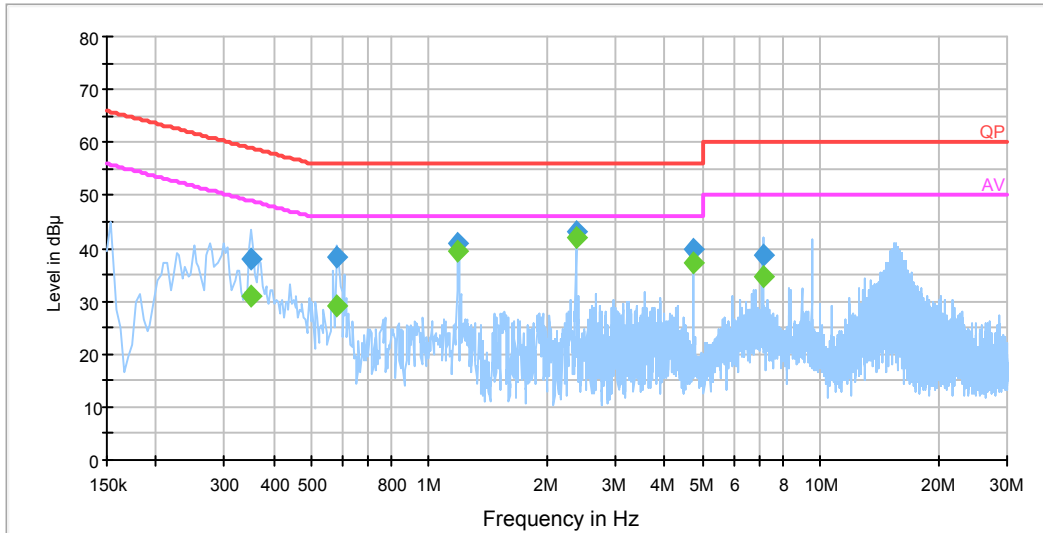


Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/ QP/Ave.)
2.370000	42.4	19.6	46.0	3.6	Ave.
1.186000	39.4	19.5	46.0	6.6	Ave.
4.746000	39.1	19.7	46.0	6.9	Ave.
2.370000	42.7	19.6	56.0	13.3	QP
1.186000	40.9	19.5	56.0	15.1	QP
4.746000	40.4	19.7	56.0	15.6	QP
0.150000	48.5	19.5	66.0	17.5	QP
0.350000	31.4	19.5	49.0	17.6	Ave.
0.582000	27.0	19.5	46.0	19.0	Ave.
0.582000	36.8	19.5	56.0	19.2	QP
0.350000	39.0	19.5	59.0	19.9	QP
0.150000	34.0	19.5	56.0	22.0	Ave.

EUT operation mode: *Playing and charging- PC*

AC 120V/60 Hz, Line

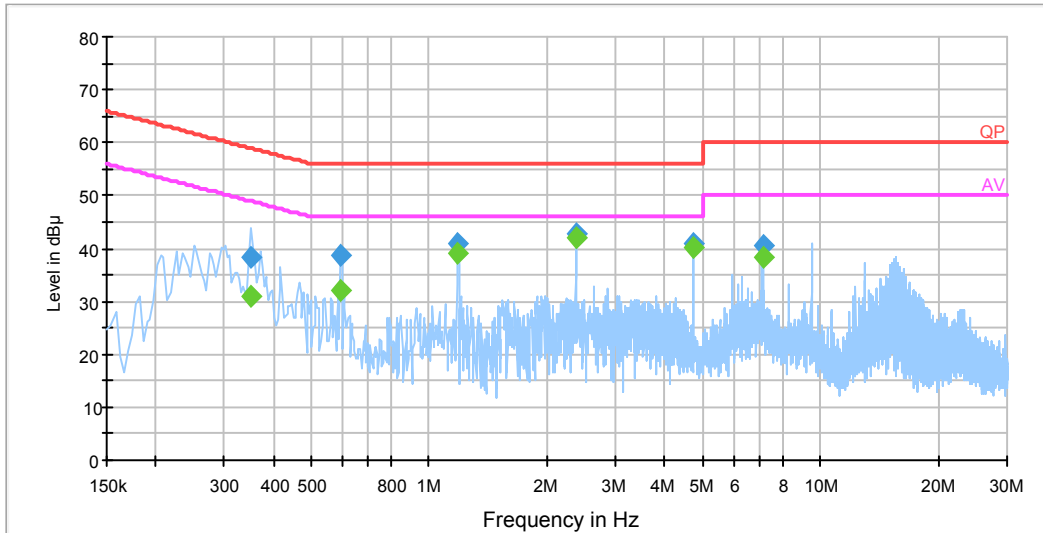
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/ QP/Ave.)
2.374000	41.9	19.5	46.0	4.1	Ave.
1.186000	39.5	19.5	46.0	6.5	Ave.
4.746000	37.1	19.6	46.0	8.9	Ave.
2.374000	43.2	19.5	56.0	12.8	QP
1.186000	41.1	19.5	56.0	14.9	QP
7.118000	34.5	19.7	50.0	15.5	Ave.
4.746000	40.0	19.6	56.0	16.0	QP
0.582000	29.3	19.5	46.0	16.7	Ave.
0.582000	38.3	19.5	56.0	17.7	QP
0.350000	31.1	19.5	49.0	17.8	Ave.
0.350000	38.1	19.5	59.0	20.8	QP
7.118000	38.6	19.7	60.0	21.4	QP

AC 120V/60 Hz, Neutral

EMI Auto Test N



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/ QP/Ave.)
2.370000	42.0	19.6	46.0	4.0	Ave.
4.742000	40.3	19.7	46.0	5.7	Ave.
1.186000	39.2	19.5	46.0	6.8	Ave.
7.114000	38.3	19.8	50.0	11.7	Ave.
2.370000	42.9	19.6	56.0	13.1	QP
0.594000	32.0	19.5	46.0	14.0	Ave.
1.186000	41.0	19.5	56.0	15.0	QP
4.742000	41.0	19.7	56.0	15.0	QP
0.594000	38.5	19.5	56.0	17.5	QP
0.350000	31.0	19.5	49.0	17.9	Ave.
7.114000	40.6	19.8	60.0	19.4	QP
0.350000	38.2	19.5	59.0	20.7	QP

Note:

- 1) Correction Factor = LISN/ISN VDF (Voltage Division Factor) + Cable Loss + Pulse Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit - Corrected Amplitude
- 4) *Within measurement uncertainty

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

According to FCC §15.109

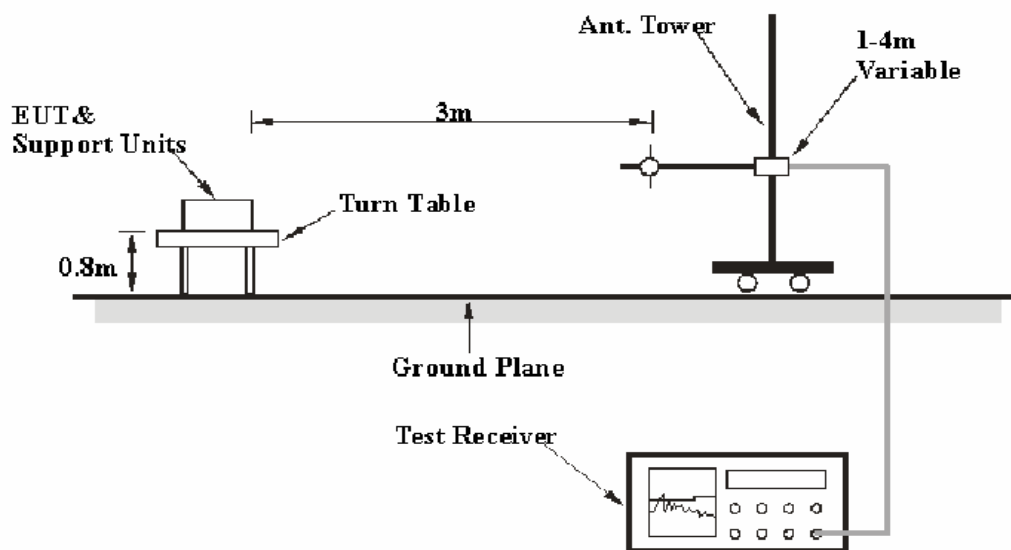
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, 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 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report

Frequency	Polarity	Measurement uncertainty
30MHz~200MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200MHz~1GHz	Horizontal	4.84 dB (k=2, 95% level of confidence)
	Vertical	5.91 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/ Vertical	4.68 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/ Vertical	4.92 dB (k=2, 95% level of confidence)

EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. 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.

The adapter was connected to an AC 120V/60 Hz power source

EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 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	Detector
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 detection mode from 30 MHz to 1 GHz, Peak and average detection mode above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2012-08-09	2013-08-09
TDK	Chamber	Chamber A	2#	2012-10-15	2015-10-15
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2012-11-24	2013-11-24
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
TDK	Chamber	Chamber B	1#	2011-07-23	2014-07-22
Mini-Circuits	Pre-amplifier	ZVA-183-S+	5969001149	2013-04-03	2014-04-03
Sunol Sciences	Horn Antenna	SAS-200/571	135	2012-02-11	2015-02-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
R&S	Auto test Software	EMC32	V6.30	-	-

* **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).

Corrected Amplitude & Margin Calculation

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

$$\text{Correction Factor} = \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

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

Test Results Summary

According to the data in the following table, with the worst margin reading of:

4.6 dB at 96.003800 MHz in the **Horizontal** polarization for Playing-PC mode

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 BAACL, $U_{(Lm)}$ 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

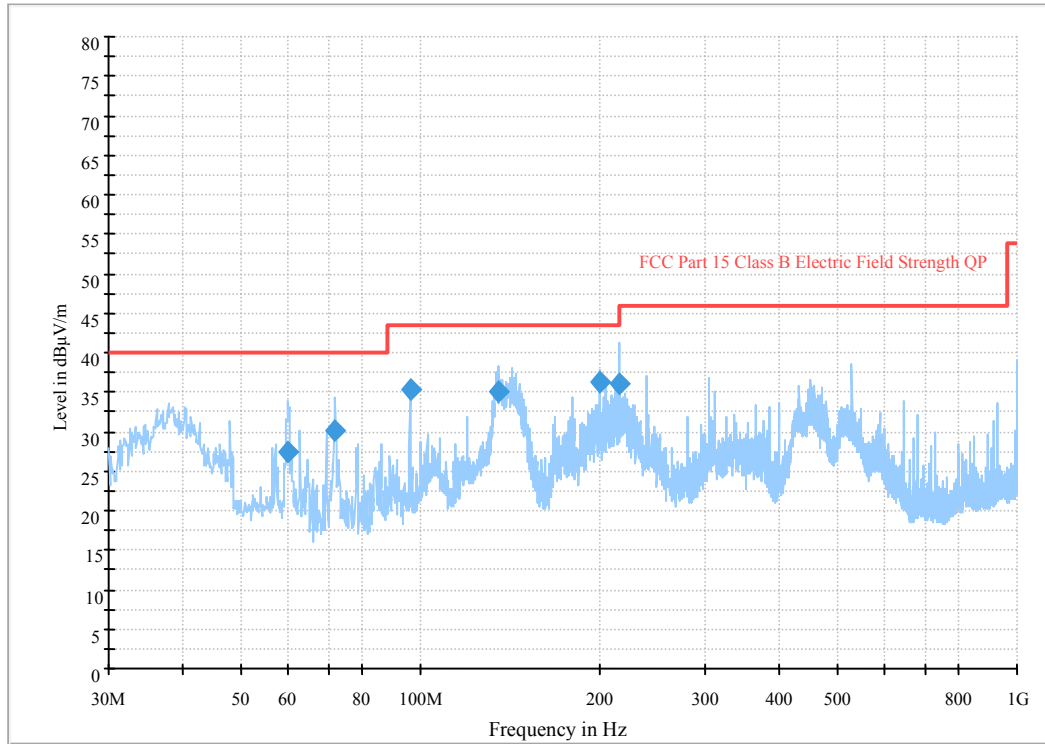
Temperature:	26 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Joson Xiao on 2013-08-08.

EUT operation mode: Playing – Mobile phone

1) 30 MHz ~ 1 GHz

Auto Test (FCC part 15 Class B)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (deg)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
200.017100	36.3	169.0	H	160.0	-15.1	43.5	7.2
215.972150	36.0	158.0	H	324.0	-16.4	43.5	7.5
95.960000	35.2	129.0	V	217.0	-18.4	43.5	8.3
135.321800	34.9	101.0	V	203.0	-13.9	43.5	8.6
71.970400	30.2	367.0	H	180.0	-20.6	40.0	9.8
59.960150	27.4	100.0	V	89.0	-20.7	40.0	12.6

Note:

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
The corrected factor has been input into the transducer of the test software.
- 3) Margin = Limit – Corrected Amplitude

2) 1 GHz ~ 5 GHz

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.109	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
1490.8	37.69	Ave.	324	1.3	V	1.15	38.84	54	15.16
1490.8	53.94	PK	324	1.3	V	1.15	55.09	74	18.91
2392.7	27.88	Ave.	60	1.3	V	6.13	34.01	54	19.99
1801.1	26.34	Ave.	255	1.4	H	2.63	28.97	54	25.03
2392.7	42.42	PK	60	1.3	V	6.13	48.55	74	25.45
1801.1	42.26	PK	255	1.4	H	2.63	44.89	74	29.11

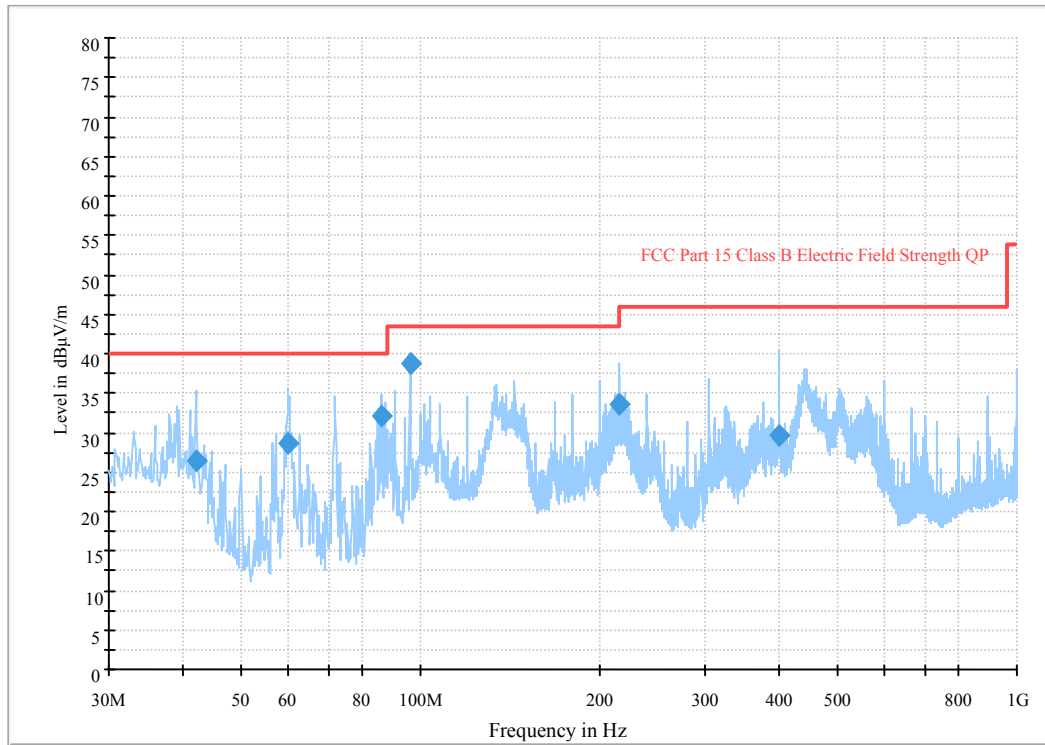
Note:

- 1) Corrected Amplitude = Corrected Factor + Reading
- 2) Corrected Factor = Antenna factor + Cable loss – Amplifier factor
- 3) Margin = Limit - Corrected Amplitude

EUT operation mode: Playing - PC

1) 30 MHz ~ 1 GHz

Auto Test (FCC part 15 Class B)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (deg)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
96.003800	38.9	336.0	H	184.0	-18.4	43.5	4.6*
85.720150	32.1	122.0	V	90.0	-20.3	40.0	7.9
60.047900	28.7	108.0	V	0.0	-20.7	40.0	11.3
216.034850	33.7	114.0	H	180.0	-16.4	46.0	12.3
42.137850	26.5	101.0	V	38.0	-15.9	40.0	13.5
399.910400	29.6	101.0	H	289.0	-11.8	46.0	16.4

Note:

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
The corrected factor has been input into the transducer of the test software.
- 3) Margin = Limit – Corrected Amplitude
- 4) *Within measurement uncertainty

2) 1 GHz ~ 5 GHz

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB μ V/m)	FCC Part 15.109	
	Reading (dB μ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
1160.3	43.58	Ave.	211	1.6	V	0.13	43.71	54	10.29
1771.5	38.94	Ave.	91	1.3	V	2.32	41.26	54	12.74
1771.5	56.76	PK	91	1.3	V	2.32	59.08	74	14.92
1941.8	34.88	Ave.	233	1.5	V	3.07	37.95	54	16.05
1160.3	56.08	PK	211	1.6	V	0.13	56.21	74	17.79
1941.8	53.10	PK	233	1.5	V	3.07	56.17	74	17.83

Note:

- 1) Corrected Amplitude = Corrected Factor + Reading
- 2) Corrected Factor = Antenna factor + Cable loss - Amplifier factor
- 3) Margin = Limit - Corrected Amplitude

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