

FCC PART 15B, CLASS B TEST REPORT

For

MOIMSTONE CO., LTD

16, sapyeong-daero, Seocho-gu, Seoul, South Korea

FCC ID: 2AAKFAIPHONE

Report Type: Original Report	Product Type: AI Phone
Report Number: RSZ180723002-00A	
Report Date: 2018-08-17	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *MOIMSTONE CO., LTD*'s product, model number: *AI-PHONE (FCC ID: 2AAKFAIPHONE)* or the "EUT" in this report was an *AI Phone*, which was measured approximately: 224 mm (L) * 170 mm (W) * 144 mm (H), rated with input voltage: DC 5.0V. The highest operating frequency is 5825 MHz.

Adapter Information:

Model: KT241050300US

Input: 100-240V ~ 50/60Hz, 0.8A

Output: 5V, 3A

**All measurement and test data in this report was gathered from production sample serial number: 180723002 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-07-23.*

Objective

This test report is prepared on behalf of *MOIMSTONE 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)

Part 15.247 DTS & DSS and Part 15.407 NII submissions with FCC ID: 2AAKFAIPHONE.

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.: 342867, the FCC Designation No.: CN1221.

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 Exercise Software

No exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

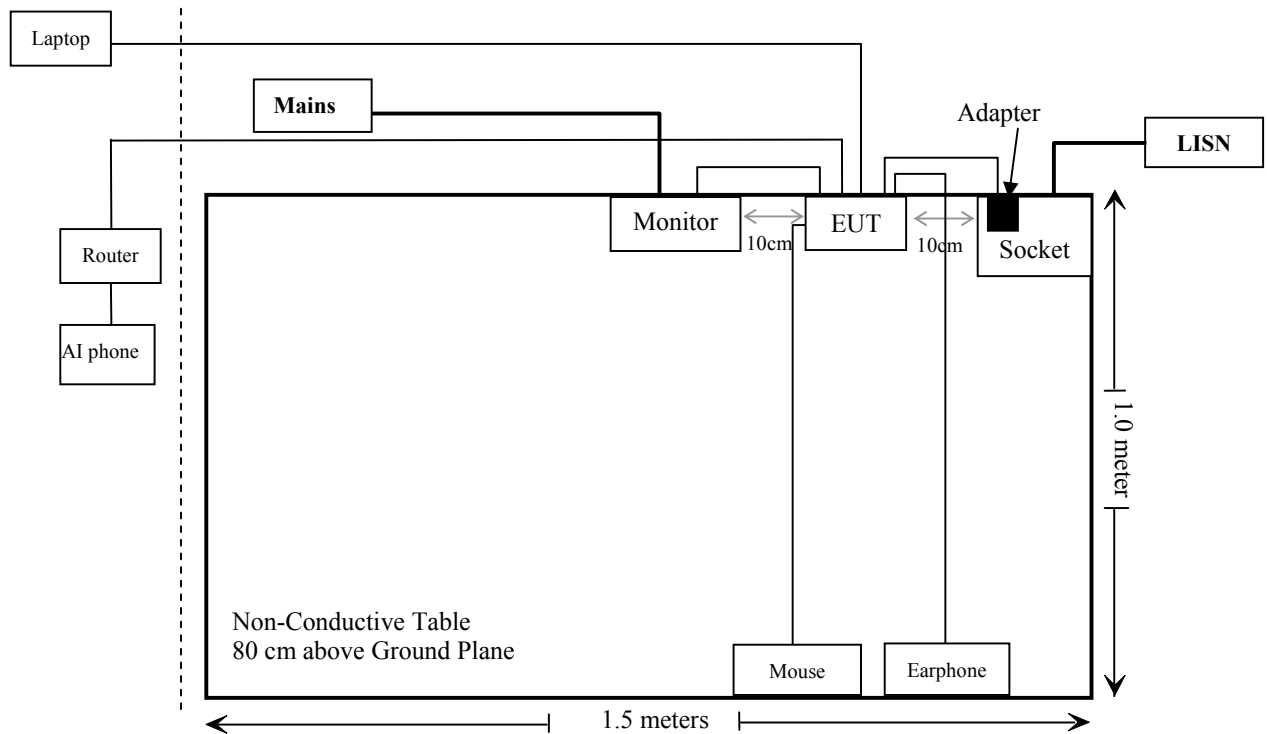
Manufacturer	Description	Model	Serial Number
SAMSUNG	Monitor	225MS	N/A
Microsoft	Mouse	1405	0204608630856
N/A	Earphone	N/A	N/A
LENOVO	Laptop	Y430p	N/A
LINKSYS	Router	Wireless-6	Q87-WT54GV70
MOIMSTONE	AI phone	AI-PHONE	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding Un-detachable DC Cable	1.5	EUT	Adapter
Un-shielding Un-detachable HDMI Cable With Ferrite Core	1.0	EUT	Monitor
Shielding Un-detachable USB Cable	1.2	EUT	Mouse
Un-shielding Detachable Earphone Cable	1.2	EUT	Earphone
Un-shielding detachable RJ45 Cable	2.0	EUT	Router
Un-shielding detachable RJ45 Cable	2.0	EUT	Laptop
Un-shielding detachable AC cable	1.2	Monitor	Mains
Un-shielding detachable RJ45 Cable	2.0	Router	AI phone

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	2018-07-11	2019-07-11
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-05-21	2018-11-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A	Conducted Emission Cable	N/A	UF A210B-1-0720-504504	2018-05-12	2018-11-12
Radiated Emission Test					
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-06-23	2019-06-23
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-05-21	2019-05-21
HP	Amplifier	HP8447E	1937A01046	2018-05-21	2018-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-04-01	2018-10-01
Ducommun technologies	RF Cable	104PEA	218124002	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	1	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-05-22	2018-11-22
Ducommun Technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Agilent	Spectrum Analyzer	8564E	3943A01781	2018-01-04	2019-01-04
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-06	2020-12-05
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-04	2017-12-06	2020-12-05

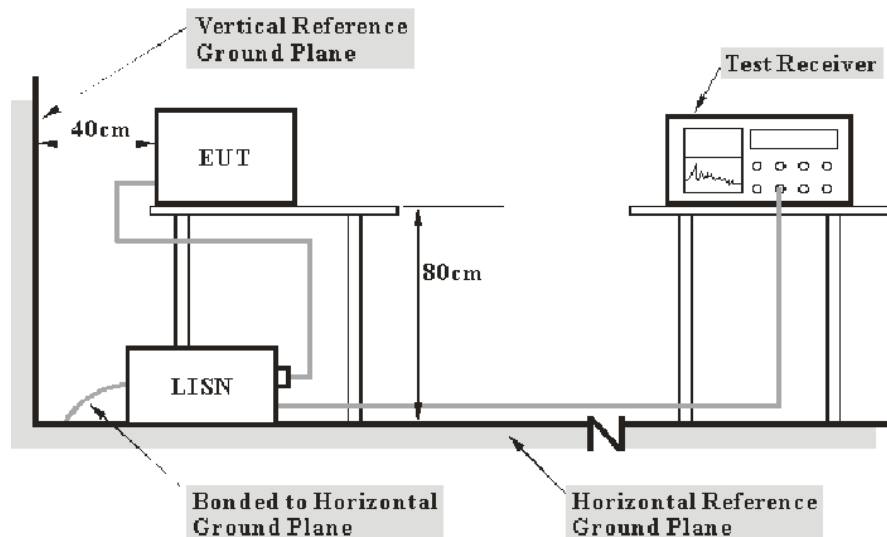
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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 .

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

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp\text{r}}$$

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

Test Data

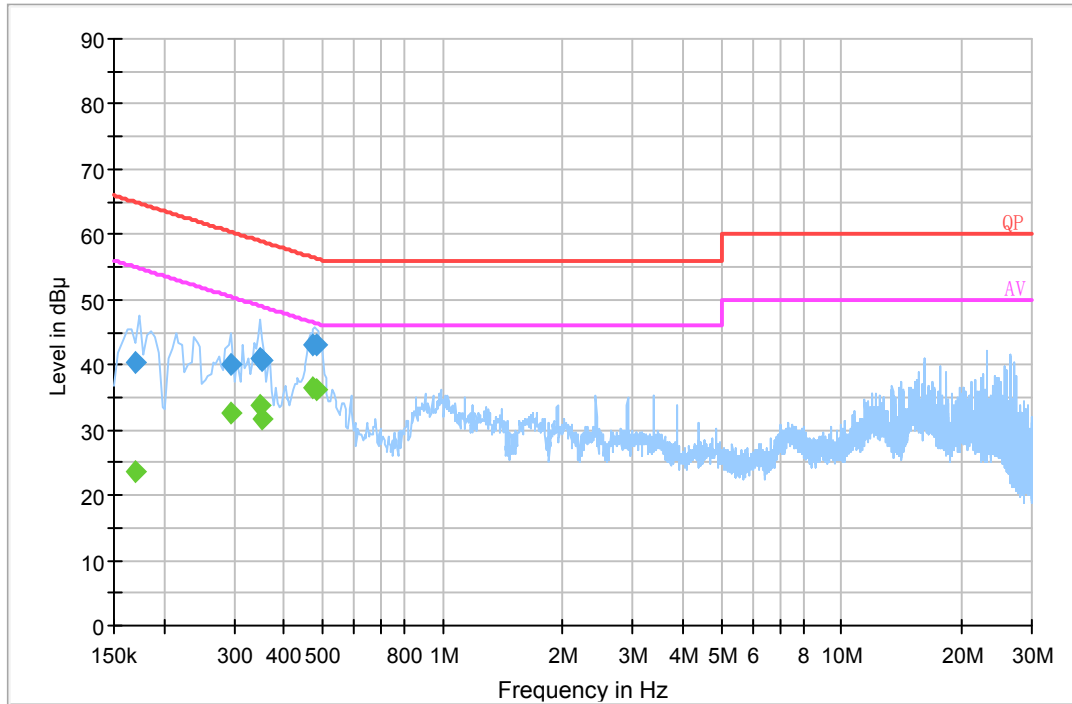
Environmental Conditions

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

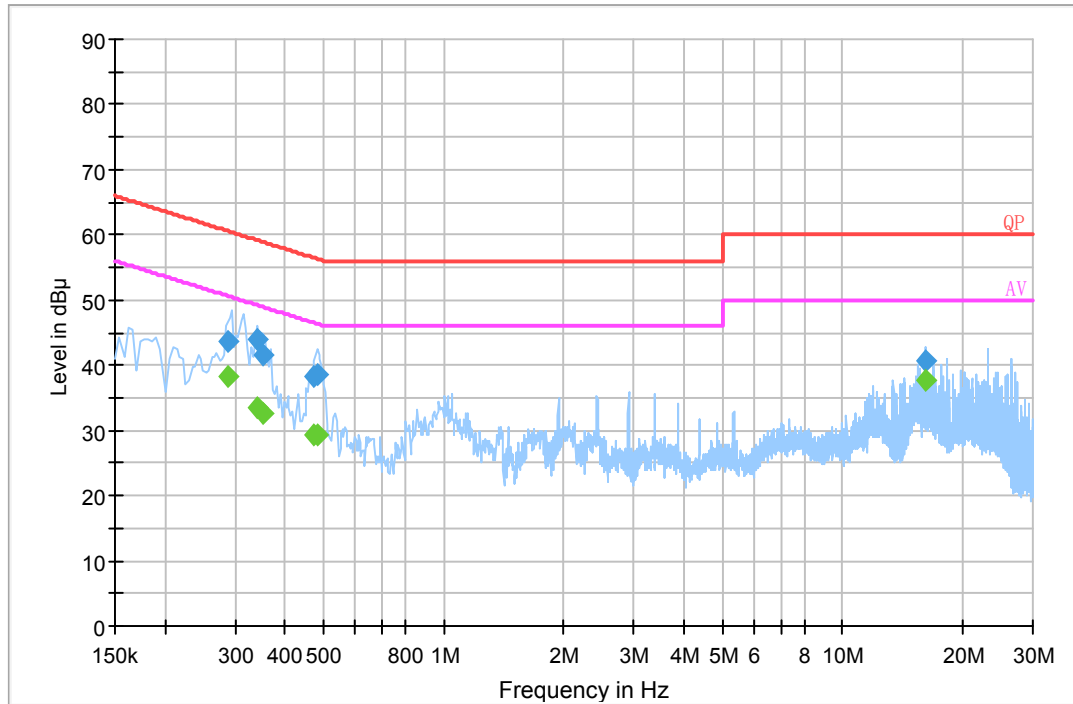
The testing was performed by KiKi Kong on 2018-07-30.

EUT Operation Mode: Talking & HDMI playing & Ping IP

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.169500	40.5	19.8	65.0	24.5	QP
0.293500	39.9	19.8	60.4	20.5	QP
0.348690	41.0	19.7	59.0	18.0	QP
0.352750	40.7	19.7	58.9	18.2	QP
0.474770	43.0	19.8	56.4	13.4	QP
0.482830	43.0	19.8	56.3	13.3	QP
0.169500	23.6	19.8	55.0	31.4	Ave.
0.293500	32.7	19.8	50.4	17.7	Ave.
0.348690	33.7	19.7	49.0	15.3	Ave.
0.352750	31.7	19.7	48.9	17.2	Ave.
0.474770	36.5	19.8	46.4	9.9	Ave.
0.482830	36.2	19.8	46.3	10.1	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.289500	43.6	19.8	60.5	16.9	QP
0.340870	44.0	19.7	59.2	15.2	QP
0.352690	41.5	19.7	58.9	17.4	QP
0.474770	38.2	19.8	56.4	18.2	QP
0.482830	38.6	19.8	56.3	17.7	QP
16.226610	40.6	20.2	60.0	19.4	QP
0.289500	38.4	19.8	50.5	12.1	Ave.
0.340870	33.4	19.7	49.2	15.8	Ave.
0.352690	32.6	19.7	48.9	16.3	Ave.
0.474770	29.2	19.8	46.4	17.2	Ave.
0.482830	29.3	19.8	46.3	17.0	Ave.
16.226610	37.7	20.2	50.0	12.3	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

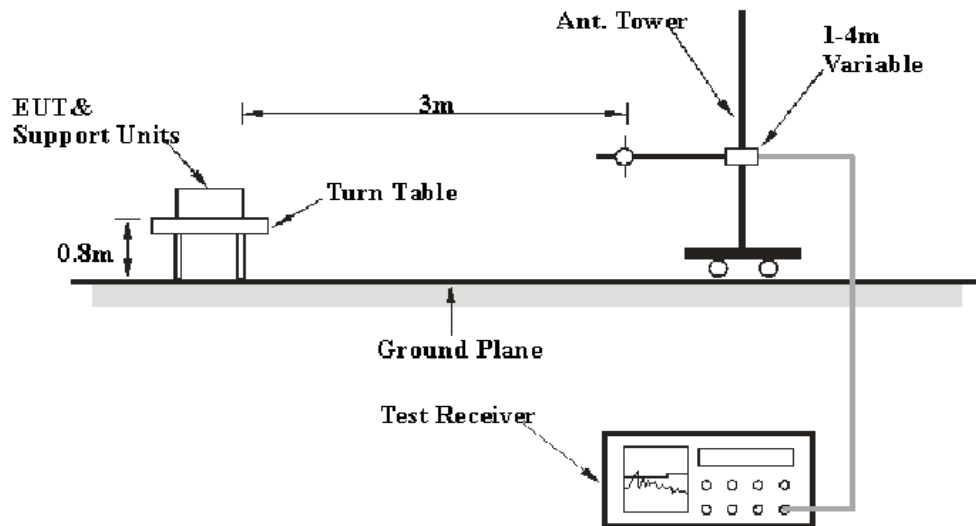
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

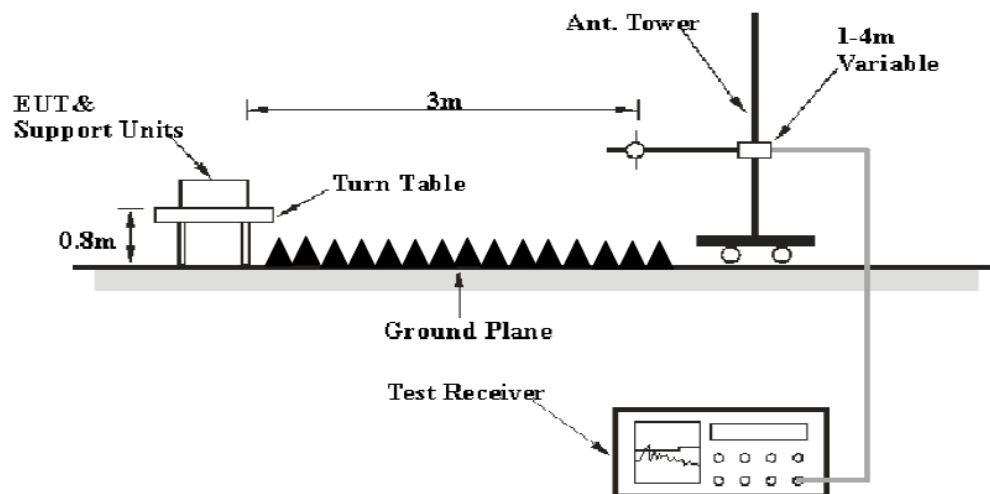
FCC §15.109

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 30 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

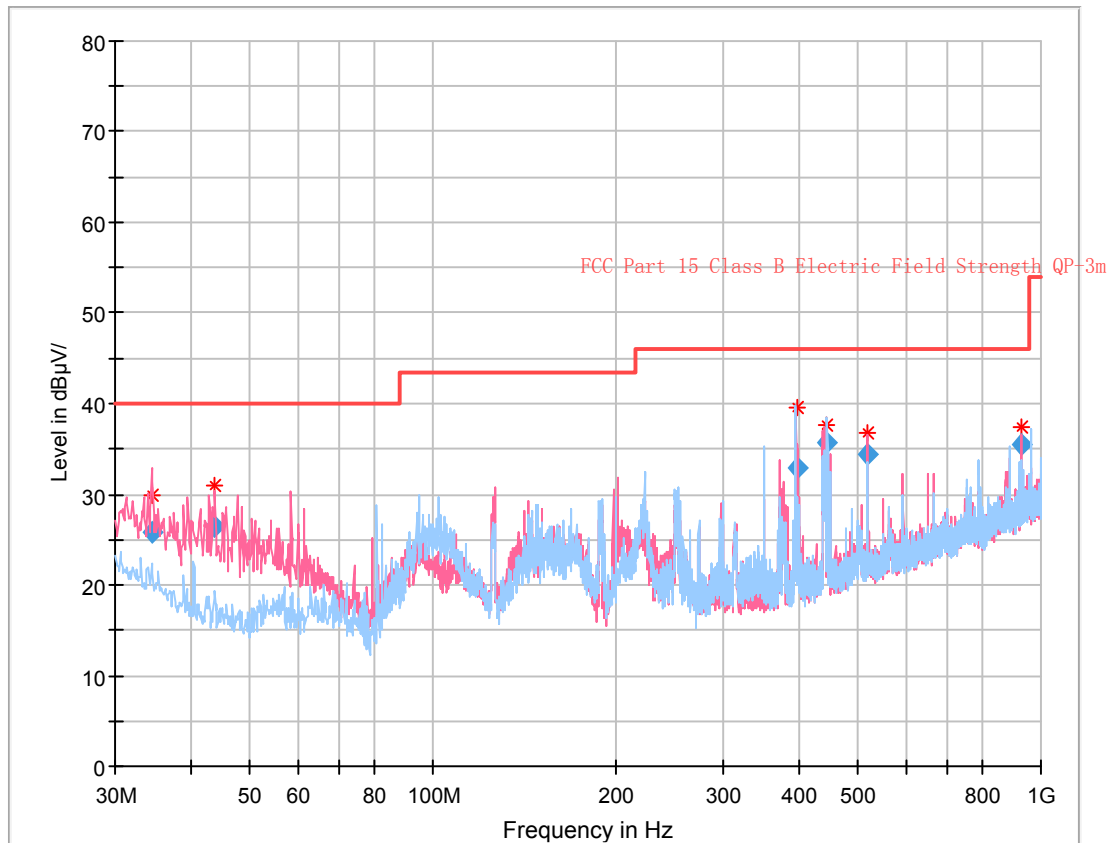
Environmental Conditions

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

The testing was performed by KiKi Kong on 2018-08-01.

EUT Operation Mode: Talking & HDMI playing & Ping IP

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)
34.564875	25.73	107.0	V	219.0	-7.4	40.00	14.27
43.773750	26.48	107.0	V	127.0	-13.3	40.00	13.52
396.019125	32.90	102.0	H	137.0	-7.7	46.00	13.10
445.473125	35.70	210.0	H	61.0	-6.1	46.00	10.30
519.767500	34.48	106.0	V	330.0	-4.5	46.00	11.52
928.107250	35.38	103.0	V	0.0	1.5	46.00	10.62

1 GHz – 30 GHz:

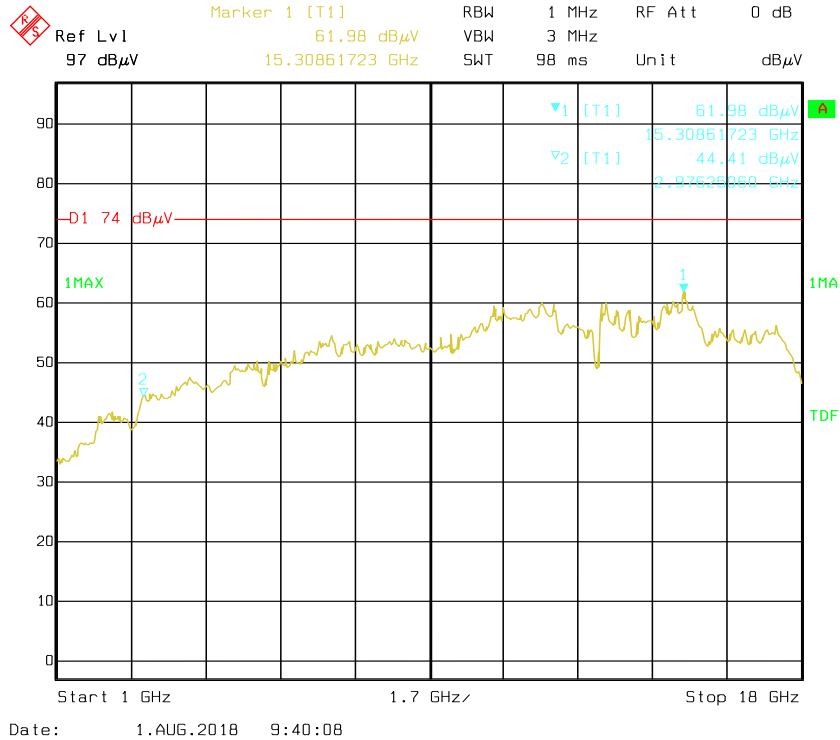
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1476.95	42.28	PK	329	2.3	H	-5.52	36.76	74	37.24
1476.95	32.27	Ave.	329	2.3	H	-5.52	26.75	54	27.25
1476.95	42.15	PK	264	1.0	V	-5.52	36.63	74	37.37
1476.95	31.87	Ave.	264	1.0	V	-5.52	26.35	54	27.65
2975.25	43.66	PK	216	1.8	H	1.21	44.87	74	29.13
2975.25	26.47	Ave.	216	1.8	H	1.21	27.68	54	26.32
2975.25	44.05	PK	116	2.4	V	1.21	45.26	74	28.74
2975.25	27.32	Ave.	116	2.4	V	1.21	28.53	54	25.47

Note:

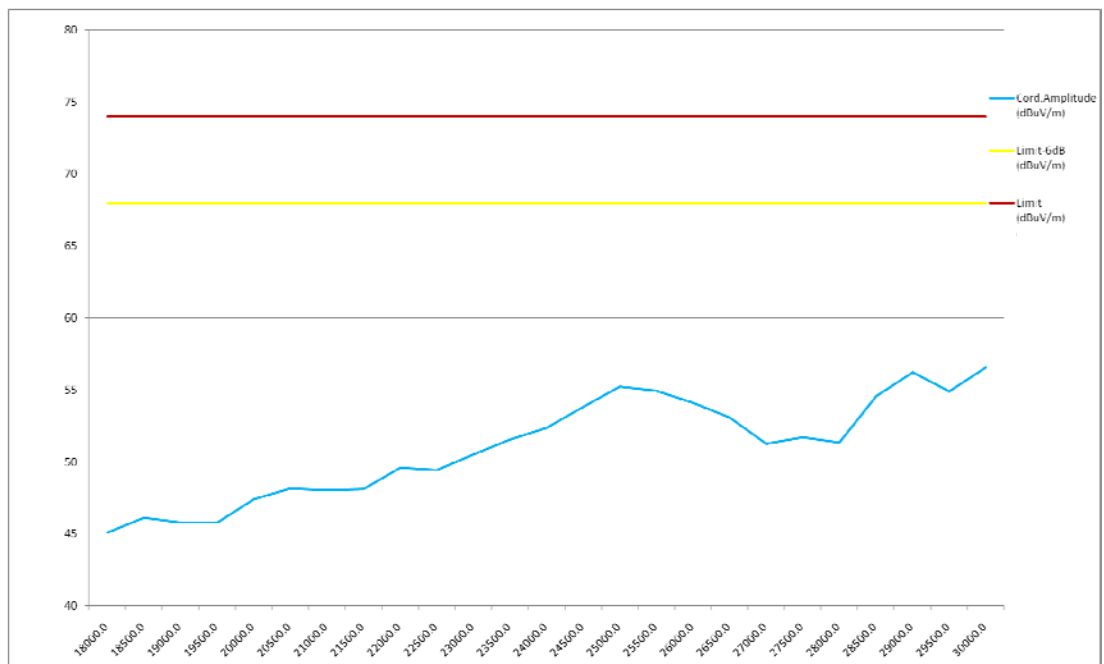
- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

Pre-scan for peak

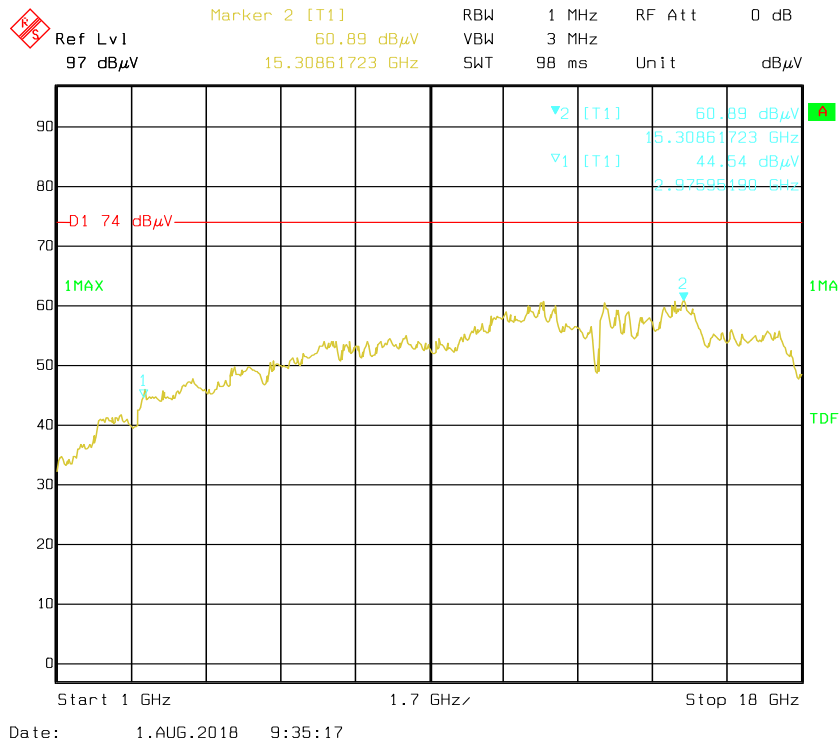
Horizontal – Peak (1-18 GHz)



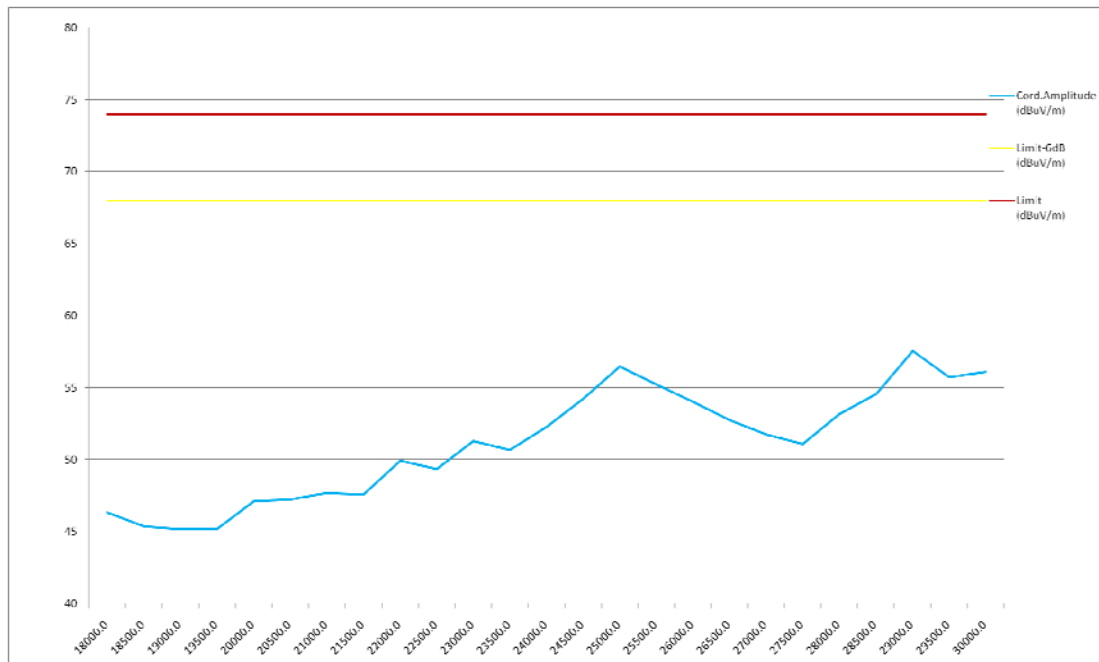
Horizontal – Peak (Above 18 GHz)



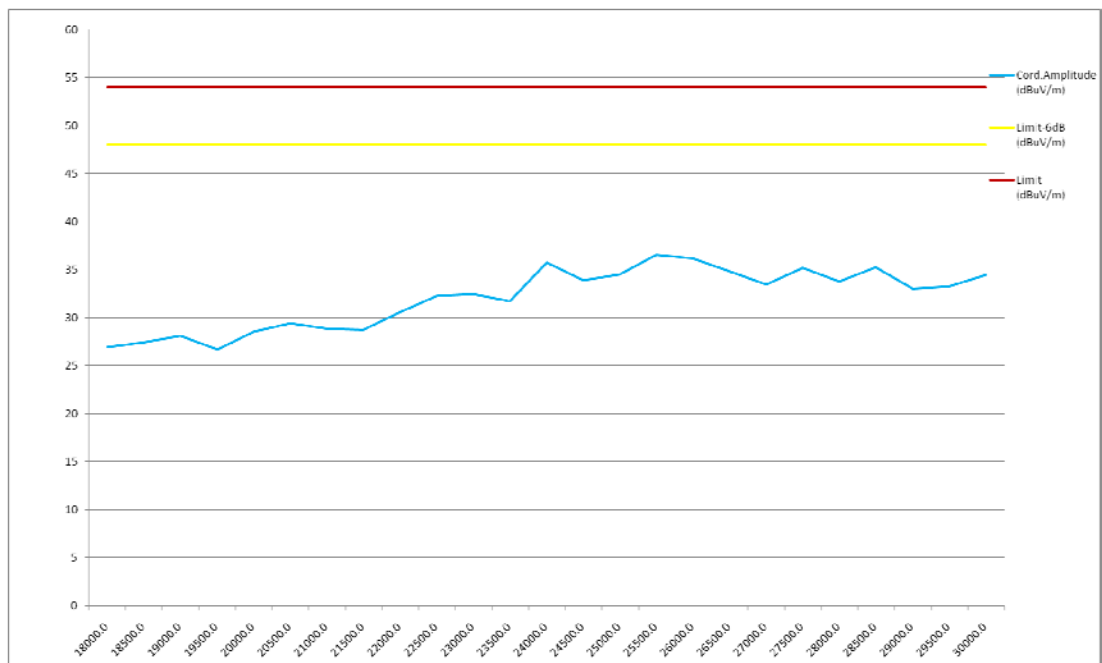
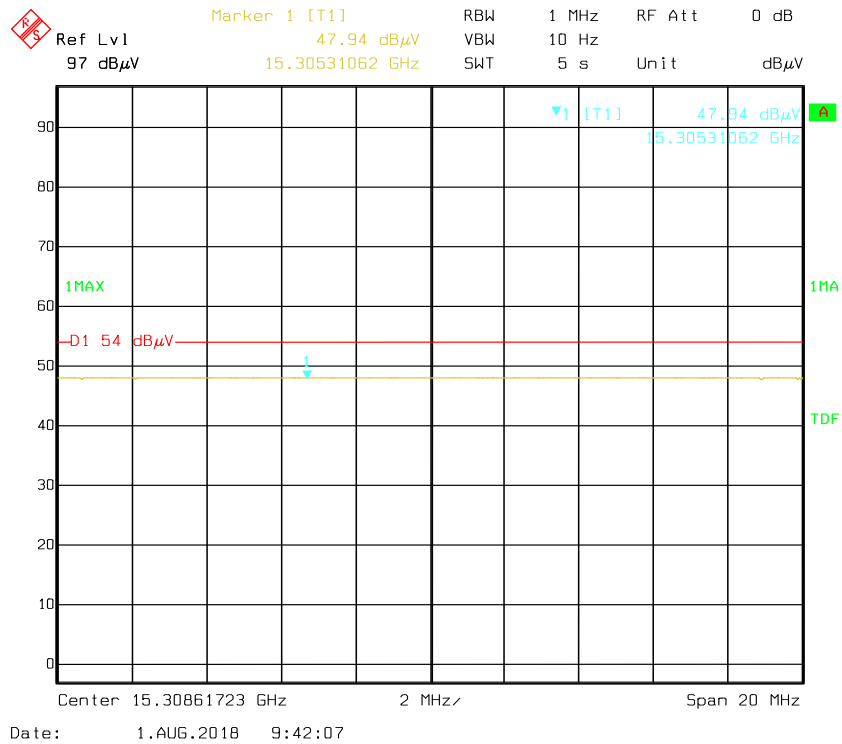
Vertical - Peak (1-18 GHz)



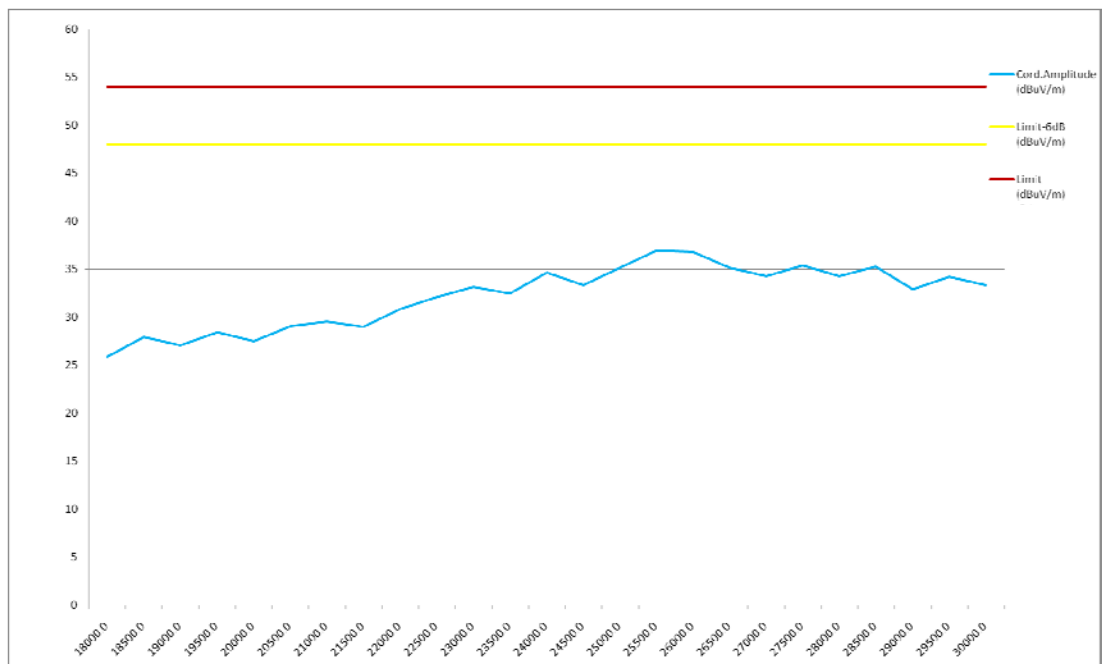
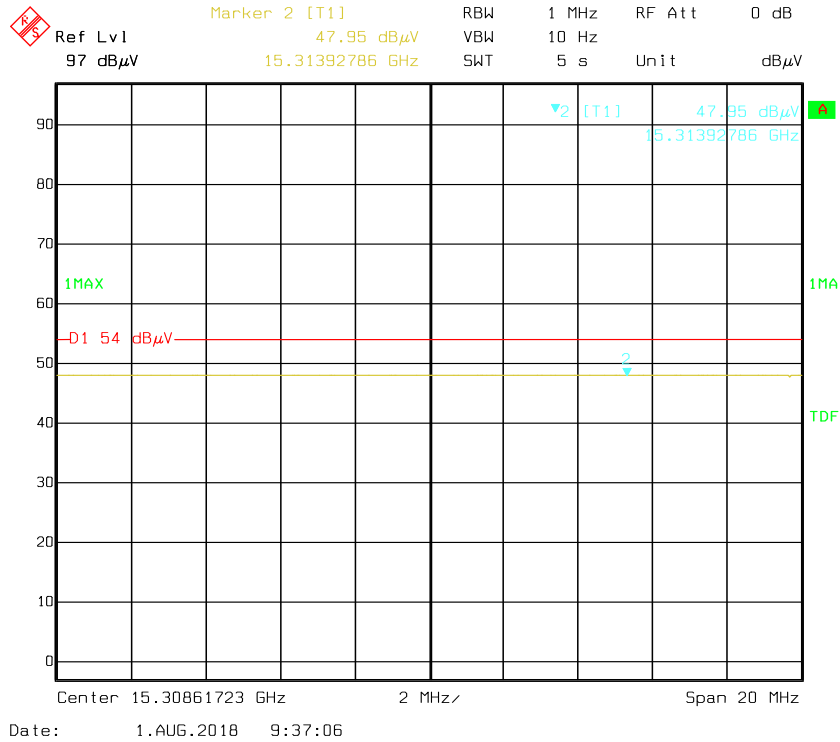
Vertical - Peak (Above 18 GHz)



Horizontal - Average



Vertical - Average



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