

FCC PART 15B, CLASS B TEST REPORT

For

Consumer 2.0

1180 South Beverly Drive Suite 300, Los Angeles, CA, 90035, United States

FCC ID: 2AH4J-RKH-TRI-01

Report Type: Class II Permissive Change	Product Type: Rently Keyless Hub
Report Number: RSZ171205003-00AA1	
Report Date: 2018-01-18	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Consumer 2.0*'s product, model number: *RKH-TRI-01* (FCC ID: *2AH4J-RKH-TRI-01*) in this report is a *Rently Keyless Hub* which was measured approximately: 148 mm (L) * 182 mm (W) * 29 mm (H), rated with input voltage: DC 3.7 V battery or DC 5.0V from adapter.

Adapter Information:

Model: ZD120A-0502500

Input: AC 100-240V, 50/60Hz, 0.5A

Output: DC 5.0V, 2.5A

**All measurement and test data in this report was gathered from production sample serial number: 1702662 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2017-12-05.*

Objective

This test report is prepared on behalf of *Consumer 2.0* 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.

This is a CIIPC application of the device, the differences between the original device and the current one are as follows:

1. Change the 4G module SIM7500A (FCC ID: UDV-201606) to NL-SW-LTE-GELS3-C(FCC ID:QIPELS31-V) or MC7354(FCC ID:N7NMC7355), those two 4G modules can be optional for the marketing purpose.

For the change made to the device, the test item "AC Line Conducted Emissions" and "Spurious Radiated Emission" were performed.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submissions with FCC ID: 2AH4J-RKH-TRI-01.

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: Downloading and Ping IP

EUT Exercise Software

“BurnIn test v5.3” exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

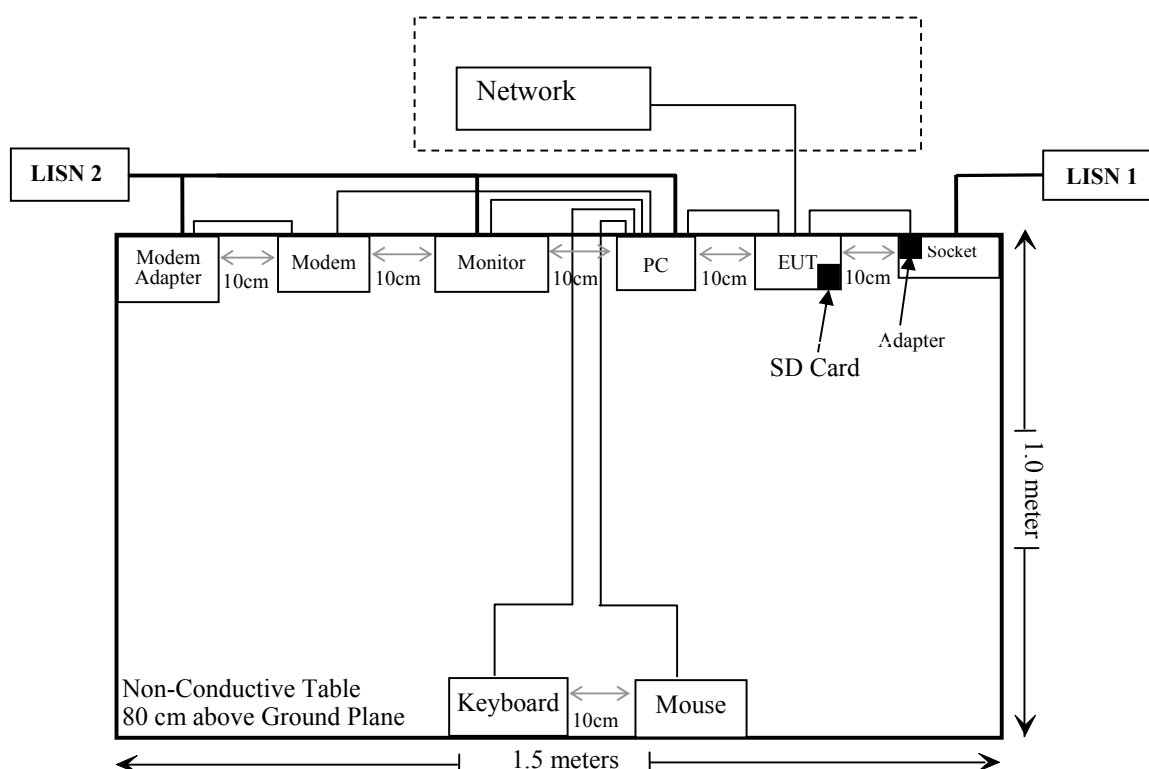
No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	PC	VOSTRO 220S	127BP2X
DELL	LCD Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
DELL	Keyboard	L100	CNORH656658907BL05DC
DELL	Mouse	MOC5UO	G1900NKD
SAST	Modem	AEM-2100	0293
BULL	Socket	GN-415K	5503290068073
Kingston	SD Card	4 GB	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-Shielding Detachable USB Cable	1.5	Host PC	Mouse
Un-Shielding Detachable Serial Cable	1.5	Host PC	Modem
Un-Shielding Detachable K/B Cable	1.5	Host PC	Keyboard
Shielding Detachable VGA Cable	1.5	Host PC	LCD Monitor
Shielding Detachable USB Cable With Magnet Ring	1.0	EUT	Host PC
Un-shielding detachable RJ45 Cable	3.0	EUT	Network
Un-shielding Un-detachable DC Cable	1.0	Modem	Modem Adapter
Unshielded Un-detachable AC cable	1.0	Socket	LISN
Unshielded Un-detachable DC Cable	2.5	EUT	Adapter

Block Diagram of Test Setup

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	2017-11-19	2018-05-21
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					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-29	2020-12-28
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	2017-12-17	2020-12-16
HP	Amplifier	HP8447E	1937A01046	2017-11-19	2018-05-21
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2017-12-07	2018-12-07
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369223410-001	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	104PEA	218124002	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	1	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	2	2017-11-19	2018-05-21

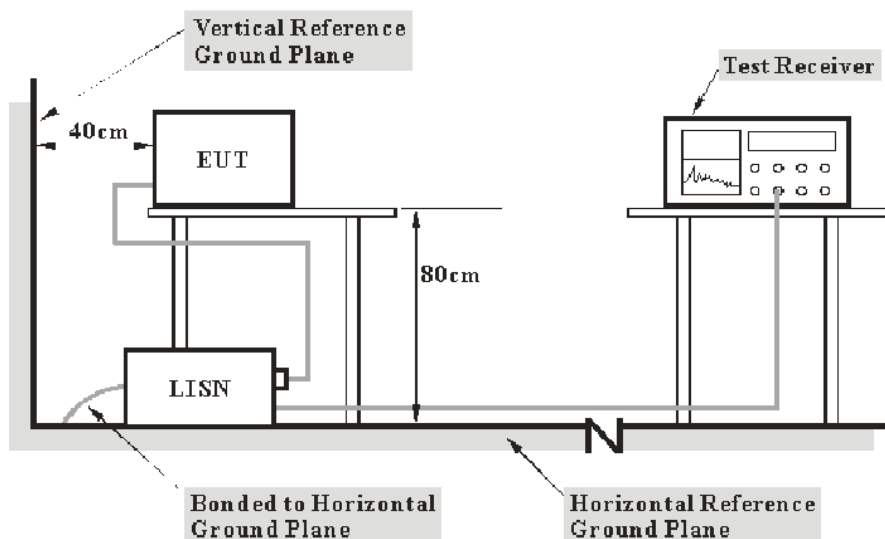
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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 adapter was connected to the first LISN and the other relevant equipments were connected 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:

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

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.

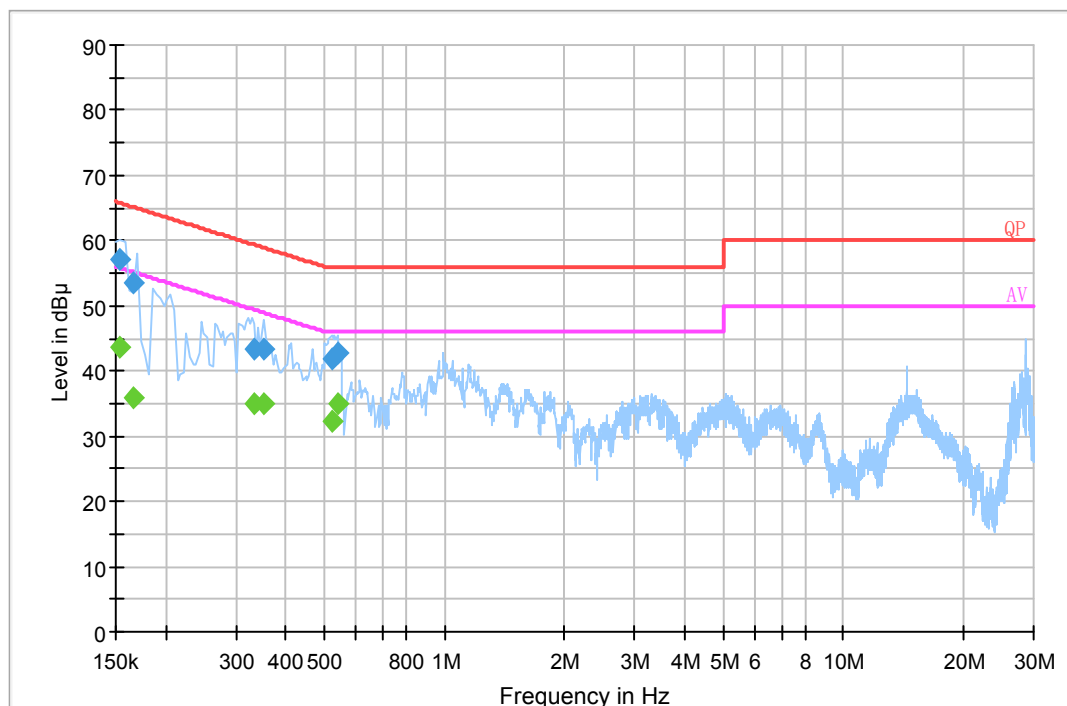
Test Data

Environmental Conditions

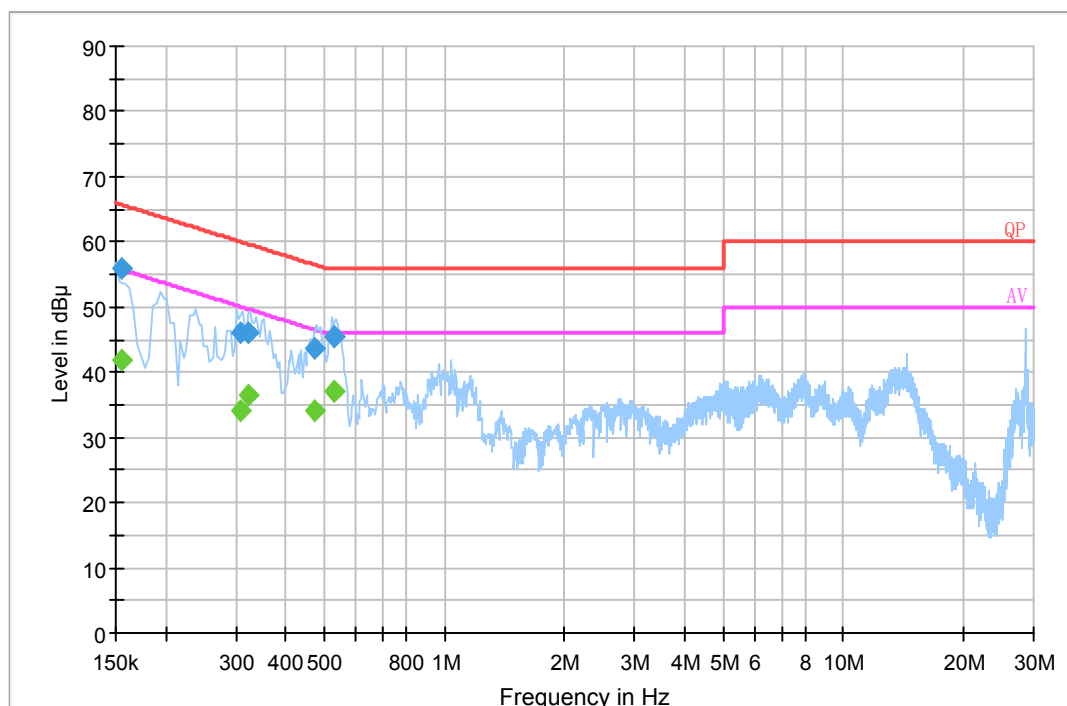
Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Joson Xiao on 2018-01-09.

EUT Operation Mode: Downloading & Ping IP (pre-scan the two sample, the worst case is scanning the sample which with LTE module 2 (FCC ID: N7NMC7355) one)

AC 120V/60 Hz, Line

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.154000	57.2	20.2	65.8	8.6	QP
0.165500	53.5	20.2	65.2	11.7	QP
0.334950	43.5	20.2	59.3	15.8	QP
0.352690	43.5	20.2	58.9	15.4	QP
0.522170	41.9	20.2	56.0	14.1	QP
0.537930	42.9	20.2	56.0	13.1	QP
0.154000	43.7	20.2	55.8	12.1	Ave.
0.165500	35.9	20.2	55.2	19.3	Ave.
0.334950	34.9	20.2	49.3	14.4	Ave.
0.352690	34.9	20.2	48.9	14.0	Ave.
0.522170	32.3	20.2	46.0	13.7	Ave.
0.537930	34.9	20.2	46.0	11.1	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.154500	56.0	20.2	65.8	9.8	QP
0.306530	46.1	20.2	60.1	14.0	QP
0.321110	45.9	20.2	59.7	13.8	QP
0.474830	43.8	20.2	56.4	12.6	QP
0.529830	45.5	20.2	56.0	10.5	QP
0.529930	45.4	20.2	56.0	10.6	QP
0.154500	41.9	20.2	55.8	13.9	Ave.
0.306530	34.1	20.2	50.1	16.0	Ave.
0.321110	36.5	20.2	49.7	13.2	Ave.
0.474830	34.1	20.2	46.4	12.3	Ave.
0.529830	37.0	20.2	46.0	9.0	Ave.
0.529930	37.1	20.2	46.0	8.9	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

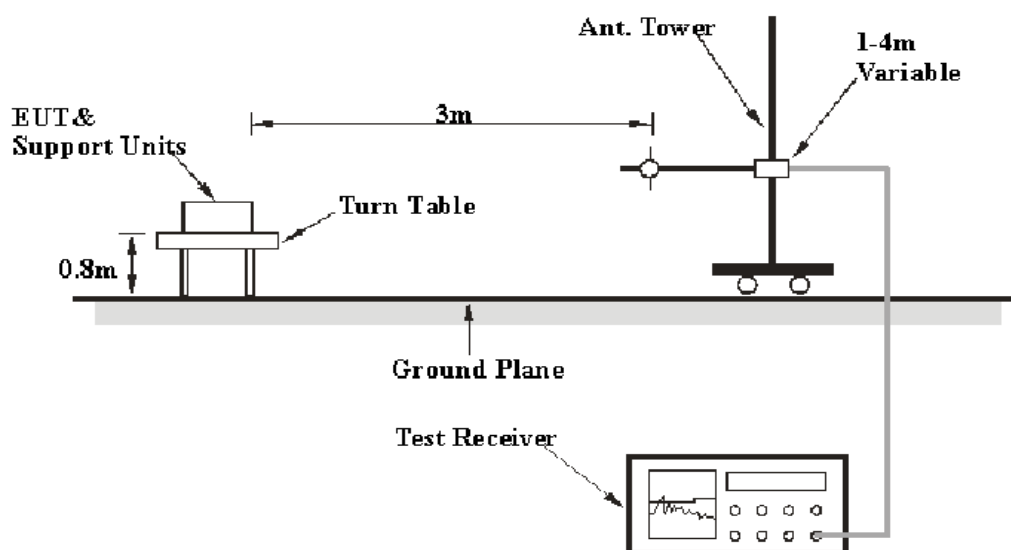
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

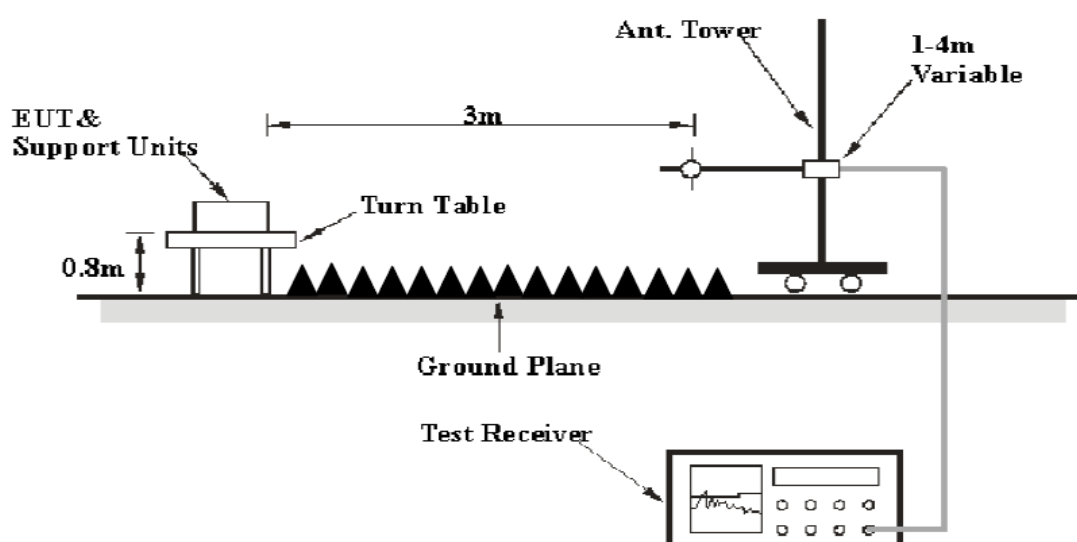
FCC §15.109

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 13 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:

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

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.

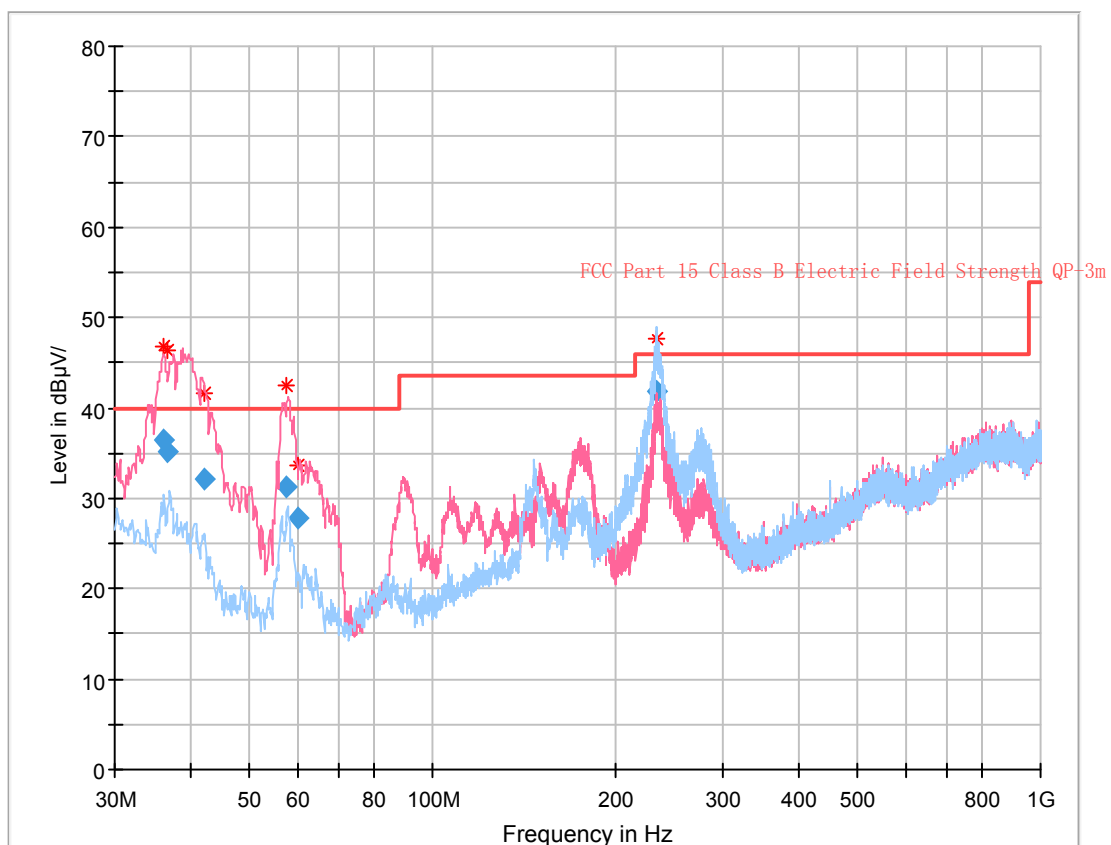
Test Data**Environmental Conditions**

Temperature:	24~25 °C
Relative Humidity:	49~52 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by Joson Xiao from 2018-01-09 to 2018-01-18.

EUT Operation Mode: Downloading & Ping IP

LTE module 1 (FCC ID: QIPELS31-V)
30 MHz – 1 GHz:



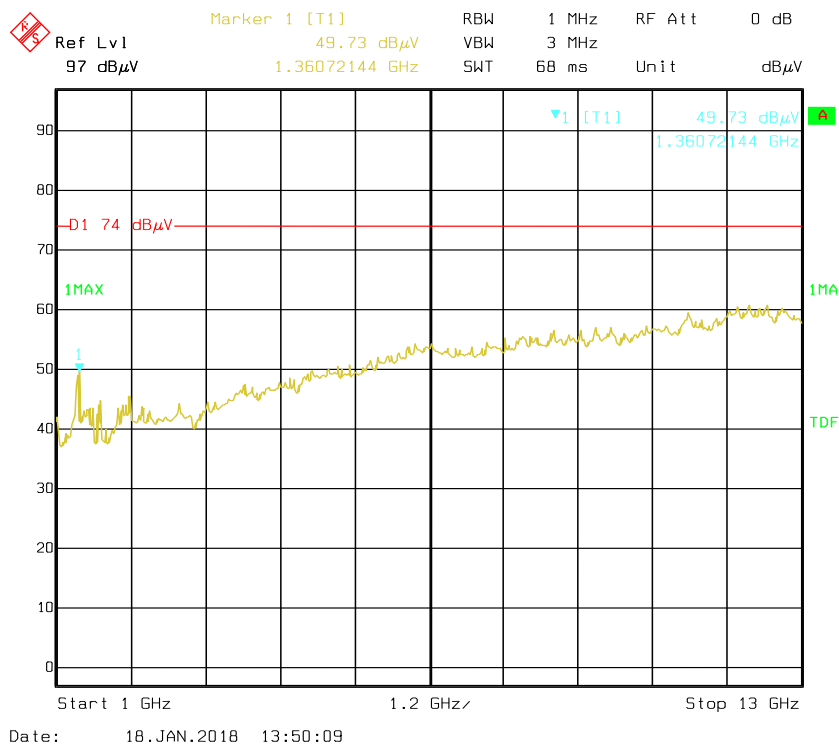
Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
36.181250	36.35	105.0	V	0.0	-3.7	40.00	3.65
36.654500	35.05	105.0	V	347.0	-4.0	40.00	4.95
42.117750	32.03	101.0	V	19.0	-7.7	40.00	7.97
57.479750	31.24	109.0	V	188.0	-11.7	40.00	8.76
60.177250	27.71	109.0	V	334.0	-11.9	40.00	12.29
234.113625	41.90	121.0	H	0.0	-5.3	46.00	4.10

1GHz – 13GHz:

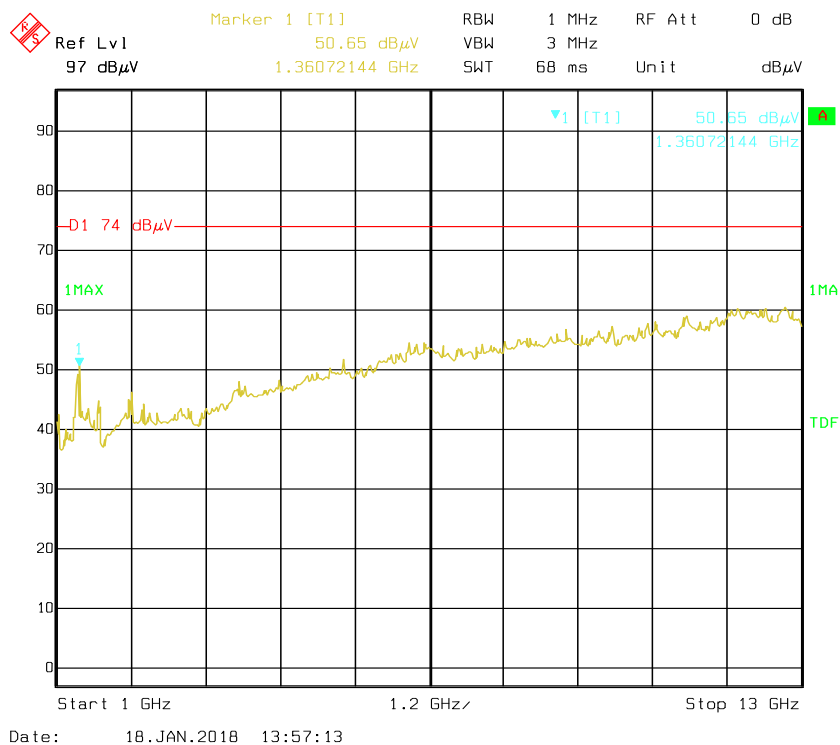
Frequency (MHz)	Measurement		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15B	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
1360.72	57.84	PK	268	2.4	H	-7.89	49.95	74	24.05
1360.72	32.25	Ave.	268	2.4	H	-7.89	24.36	54	29.64
1360.72	58.74	PK	282	2.0	V	-7.89	50.85	74	23.15
1360.72	32.24	Ave.	282	2.0	V	-7.89	24.35	54	29.65
1673.34	52.32	PK	121	1.9	H	-5.23	47.09	74	26.91
1673.34	31.21	Ave.	121	1.9	H	-5.23	25.98	54	28.02
1673.34	50.17	PK	164	1.4	V	-5.23	44.94	74	29.06
1673.34	31.08	Ave.	164	1.4	V	-5.23	25.85	54	28.15

Note:

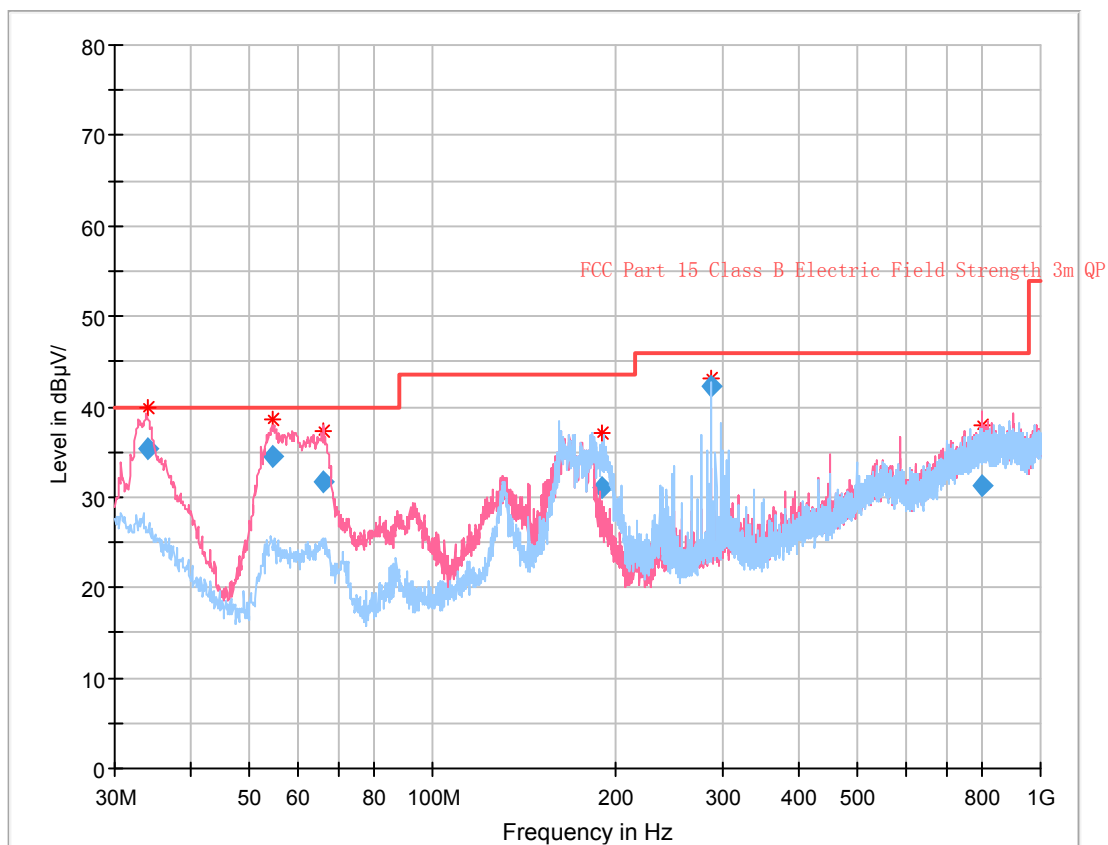
- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude
- 4) All spurious emissions are 20 dB below the limit or are on the system noise floor level for above 6GHz.

Prescan with Horizontal

Prescan with Vertical



LTE module 2 (FCC ID: N7NMC7355)
30 MHz – 1 GHz:



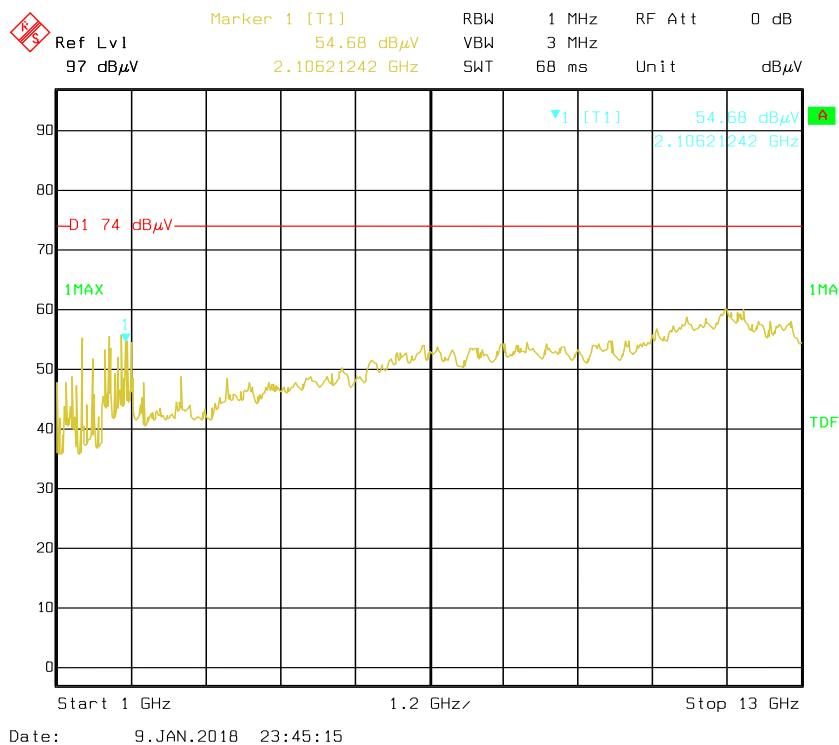
Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
33.952750	35.37	102.0	V	258.0	-2.3	40.00	4.63
54.507000	34.43	114.0	V	357.0	-11.4	40.00	5.57
65.900875	31.63	100.0	V	109.0	-11.9	40.00	8.37
190.626625	31.08	157.0	H	262.0	-5.6	43.50	12.42
287.502500	42.37	104.0	H	127.0	-3.1	46.00	3.63
798.783000	31.19	383.0	V	195.0	9.0	46.00	14.81

1GHz – 13GHz:

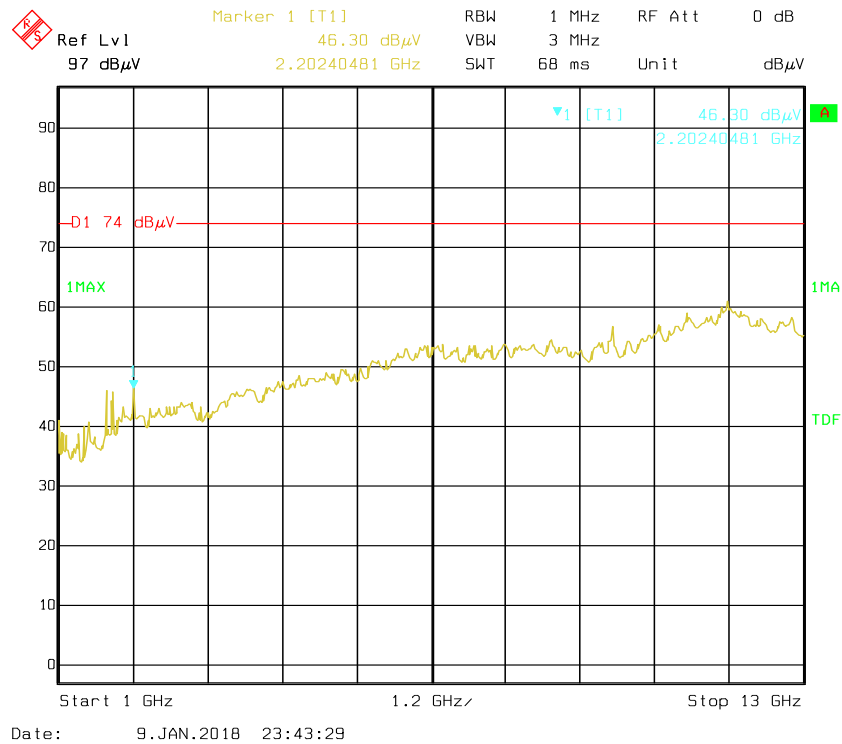
Frequency (MHz)	Measurement		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15B	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
1769.53	53.34	PK	178	2.5	V	-5.22	48.12	74	25.88
1769.53	34.12	Ave.	178	2.5	V	-5.22	28.90	54	25.1
2202.41	49.62	PK	77	1.5	V	-0.97	48.65	74	25.35
2202.41	33.61	Ave.	77	1.5	V	-0.97	32.64	54	21.36
1408.81	62.35	PK	67	1.8	H	-7.89	54.46	74	19.54
1408.81	34.76	Ave.	67	1.8	H	-7.89	26.87	54	27.13
2106.21	55.67	PK	334	1.2	H	-0.82	54.85	74	19.15
2106.21	34.34	Ave.	334	1.2	H	-0.82	33.52	54	20.48

Note:

- 5) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 6) Corrected Amplitude = Correction Factor + Reading
- 7) Margin = Limit - Corrected Amplitude
- 8) All spurious emissions are 20 dB below the limit or are on the system noise floor level for above 6GHz.

Prescan with Horizontal

Prescan with Vertical



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