



FCC Test Report

APPLICANT : Xiaomi Communications Co., Ltd.
EQUIPMENT : Mobile Phone
BRAND NAME : Redmi
MODEL NAME : M1903C3EH
FCC ID : 2AFZZ-RMSC3EH
STANDARD : 47 CFR Part 15 Subpart B
CLASSIFICATION : Certification

The product was received on Mar. 12, 2019 and testing was completed on May 11, 2019. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Reviewed by: Jason Jia / Supervisor

Approved by: James Huang / Manager



Sporton International (Kunshan) Inc.

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China



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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	Under limit 10.53 dB at 0.150 MHz
3.2	15.109	Radiated Emission	< 15.109 limits	PASS	Under limit 3.59 dB at 530.52 MHz



1. General Description

1.1. Applicant

Xiaomi Communications Co., Ltd.

The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

1.2. Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Redmi
Model Name	M1903C3EH
FCC ID	2AFZZ-RMSC3EH
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE WLAN 2.4GHz 802.11b/g/n HT20 Bluetooth BR /EDR/ LE FM Receiver / GNSS
IMEI Code	Conduction: 860503040061364/860503040061372 Radiation: 860503040058808/860503040058816
HW Version	V2
SW Version	MIUI10
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples is for memory, sample 1 is 2+32GB capacity and sample 2 is 2+16GB capacity. According to the difference, we only choose sample 1 to perform full tests and the sample 2 is verified for Radiation.



1.3. Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV : 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz LTE Band 38 : 2572.5 MHz ~ 2617.5 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band IV : 2112.4 MHz ~ 2152.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 7 : 2622.5 MHz ~ 2687.5 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz GNSS : 1559 MHz ~ 1610 MHz FM : 87.5MHz ~ 108MHz
Antenna Type	WWAN : PIFA Antenna WLAN/Bluetooth : PIFA Antenna GNSS: PIFA Antenna FM : External Headset Antenna
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK WCDMA : BPSK (Uplink) HSDPA/DC-HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (uplink is not supported) DC-HSDPA : 64QAM LTE: QPSK / 16QAM / 64QAM 802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth LE : GFSK Bluetooth (1Mbps) : GFSK Bluetooth (2Mbps) : $\pi/4$ -DQPSK Bluetooth (3Mbps) : 8-DPSK GNSS : BPSK



1.4. Modification of EUT

No modifications are made to the EUT during all test items.

1.5. Test Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH02-KS	CN1257	314309

1.6. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.



2. Test Configuration of Equipment Under Test

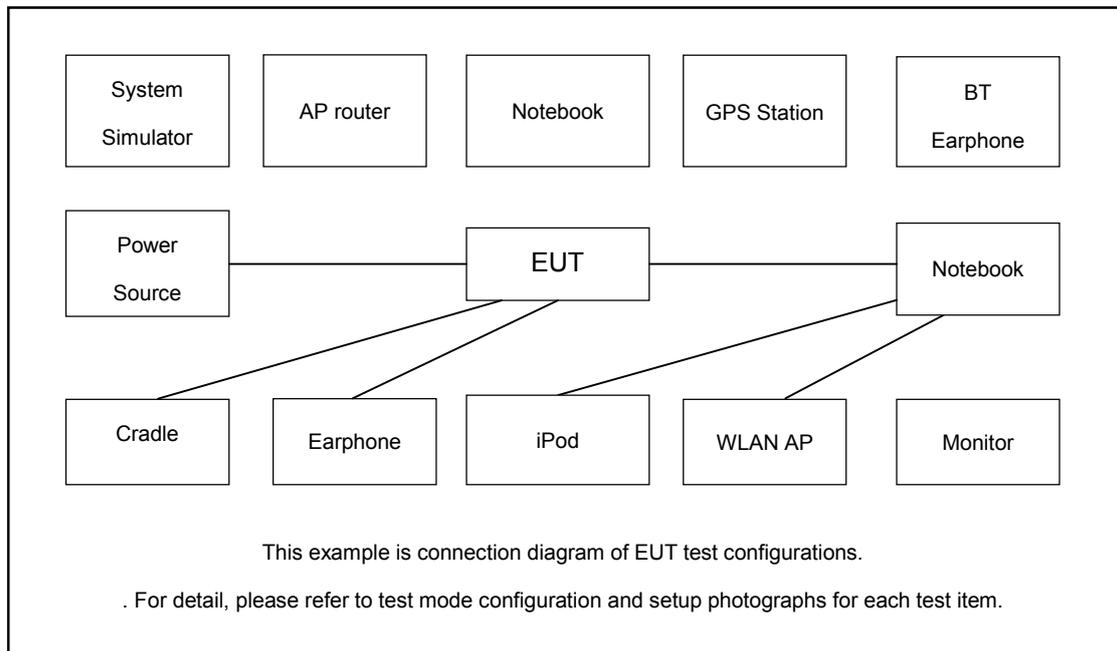
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
AC Conducted Emission	Mode 1: GSM 850 Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + Camera(Rear) + Earphone + USB Cable 1 (Charging from Adapter 1) + SIM 1 for Sample 1
	Mode 2: GSM1900 Rx + Bluetooth Idle + WLAN Idle(2.4G) + Camera(Front) + Earphone + USB Cable 2 (Charging from Adapter 2) + SIM 2 for Sample 1
	Mode 3: WCDMA Band V Rx(Middle) + Bluetooth Idle + WLAN Idle(2.4G) + MPEG4 + Earphone + USB Cable 1 (Charging from Adapter 1) + SIM 1 for Sample 1
	Mode 4: LTE Band 4 Rx + Bluetooth Idle + WLAN Idle(2.4G) + FM Rx(98MHz) + Earphone + USB Cable 1 (Charging from Adapter 1) + SIM 2 for Sample 1
	Mode 5: LTE Band 2 Rx + Bluetooth Idle + WLAN Idle(2.4G) + GNSS Rx + Earphone + USB Cable 1 (Data Link with Notebook) + SIM 1 for Sample 1
	Mode 6: LTE Band 7 Rx + Bluetooth Idle + WLAN Idle(2.4G) + GNSS RX + Earphone + USB Cable 2 (Data Link with Notebook) + SIM 2 for Sample 1
Radiated Emissions	Mode 1: GSM 850 Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + Camera(Rear) + Earphone + USB Cable 1 (Charging from Adapter 1) + SIM 1 for Sample 1
	Mode 2: GSM1900 Rx + Bluetooth Idle + WLAN Idle(2.4G) + Camera(Front) + Earphone + USB Cable 2 (Charging from Adapter 2) + SIM 2 for Sample 1
	Mode 3: WCDMA Band V Rx(Middle) + Bluetooth Idle + WLAN Idle(2.4G) + MPEG4 + Earphone + USB Cable 1 (Charging from Adapter 1) + SIM 1 for Sample 1
	Mode 4: LTE Band 4 Rx + Bluetooth Idle + WLAN Idle(2.4G) + FM Rx(88MHz) + Earphone + USB Cable 1 (Charging from Adapter 1) + SIM 2 for Sample 1
	Mode 5: LTE Band 2 Rx + Bluetooth Idle + WLAN Idle(2.4G) + GNSS Rx + Earphone + USB Cable 1 (Data Link with Notebook) + SIM 1 for Sample 1
	Mode 6: LTE Band 7 Rx + Bluetooth Idle + WLAN Idle(2.4G) + GNSS RX + Earphone + USB Cable 2 (Data Link with Notebook) + SIM 2 for Sample 1
	Mode 7: LTE Band 2 Rx + Bluetooth Idle + WLAN Idle(2.4G) + GNSS Rx + Earphone + USB Cable 1 (Data Link with Notebook) + SIM 1 for Sample 2
Remark:	
<ol style="list-style-type: none"> 1. The worst case of AC is mode 1; only the test data of this mode is reported. 2. The worst case of RE is mode 5; only the test data of this mode is reported. 3. Data Link with Notebook means data application transferred mode between EUT and Notebook. 	

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	Signal Generator	R&S	SMBV100A	N/A	N/A	Unshielded, 1.8m
3.	Signal Generator	R&S	GSS7000	NA	NA	Unshielded, 1.8m
4.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8m
5.	WLAN AP	TP-LINK	TL-WDR5600	N/A	N/A	Unshielded, 1.8m
6.	Bluetooth Earphone	Xiaomi	LYEJ02LM	N/A	N/A	N/A
7.	Bluetooth Earphone	Lenevo	LYEJ02LM	N/A	N/A	N/A
8.	Notebook	DELL	MT320	N/A	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
9.	Notebook	Lenovo	G480	N/A	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
10.	SD Card	Kingston	8GB	N/A	N/A	N/A
11.	iPod	Apple	A1199	FCC DoC	Unshielded, 1.2 m	N/A
12.	SD Card	SanDisk	Ultra	N/A	N/A	N/A



2.4. EUT Operation Test Setup

The EUT was in GSM or WCDMA or LTE idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Bluetooth earphone or WLAN AP, and the following programs installed in the EUT were programmed during the test.

1. Data application is transferred between notebook and EUT via USB cable.
2. Turn on camera to capture images.
3. Turn on MPEG4 function.
4. Turn on GNSS function to make the EUT receive continuous signals from GNSS station.
5. Turn on FM Function.



3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

<Class B Limit>

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

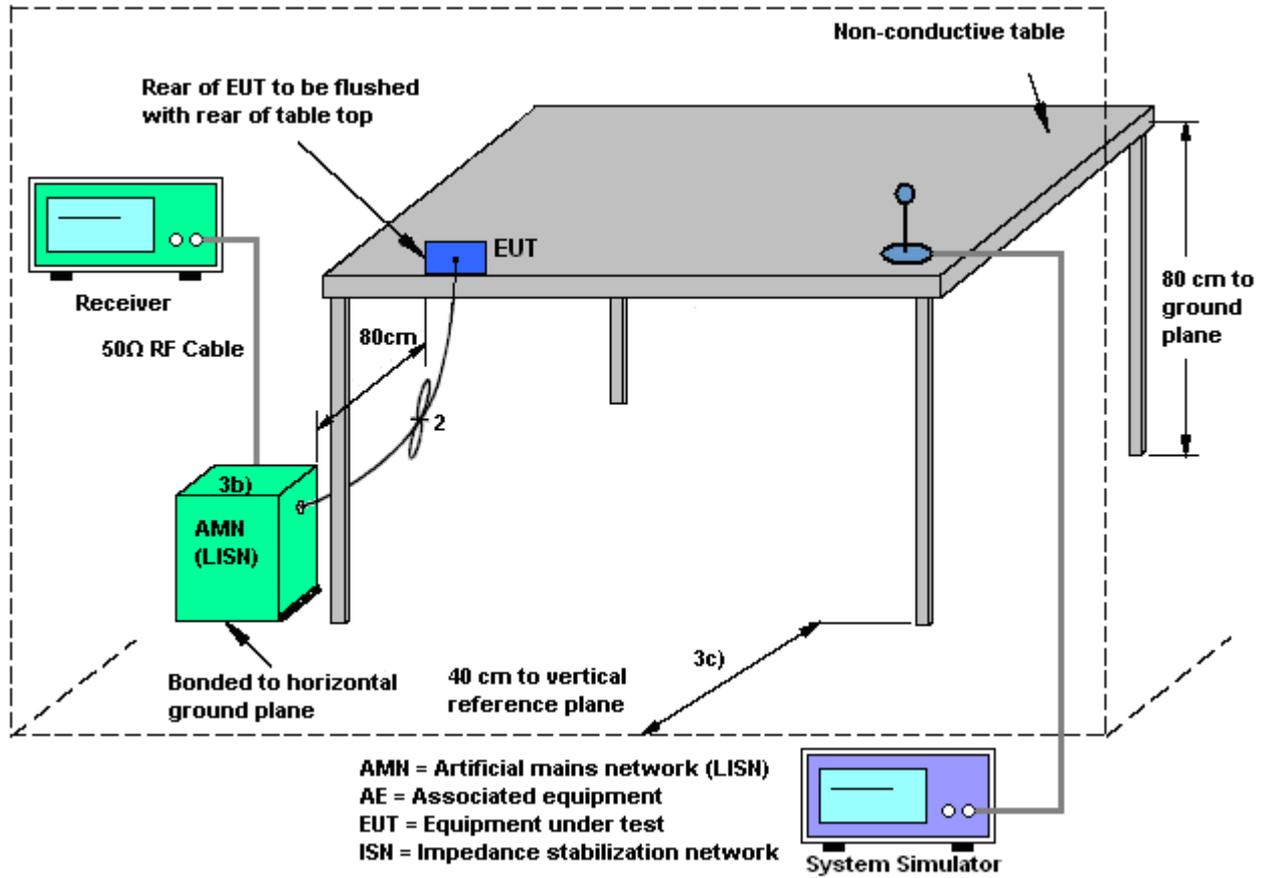
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

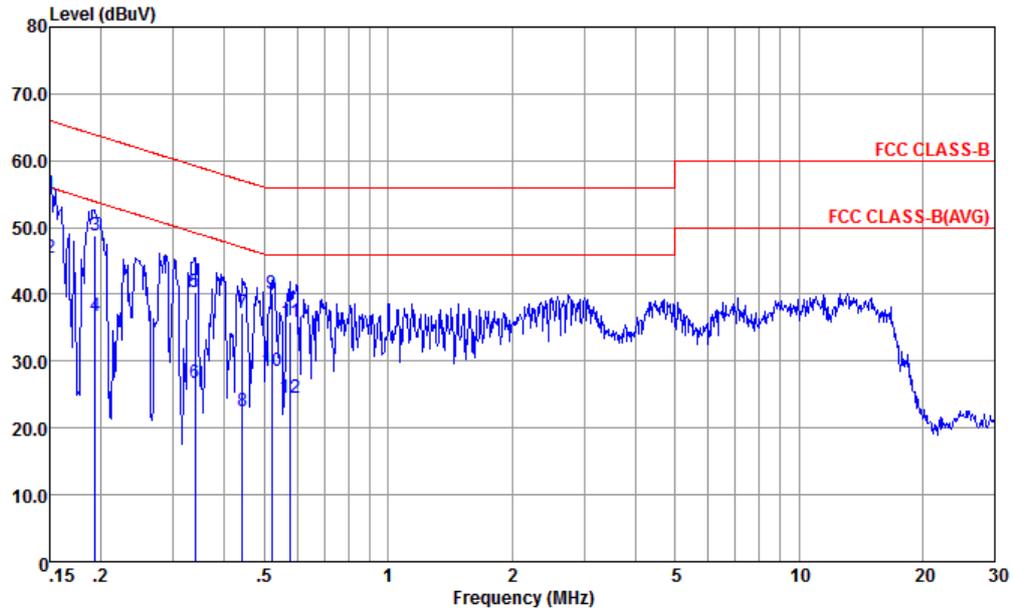
3.1.4 Test Setup





3.1.5 Test Result of AC Conducted Emission

Test Engineer :	Amos Zhang	Temperature :	22.3~23.2°C
		Relative Humidity :	28~30%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



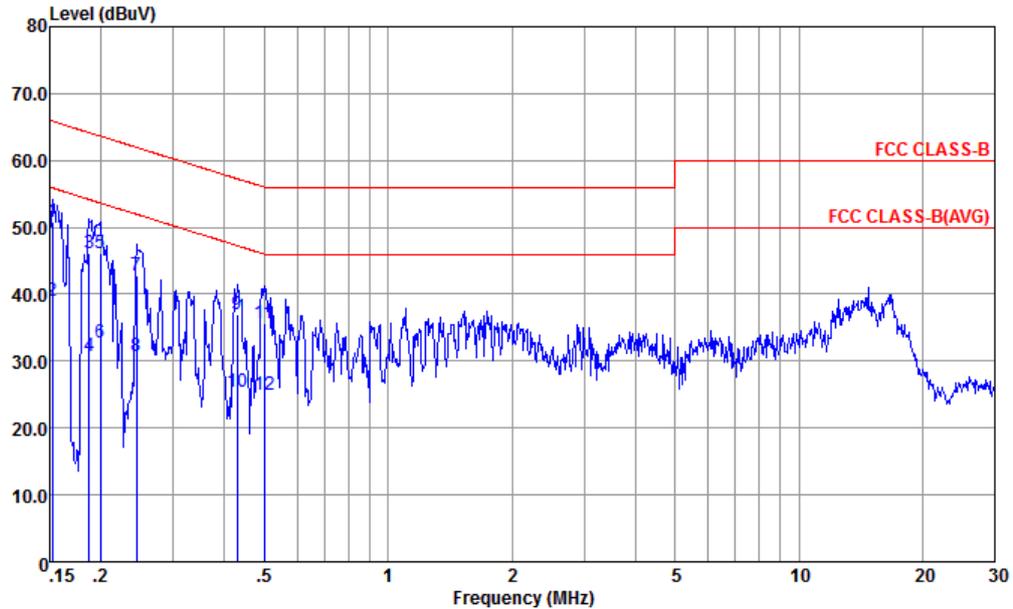
Site : CO01-KS
 Condition : FCC CLASS-B LISN-L-181119-060105 LINE

: 869323040061364/869323040061372 #11

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.150	54.77	-11.23	66.00	44.20	0.09	10.48	QP
2 *	0.150	45.47	-10.53	56.00	34.90	0.09	10.48	Average
3	0.193	48.79	-15.10	63.89	38.29	0.12	10.38	QP
4	0.193	36.79	-17.10	53.89	26.29	0.12	10.38	Average
5	0.339	40.34	-18.88	59.22	29.90	0.15	10.29	QP
6	0.339	26.64	-22.58	49.22	16.20	0.15	10.29	Average
7	0.442	37.32	-19.70	57.02	26.91	0.16	10.25	QP
8	0.442	22.62	-24.40	47.02	12.21	0.16	10.25	Average
9	0.521	40.01	-15.99	56.00	29.60	0.17	10.24	QP
10	0.521	28.61	-17.39	46.00	18.20	0.17	10.24	Average
11	0.579	35.91	-20.09	56.00	25.49	0.18	10.24	QP
12	0.579	24.61	-21.39	46.00	14.19	0.18	10.24	Average



Test Engineer :	Amos Zhang	Temperature :	22.3~23.2°C
		Relative Humidity :	28~30%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
 Condition : FCC CLASS-B LISN-N-181119-060105 NEUTRAL

: 869323040061364/869323040061372 #11

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.152	50.85	-15.02	65.87	40.20	0.18	10.47	QP
2	0.152	38.95	-16.92	55.87	28.30	0.18	10.47	Average
3	0.187	46.17	-17.98	64.15	35.61	0.17	10.39	QP
4	0.187	30.77	-23.38	54.15	20.21	0.17	10.39	Average
5	0.200	46.14	-17.48	63.62	35.61	0.17	10.36	QP
6	0.200	32.74	-20.88	53.62	22.21	0.17	10.36	Average
7	0.244	42.70	-19.25	61.95	32.19	0.17	10.34	QP
8	0.244	30.70	-21.25	51.95	20.19	0.17	10.34	Average
9	0.428	37.01	-20.28	57.29	26.60	0.15	10.26	QP
10	0.428	25.31	-21.98	47.29	14.90	0.15	10.26	Average
11	0.499	35.58	-20.43	56.01	25.20	0.15	10.23	QP
12	0.499	24.98	-21.03	46.01	14.60	0.15	10.23	Average



3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B Limit>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

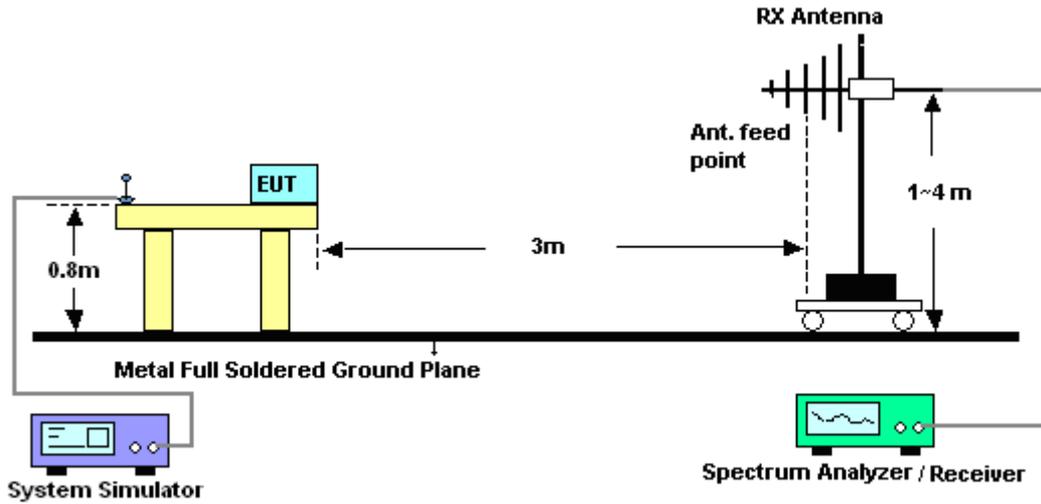


3.2.3. Test Procedures

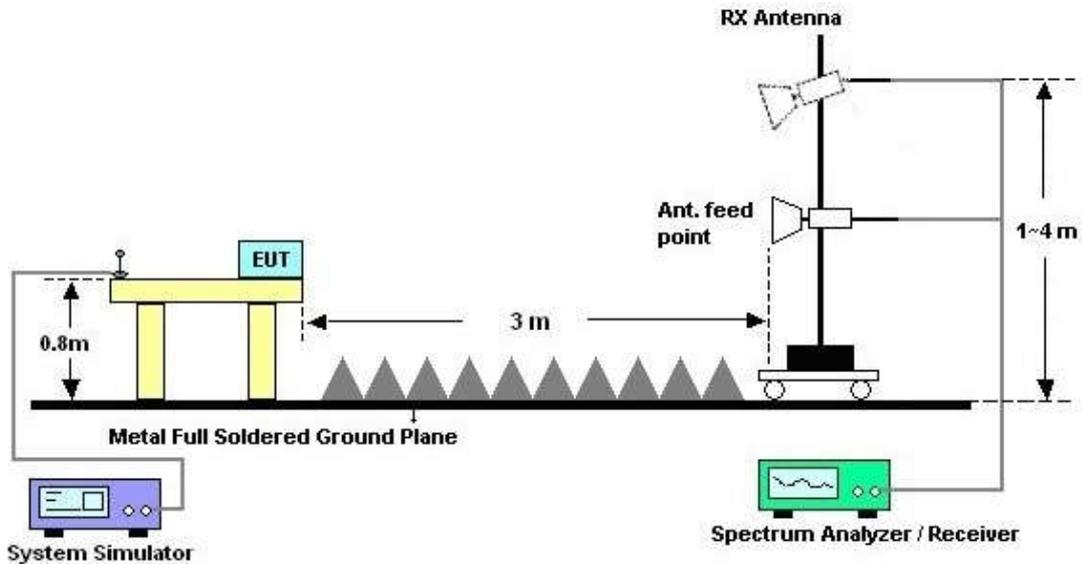
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dB μ V/m) = 20 log Emission level (μ V/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz

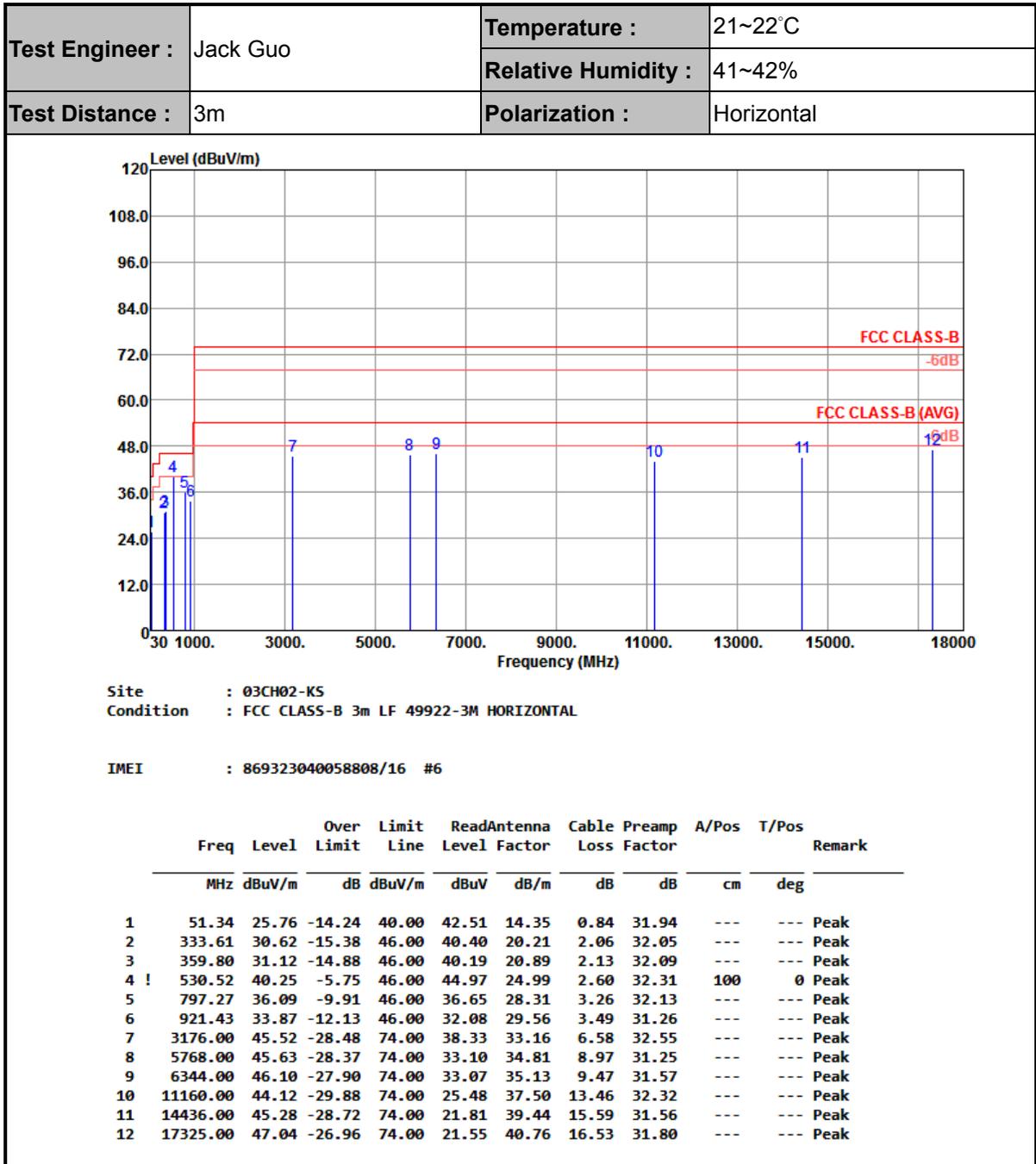


For radiated emissions above 1GHz



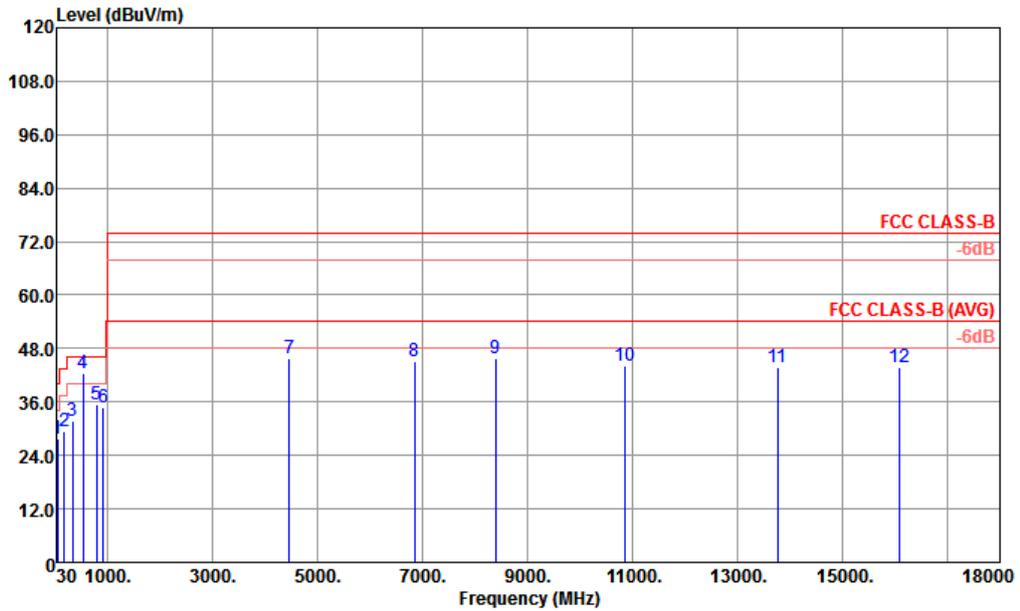


3.2.5. Test Result of Radiated Emission





Test Engineer :	Jack Guo	Temperature :	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Vertical



Site : 03CH02-KS
 Condition : FCC CLASS-B 3m LF 49922-3M VERTICAL

IMEI : 869323040058808/16 #6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	51.34	27.66	-12.34	40.00	44.41	14.35	0.84	31.94	---	---	Peak
2	185.20	29.35	-14.15	43.50	44.75	14.95	1.56	31.91	---	---	Peak
3	332.64	31.89	-14.11	46.00	41.70	20.18	2.06	32.05	---	---	Peak
4	530.52	42.41	-3.59	46.00	47.13	24.99	2.60	32.31	100	0	Peak
5	797.27	35.39	-10.61	46.00	35.95	28.31	3.26	32.13	---	---	Peak
6	928.22	34.90	-11.10	46.00	32.95	29.64	3.51	31.20	---	---	Peak
7	4472.00	45.86	-28.14	74.00	36.19	33.44	7.92	31.69	---	---	Peak
8	6856.00	44.97	-29.03	74.00	31.20	35.30	9.90	31.43	---	---	Peak
9	8400.00	45.81	-28.19	74.00	30.32	36.42	11.04	31.97	---	---	Peak
10	10854.00	44.12	-29.88	74.00	25.65	37.32	13.27	32.12	---	---	Peak
11	13761.00	43.64	-30.36	74.00	21.28	38.66	15.29	31.59	---	---	Peak
12	16083.00	43.75	-30.25	74.00	17.40	41.24	16.87	31.76	---	---	Peak



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Receiver	R&S	ESC17	100768	9kHz~7GHz;	Apr. 16, 2019	May 10, 2019	Apr. 15, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	May 10, 2019	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	May 10, 2019	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	May 10, 2019	Oct. 11, 2019	Conduction (CO01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Aug. 06, 2018	May 11, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 16, 2019	May 11, 2019	Apr. 15, 2020	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Dec. 29, 2018	May 11, 2019	Dec. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	May 11, 2019	Jan. 26, 2020	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2018	May 11, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5G Hz	Apr. 15, 2019	May 11, 2019	Apr. 14, 2020	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	61601000247 3	N/A	NCR	May 11, 2019	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 11, 2019	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 11, 2019	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required



5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.9 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.9 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0 dB
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