FCC Test Report

APPLICANT : Xiaomi Communications Co., Ltd.

EQUIPMENT: Mobile Phone

BRAND NAME : MI

MODEL NAME : M1903C3GH

FCC ID : 2AFZZ-RMSC3GH

STANDARD : FCC CFR Title 47 Part 15 Subpart B

CLASSIFICATION: Certification

The product was received on Oct. 18, 2018 and testing was completed on Nov. 16, 2018. 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.

James Huang

TESTING NVLAP LAB CODE 600155-0

Approved by: James Huang / Manager

Sporton International (Kunshan) Inc.

No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China

Sporton International (Kunshan) Inc.

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Report No.: FC8O1822-01

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC8O1822-01	Rev. 01	Initial issue of report	Dec. 04, 2018

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
					Under limit
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	8.18 dB at
					0.499 MHz
					Under limit
2.0	15.109	Dedicted Engineers	4.5.400 limita	DACC	3.47 dB at
3.2	15.109	Radiated Emission	< 15.109 limits	PASS	45.52 MHz
					for Quasi-Peak

Declaration of Conformity:

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

Comments and Explanations:

None

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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

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1.2. Manufacturer

Xiaomi Communications Co., Ltd.

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

1.3. Product Feature of Equipment Under Test

	Product Feature		
Equipment	Mobile Phone		
Brand Name	MI		
Model Name	M1903C3GH		
FCC ID	2AFZZ-RMSC3GH		
GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM uplink is not supported)/LTE	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/		
	HSPA+(16QAM uplink is not supported)/LTE		
EUT Supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20		
	Bluetooth BR/EDR/LE		
IMEL Code	Conduction: 864520040010524/864520040010532		
IMEI Code	Radiation: 864520040007660/864520040007678		
HW Version	P2		
SW Version	OPM1.171019.026 V10		
EUT Stage	Identical Prototype		

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.4. Product Specification of Equipment Under Test

Otor douds	related Broduct Specification
Standards	-related Product Specification
	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
Tx Frequency	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz
1 x 1 requestion	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
	Bluetooth: 2402 MHz ~ 2480 MHz
	WLAN: 2412 MHz ~2462 MHz
	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
Dy Francisco	LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz
Rx Frequency	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
	Bluetooth: 2402 MHz ~ 2480 MHz
	WLAN : 2412 MHz ~2462 MHz
	GNSS: 1559 MHz ~ 1610 MHz
	FM: 88MHz~108MHz
	WWAN : Loop Antenna
	WLAN : PIFA Antenna
Antenna Type	Bluetooth : PIFA Antenna
· · · · · · · · · · · · · · · · · · ·	GNSS: PIFA Antenna
	FM: External Headset Antenna
	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)
Type of Modulation	DC-HSDPA: 64QAM
	LTE: QPSK/16QAM/64QAM
	Bluetooth LE : GFSK
	Bluetooth (1Mbps) : GFSK
	Bluetooth (2Mbps): π /4-DQPSK
	Bluetooth (3Mbps) : 8-DPSK
	GNSS: BPSK
	FM
	ΓIVI

Note: GNSS=GPS + Glonass + Beidou + SBAS

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1.5. Modification of EUT

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

1.6. Test Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

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Test Site	Sporton International (F	Sporton International (Kunshan) Inc.							
	No. 1098, Pengxi North	No. 1098, Pengxi North Road, Kunshan Economic Development Zone,							
Test Site Location	Jiangsu Province 215335, China								
rest Site Location	TEL: 86-512-57900158	3							
	FAX: 86-512-57900958								
	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.						
Test Site No.	CO01-KS	CN5013	630927						
	03CH02-KS	CN3013	030927						

1.7. Applicable Standards

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

- FCC CFR Title 47 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.

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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
	Mode 1: GSM850 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + Camera(Rear) + USB Cable 1(Charging from Adapter)
	Mode 2: PCS1900 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + Camera(Front) + USB Cable 2 (Charging from Adapter)
AC Conducted	Mode 3: WCDMA Band V Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + MPEG4(Colur bar) + USB Cable 1(Charging from Adapter)
Emission	Mode 4: LTE Band 4 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + FM Rx(98MHz) + USB Cable 1(Charging from Adapter)
	Mode 5: LTE Band 2 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + GNSS Rx + USB Cable 1(Data Link with Notebook)
	Mode 6: LTE Band 7 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + GNSS Rx + USB Cable 2(Data Link with Notebook)
	Mode 1: GSM850 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + Camera(Rear) + USB Cable 1(Charging from Adapter)
	Mode 2: PCS1900 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + Camera(Front) + USB Cable 2 (Charging from Adapter)
Radiated	Mode 3: WCDMA Band V Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + MPEG4(Colur bar) + USB Cable 1(Charging from Adapter)
Emissions	Mode 4: LTE Band 4 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + FM Rx(98MHz) + USB Cable 1(Charging from Adapter)
	Mode 5: LTE Band 2 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + GNSS Rx + USB Cable 1(Data Link with Notebook)
	Mode 6: LTE Band 7 Idle + Earphone + Bluetooth Idle + WLAN (2.4G) Idle + GNSS Rx + USB Cable 2(Data Link with Notebook)

Remark:

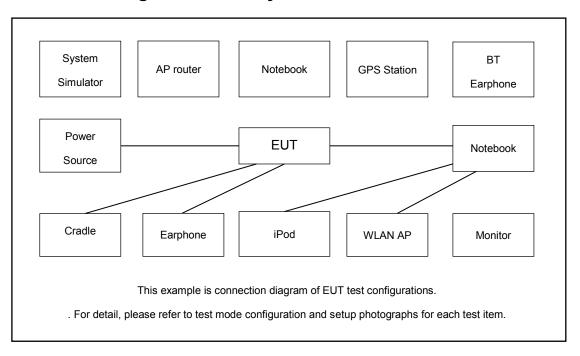
- 1. The worst case of AC is mode 1; only the test data of this mode is reported.
- 2. The worst case of RE is mode 1; only the test data of this mode is reported.
- Data Link with Notebook means data application transferred mode between EUT and Notebook.

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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.	Vector Signal Generator	R&S	SMBV100A	258305	N/A	N/A
3.	WLAN AP	TP-LINK	TL-WDR5600	N/A	N/A	Unshielded,1.8m
4.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded,1.8m
5.	Bluetooth Earphone	Xiaomi	LYEJ02LM	N/A	N/A	N/A
6.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
7.	SD Card	Kingston	8GB	N/A	N/A	N/A
8.	SD Card	SanDisk	Uitra	N/A	N/A	N/A

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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 GNSS function to make the EUT receive continuous signals from GNSS station.
- 3. Turn on camera to capture images.
- 4. Turn on MPEG4 function.
- 5. Turn on FM receiver function to make the EUT receive continuous signals from FM station

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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	Conducted	Average 56 to 46* 46 50
(MHz)	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.

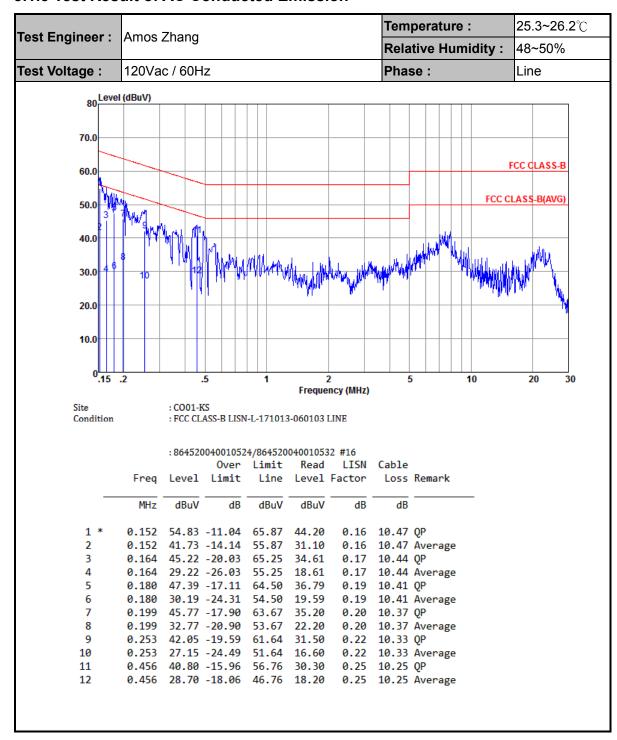
3.1.4 Test Setup



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3.1.5 Test Result of AC Conducted Emission



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Temperature: **25.3~26.2**℃ Test Engineer : Amos Zhang Relative Humidity: 48~50% Test Voltage: 120Vac / 60Hz Phase: Neutral 80 Level (dBuV) 70.0 FCC CLASS-B 60.0 FCC CLASS-B(AVG) 50.0 40.0 30.0 20.0 10.0 Frequency (MHz) : CO01-KS Site Condition : FCC CLASS-B LISN-N-171013-060103 NEUTRAL 264520040010524/264520040010522 #16

	:864520040010524/864520040010532 #16										
			0ver	Limit	Read	LISN	Cable				
	Freq	Level	Limit	Line	Level	Factor	Loss	Remark			
	MHz	dBuV	dB	dBuV	dBuV	dB	dB				
1	0.151	56.66	-9.30	65.96	45.90	0.28	10.48	QP			
2	0.151	45.06	-10.90	55.96	34.30	0.28	10.48	Average			
3	0.168	46.91	-18.17	65.08	36.20	0.28	10.43	QP			
4	0.168	32.01	-23.07	55.08	21.30	0.28	10.43	Average			
5	0.181	48.98	-15.48	64.46	38.30	0.28	10.40	QP			
6	0.181	33.28	-21.18	54.46	22.60	0.28	10.40	Average			
7	0.203	48.94	-14.55	63.49	38.30	0.28	10.36	QP			
8	0.203	34.54	-18.95	53.49	23.90	0.28	10.36	Average			
9	0.442	45.14	-11.88	57.02	34.60	0.29	10.25	QP			
10	0.442	36.04	-10.98	47.02	25.50	0.29	10.25	Average			
11	0.499	44.42	-11.59	56.01	33.90	0.29	10.23	QP			
12 *	0.499	37.83	-8.18	46.01	27.31	0.29	10.23	Average			

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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	Field Strength	Measurement Distance		
(MHz)	(microvolts/meter)	(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.

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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

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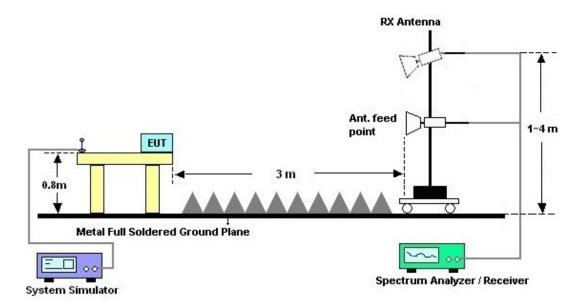
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3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



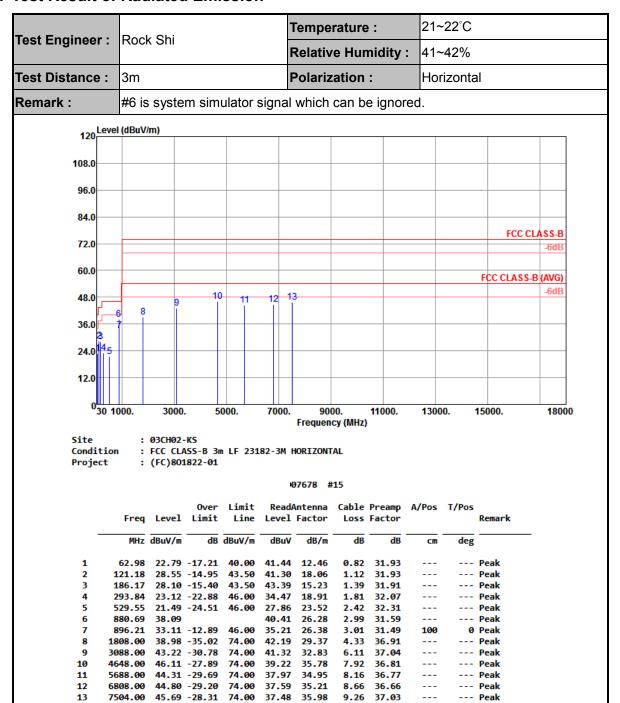
For radiated emissions above 1GHz



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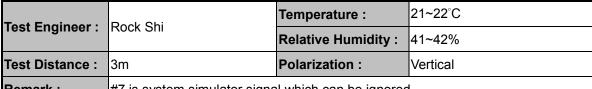
3.2.5. Test Result of Radiated Emission



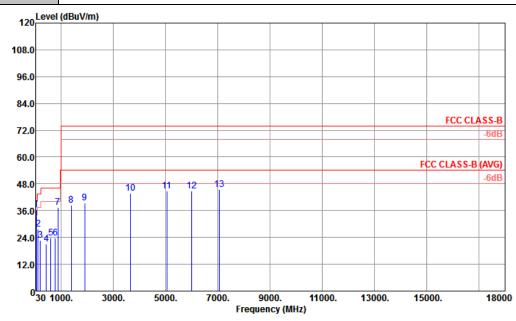
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Remark: #7 is system simulator signal which can be ignored.



Site : 03CH02-KS

Condition : FCC CLASS-B 3m LF 23182-3M VERTICAL

Project : (FC)801822-01

	Freq	Level	Over Limit			Antenna Factor		Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1!	45.52	36.53	-3.47	40.00	51.68	16.07	0.72	31.94	100	248	QP
2	119.24	27.63	-15.87	43.50	40.40	18.05	1.11	31.93			Peak
3	204.60	22.70	-20.80	43.50	37.88	15.25	1.48	31.91			Peak
4	441.28	21.19	-24.81	46.00	29.02	22.26	2.11	32.20			Peak
5	607.15	23.82	-22.18	46.00	29.32	24.32	2.58	32.40			Peak
6	782.72	23.72	-22.28	46.00	27.47	25.59	2.83	32.17			Peak
7	880.69	37.41			39.73	26.28	2.99	31.59			Peak
8	1400.00	38.41	-35.59	74.00	43.33	28.70	3.87	37.49			Peak
9	1904.00	39.52	-34.48	74.00	42.29	29.61	4.42	36.80			Peak
10	3656.00	43.79	-30.21	74.00	39.72	34.03	6.49	36.45			Peak
11	5056.00	44.94	-29.06	74.00	38.54	35.46	7.64	36.70			Peak
12	5992.00	44.79	-29.21	74.00	38.81	34.82	8.10	36.94			Peak
13	7064.00	45.36	-28.64	74.00	37.25	35.74	9.20	36.83			Peak

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4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Nov. 16, 2018	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Nov. 16, 2018	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 23, 2017	Nov. 16, 2018	Nov. 22, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Nov. 16, 2018	Oct. 11, 2019	Conduction (CO01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Aug. 08, 2018	Nov. 15, 2018	Aug. 07, 2019	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44G,MAX 30dB	Oct. 10, 2018	Nov. 15, 2018	Oct. 09, 2019	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Jan. 29, 2018	Nov. 15, 2018	Jan. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Jan. 21, 2018	Nov. 15, 2018	Jan. 20, 2019	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Nov. 15, 2018	Feb. 06, 2019	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2018	Nov. 15, 2018	Aug. 05, 2019	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY53270203	500MHz~26.5G Hz	Apr. 18, 2018	Nov. 15, 2018	Apr. 17, 2019	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35-H G	2014749	18~40GHz	Feb. 08, 2018	Nov. 15, 2018	Feb. 07, 2019	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	61601000247 3	N/A	NCR	Nov. 15, 2018	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Nov. 15, 2018	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Nov. 15, 2018	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required

Sporton International (Kunshan) Inc.

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5. Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence	2.9 dB
of 95% (U = 2Uc(y))	2.9 UD

<u>Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)</u>

Measuring Uncertainty for a Level of Confidence	4.8 dB
of 95% (U = 2Uc(y))	4.0 UB

<u>Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)</u>

Measuring Uncertainty for a Level of Confidence	5.2 dB
of 95% (U = 2Uc(y))	5.2 UB

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