



FCC PART 15B, CLASS B TEST REPORT

For

Hyundai Corporation

25, Yulgok-ro 2-Gil, Jongno-gu, Seoul, 110-793, South Korea

FCC ID: RQQHLT-FSE502A

Report Type: Original Report	Product Type: Smart Phone
Report Number: RSZ170706008-00A	
Report Date: 2017-08-01	
Oscar Ye	
Reviewed By: Engineer	
Prepared By: Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn	

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

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EUT EXERCISE SOFTWARE	5
SPECIAL ACCESSORIES.....	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLE.....	5
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC §15.107 – AC LINE CONDUCTED EMISSIONS.....	9
APPLICABLE STANDARD	9
EUT SETUP	9
EMI TEST RECEIVER SETUP.....	9
TEST PROCEDURE	9
CORRECTED FACTOR & MARGIN CALCULATION	10
TEST RESULTS SUMMARY	10
TEST DATA	10
FCC §15.109 - RADIATED SPURIOUS EMISSIONS	13
APPLICABLE STANDARD	13
EUT SETUP	13
EMI TEST RECEIVER SETUP.....	14
TEST PROCEDURE	14
CORRECTED AMPLITUDE & MARGIN CALCULATION	14
TEST RESULTS SUMMARY	14
TEST DATA	15

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hyundai Corporation's* product, model number: *e502 (FCC ID: RQQHLT-FSE502A)* in this report is a *Smart Phone* which was measured approximately: 143.0 mm (L) * 71.0 mm (W) * 9.0 mm (H), rated with input voltage: DC 3.7V from Li-ion battery or DC 5V from adapter. The highest operating frequency is 2480MHz.

Adapter Information:

Model: UAP-L05Y10-00AFC

Input: AC 100-240V, 50/60Hz, 0.15 A

Output: DC 5V, 1000mA

** All measurement and test data in this report was gathered from production sample serial number: 1701606 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2017-07-06.*

Objective

This test report is prepared on behalf of *Hyundai Corporation* 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 the EUT with FCC Part 15 B.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS/DTSS and Part 22H & 24E PCE submissions with FCC ID: RQQHLT-FSE502A.

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. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		±3.26 dB
Radiated emission	30MHz~1GHz	±5.91dB
	Above 1G	±4.92dB

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China

Bay Area Compliance Laboratories Corp. (Kunshan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L9963). And accredited to ISO/IEC 17025 by A2LA(Lab code: 4323.01), the FCC Designation No. CN1185 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Kunshan) was registered with ISED Canada under ISED Canada Registration Number 3062E.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

EUT operation mode: Downloading (data transfer with computer)

EUT Exercise Software

“Burn In test v5.3” exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

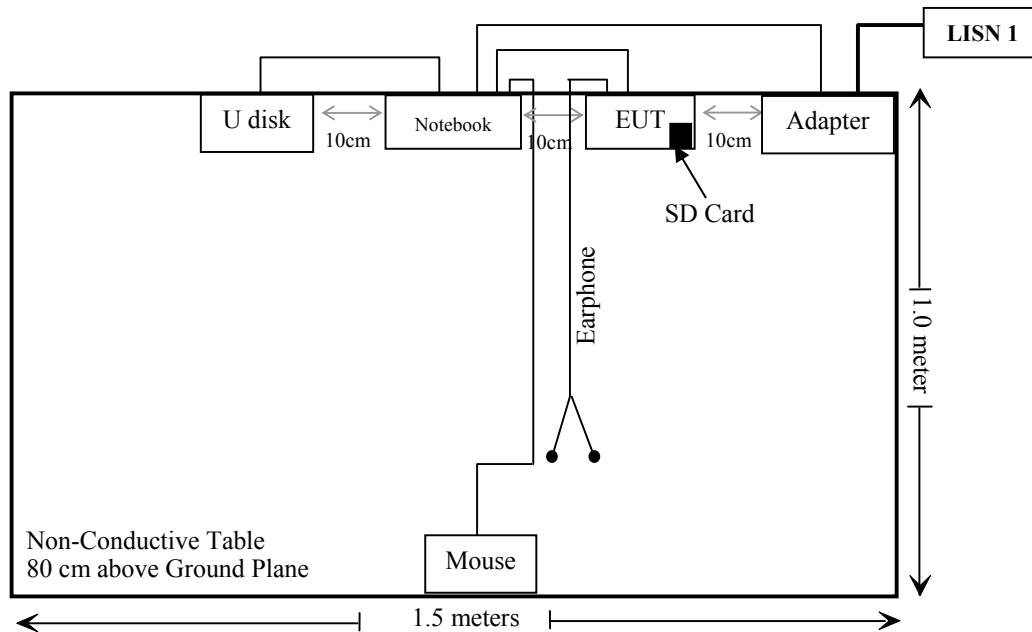
Manufacturer	Description	Model	Serial Number
DELL	Notebook	E6410	GYXJ3A00 JSD2
DELL	Mouse	MOC5UO	G1900NKD
DELL	Adapter	LA90PM130	CN-06C3W2-72438-6BT-194A-A03
Kingston	U disk	4 GB	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-Shielding Detachable USB Cable	1.5	Notebook	U disk
Un-Shielding Detachable USB Cable	1.5	Notebook	Mouse
Un-shielding Detachable USB Cable	1.0	EUT	Notebook
Un-shielding Detachable AC Cable	0.9	Adapter	LISN 1
Un-shielding Un-detachable DC Cable	0.9	Adapter	Notebook

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	834115/007	2016-11-25	2017-11-25
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-10
Rohde & Schwarz	Pulse limiter	ESH3-Z2	879940/0058	2017-06-18	2018-06-17
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2016-09-08	2017-09-08
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	NCR	NCR
Radiated Emission Test					
Sonoma Instrument	Amplifier	330	171377	2016-12-12	2017-12-12
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
EMCO	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-25
ETS	Horn Antenna	3115	6229	2016-12-12	2019-12-12
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-12

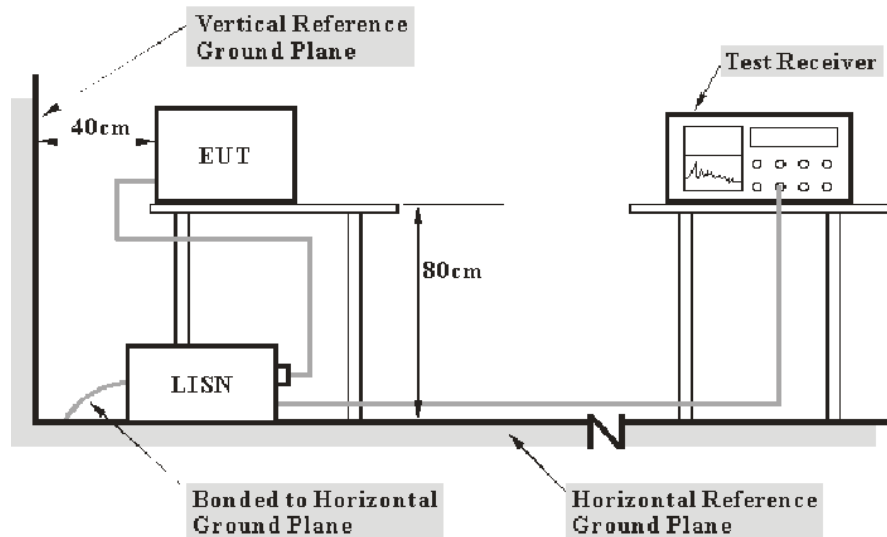
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI)

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

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:

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

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:

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

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

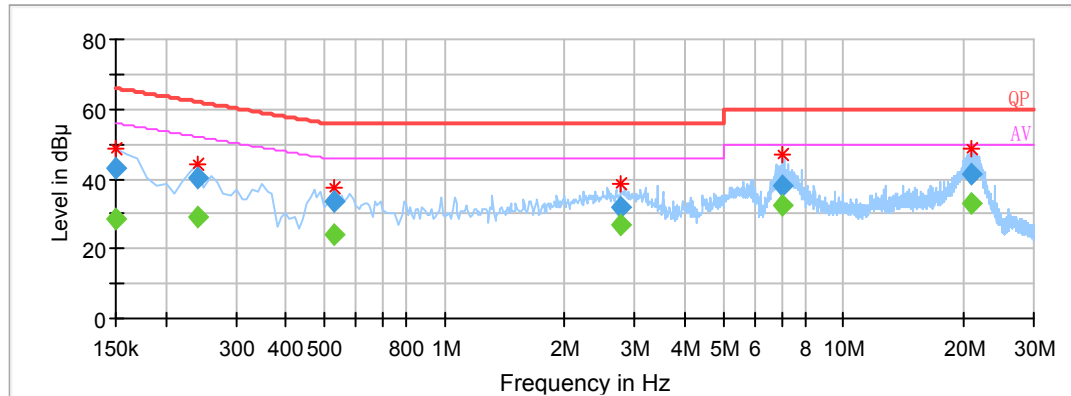
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-07-16.

EUT Operation Mode: Downloading

AC 120V/60 Hz, Line

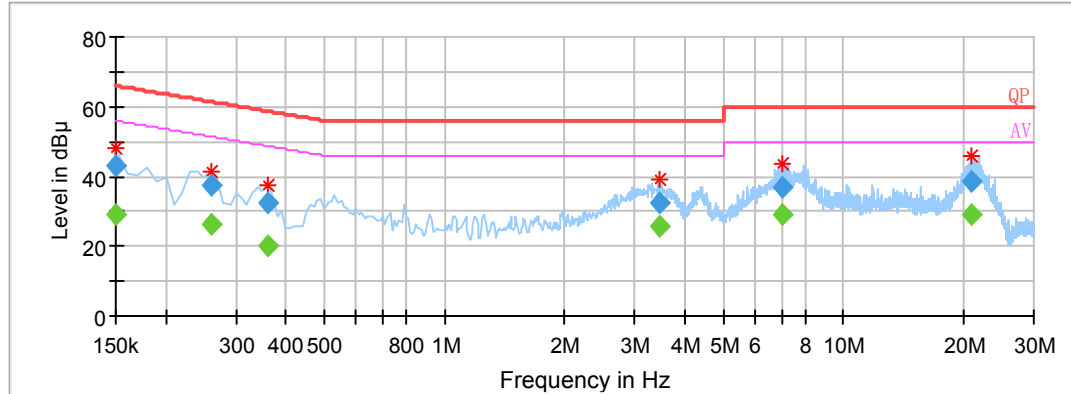
Full Spectrum



Frequency (MHz)	QuasiPeak (dBμV)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	---	28.33	9.000	L1	10.1	27.67	56.00	Compliance
0.150000	43.18	---	9.000	L1	10.1	22.82	66.00	Compliance
0.240000	---	29.22	9.000	L1	10.2	22.88	52.10	Compliance
0.240000	40.06	---	9.000	L1	10.2	22.04	62.10	Compliance
0.530000	---	24.06	9.000	L1	10.1	21.94	46.00	Compliance
0.530000	33.31	---	9.000	L1	10.1	22.69	56.00	Compliance
2.760000	---	26.86	9.000	L1	9.9	19.14	46.00	Compliance
2.760000	32.12	---	9.000	L1	9.9	23.88	56.00	Compliance
7.030000	---	32.50	9.000	L1	10.0	17.50	50.00	Compliance
7.030000	38.23	---	9.000	L1	10.0	21.77	60.00	Compliance
21.020000	---	33.14	9.000	L1	10.2	16.86	50.00	Compliance
21.020000	41.61	---	9.000	L1	10.2	18.39	60.00	Compliance

AC 120V/60 Hz, Neutral

Full Spectrum



Frequency (MHz)	QuasiPeak (dBμV)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	---	28.88	9.000	N	10.1	27.12	56.00	Compliance
0.150000	43.10	---	9.000	N	10.1	22.90	66.00	Compliance
0.260000	---	26.09	9.000	N	10.1	25.34	51.43	Compliance
0.260000	37.59	---	9.000	N	10.1	23.84	61.43	Compliance
0.360000	---	20.05	9.000	N	10.1	28.68	48.73	Compliance
0.360000	32.24	---	9.000	N	10.1	26.49	58.73	Compliance
3.470000	---	25.91	9.000	N	9.9	20.09	46.00	Compliance
3.470000	32.35	---	9.000	N	9.9	23.65	56.00	Compliance
7.040000	---	29.19	9.000	N	9.9	20.81	50.00	Compliance
7.040000	36.91	---	9.000	N	9.9	23.09	60.00	Compliance
20.980000	---	29.24	9.000	N	10.2	20.76	50.00	Compliance
20.980000	38.56	---	9.000	N	10.2	21.44	60.00	Compliance

Note:

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

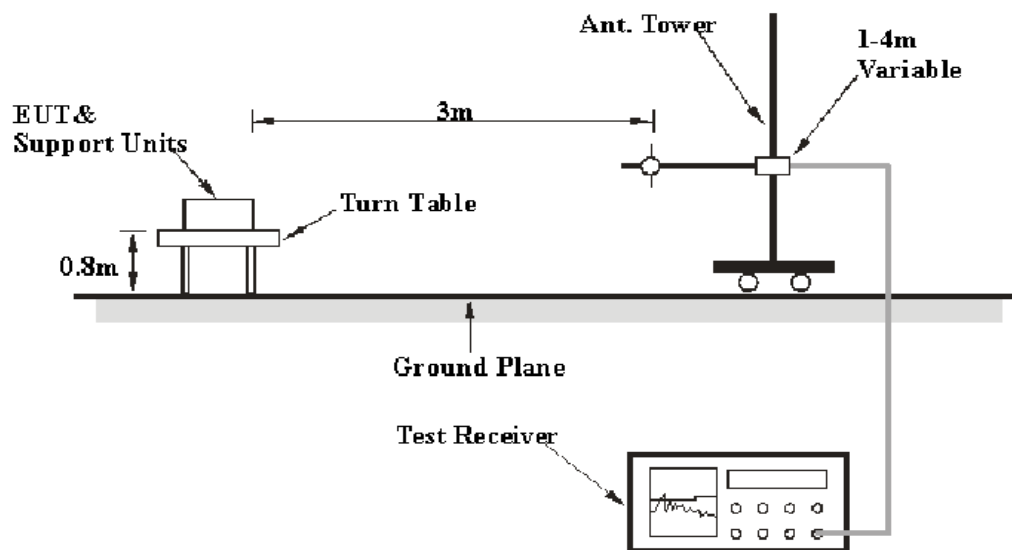
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

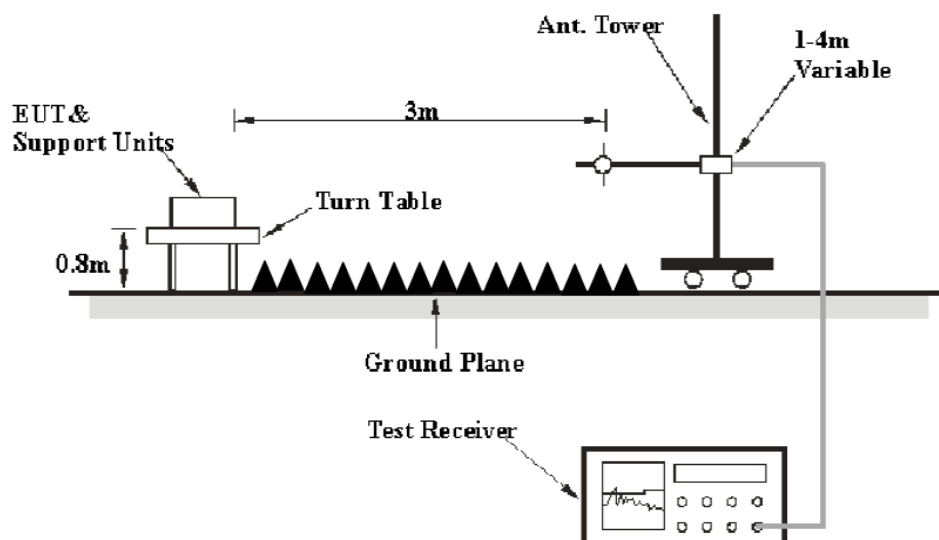
FCC §15.109

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 12.4 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 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB 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 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:	24 °C
Relative Humidity:	60 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-07-16.

EUT operation mode: Downloading

30 MHz – 12.4GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15B	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
41.71	28.76	QP	75.0	1.06	V	0.26	29.02	40.00	10.98
42.99	29.76	QP	30.0	0.99	V	0.26	30.02	40.00	9.98
60.65	35.26	QP	70.0	1.09	V	-6.02	29.24	40.00	10.76
61.19	37.35	QP	69.0	1.11	V	-6.02	31.33	40.00	8.67
143.99	38.70	QP	243.0	2.24	H	-0.17	38.53	43.50	4.97
862.39	20.59	QP	206.0	3.68	V	10.50	31.09	46.00	14.91
1320.64	55.72	PK	67	2.2	H	-10.66	45.06	74	28.94
1320.64	37.68	Ave.	67	2.2	H	-10.66	27.02	54	26.98
2166.53	57.83	PK	262	1.1	V	-6.64	51.19	74	22.81
2166.53	36.15	Ave.	262	1.1	V	-6.64	29.51	54	24.49

Note:

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

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