# **FCC Test Report**

APPLICANT : Reliance Communications, LLC

**EQUIPMENT**: Cellphone

BRAND NAME : Orbic

MODEL NAME : RC2200L

FCC ID : 2ABGH-RC2200L

STANDARD : 47 CFR Part 15 Subpart B

**CLASSIFICATION**: Certification

The product was received on Jan. 28, 2019 and testing was completed on Feb. 26, 2019. We, Sporton International (Shenzhen) 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 (Shenzhen) Inc., the test report shall not be reproduced except in full.



Approved by: Eric Shih / Manager

## Sporton International (Shenzhen) Inc.

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China

Sporton International (Shenzhen) Inc.

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## **REVISION HISTORY**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC912802	Rev. 01	Initial issue of report	Apr. 16, 2019

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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	7.79 dB at
					0.19 MHz
		15.109 Radiated Emission	< 15.109 limits	PASS	Under limit
2.0	45 400				1.12 dB at
3.2	15.109				350.10 MHz
					for Quasi-Peak

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## 1. General Description

## 1.1. Applicant

**Reliance Communications, LLC** 

555 Wireless BLVD, Hauppauge, NY 11788, USA

## 1.2. Manufacturer

#### Unimax

Room 602, Floor 6th, Building B, Software Park T3,Hi-Tech Park South, Nanshan District, Shenzhen, P.R. China 518057

## 1.3. Product Feature of Equipment Under Test

	Product Feature
Equipment	Cellphone
Brand Name	Orbic
Model Name	RC2200L
FCC ID	2ABGH-RC2200L
	CDMA/EVDO/GSM/GPRS/EGPRS/LTE/GNSS
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20
	Bluetooth BR / EDR / LE
IMELO	Conduction: 353362100010658
IMEI Code	Radiation: 864737040223150
HW Version	V1.1
SW Version	N/A
EUT Stage	Production Unit

**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

Standards-related Product Specification				
	GSM850: 824.2 MHz ~ 848.8 MHz			
	GSM1900: 1850.2 MHz ~ 1909.8MHz			
	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			
Tx Frequency	LTE Band 13 : 779.5 MHz ~ 784.5 MHz			
,	CDMA2000 BC0: 824.70 MHz ~ 848.31 MHz			
	CDMA2000 BC1: 1851.25 MHz ~ 1908.75 MHz			
	802.11b/g/n: 2412 MHz ~ 2462 MHz			
	Bluetooth: 2402 MHz ~ 2480 MHz			
	GNSS: 1559 MHz ~ 1610 MHz			
	GSM850: 869.2 MHz ~ 893.8 MHz			
	GSM1900: 1930.2 MHz ~ 1989.8 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			
Rx Frequency	LTE Band 13 : 748.5 MHz ~ 753.5 MHz			
	CDMA2000 BC0: 869.70 MHz ~ 893.31 MHz			
	CDMA2000 BC1: 1931.25 MHz ~ 1988.75 MHz			
	802.11b/g/n: 2412 MHz ~ 2462 MHz			
	Bluetooth: 2402 MHz ~ 2480 MHz			
	GNSS : 1559 MHz ~ 1610 MHz			
	WWAN : PIFA Antenna			
Antenna Type	WLAN: PIFA Antenna			
Tantonna Typo	Bluetooth : PIFA Antenna			
	GNSS: PIFA Antenna			
	GSM: GMSK			
	GPRS: GMSK			
	EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK			
	LTE: QPSK / 16QAM			
	CDMA2000 1xRTT: QPSK			
	CDMA2000 1xEV-DO: QPSK/8PSK			
Type of Modulation	802.11b: DSSS (DBPSK / DQPSK / CCK)			
	802.11g/n: OFDM (BPSK /QPSK / 16QAM)			
	Bluetooth LE : GFSK			
	Bluetooth (1Mbps) : GFSK			
	Bluetooth (2Mbps) : π /4-DQPSK			
	Bluetooth (3Mbps) : 8-DPSK			
	GNSS: BPSK			

GNSS = GLONASS + GPS

## 1.5. Modification of EUT

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

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## 1.6. Test Location

Sporton International (Shenzhen) Inc is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (Shenzhen) Inc.					
	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China					
Test Site Location	TEL: +86-755-8637-9589					
	FAX: +86-755-8637-9595					
Took Site No	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.			
Test Site No.	CO01-SZ	CN5018	337463			

Test Site	Sporton International (Shenzhen) Inc.						
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan						
Test Site Location	District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398						
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.				
rest Site No.	03CH04-SZ CN5019 577730						

## 1.7. 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.

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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 + Bluetooth Idle + WLAN Idle(2.4G) + Camera(Rear) +SD Card Load + Earphone + Battery + USB Cable (Charging from Adapter)
AC Conducted Emission	Mode 2: CMDA BC1 Idle + Bluetooth Idle + WLAN Idle(2.4G) + MPEG4(H-pattern) + SD Card Link + Earphone + Battery + USB Cable (Charging from Adapter)
	Mode 3: LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(2.4G) + GNSS Rx + SD Card Link + Earphone + Battery + Data Link with Notebook
	Mode 1: GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + Camera(Rear) +SD Card Load + Earphone + Battery + USB Cable (Charging from Adapter)
Radiated Emissions	Mode 2: CMDA BC1 Idle + Bluetooth Idle + WLAN Idle(2.4G) + MPEG4(H-pattern) + SD Card Link + Earphone + Battery + USB Cable (Charging from Adapter)
	Mode 3: LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(2.4G) + GNSS Rx + SD Card Link + Earphone + Battery + Data Link with Notebook

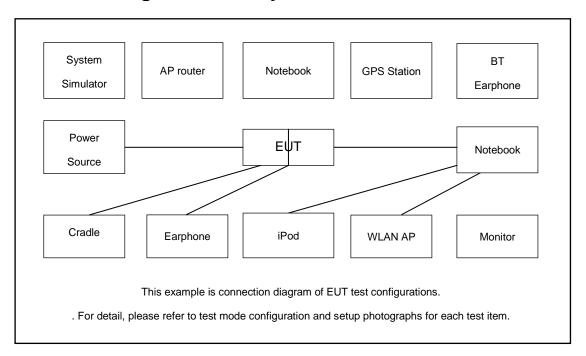
#### Remark:

- 1. The worst case of AC is mode 3; 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.	WLAN AP	ASUSTek	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,2.7m with Core
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
4.	Bluetooth Earphone	Samsung	HS3000	A3LHS3000	N/A	N/A
5.	NOTE BOOK	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m
6.	LABSAT GPS Simulator	RACELOGIC	RLLS03-2P	Fcc DoC	N/A	Unshielded,1.8m
7.	Labsat	RACELOGIC	18645	N/A	N/A	Unshielded,1.8m
8.	SD Card	N/A	MicroSD HC	FCC DoC	N/A	N/A
9.	Earphone	Apple	DCY1V-A9007ZJW3-000	N/A	N/A	Unshielded,1.8m
10.	lopd	Apple	MC69029/A	N/A	N/A	N/A
11.	IPod	Apple	MC525 ZP/A	Fcc DoC	Shielded, 1.0m	N/A

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## 2.4. EUT Operation Test Setup

The EUT was in GSM or CDMA 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 Laptop 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. Execute "H Pattern" function.
- 6. EUT links with Notebook and execute ping.

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

<sup>\*</sup>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.

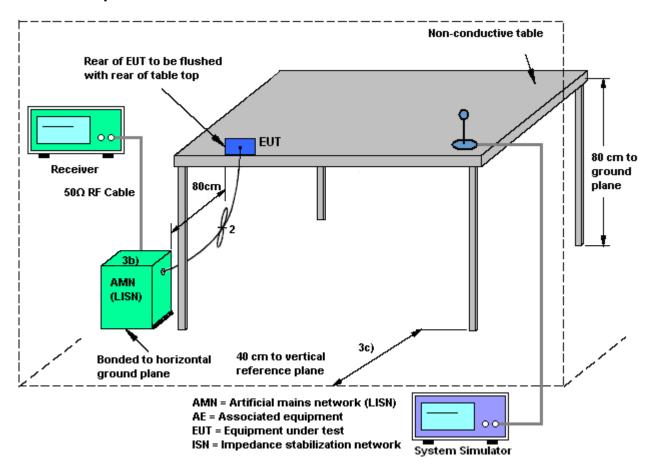
#### 3.1.3 Test Procedure

- 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.

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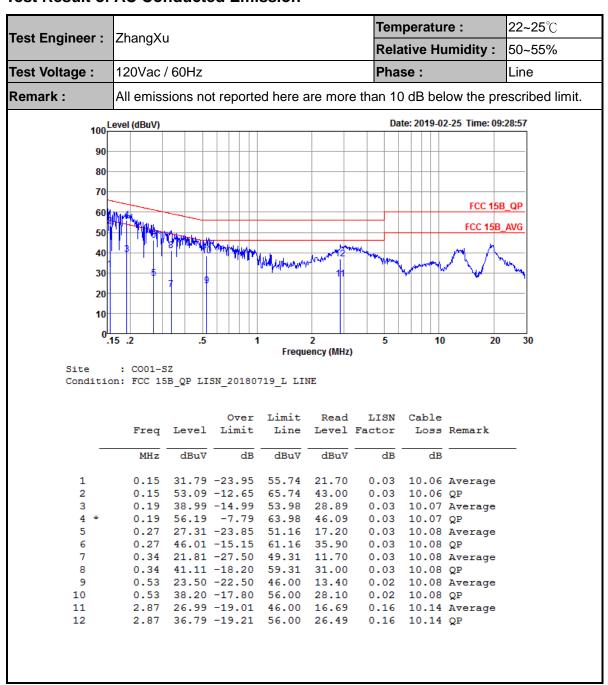
## 3.1.4 Test Setup



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### 3.1.5 Test Result of AC Conducted Emission

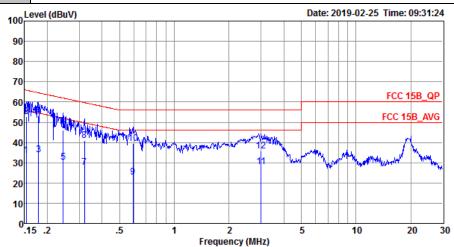


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Test Engineer :	ZhangYu	Temperature : 22~25°C		
rest Engineer.	ZhangAu 	Relative Humidity :	50~55%	
Test Voltage :	120Vac / 60Hz	Phase :	Neutral	
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.			



: CO01-SZ

Condition: FCC 15B QP LISN 20180719 N NEUTRAL

	Freq	Level	Over Timit	Limit Line	Read Level	LISN	Cable	Remark
	1104	20101	DIMI 0	22110	20,01	140001	2000	NOME I
	MHz	dBu∀	dB	dBu₹	dBu₹	dB	dB	
1	0.15	33 59	-22.23	55.82	23.50	0.03	10 06	Average
2	0.15		-12.93	65.82	42.80	0.03	10.06	_
3	0.18	33.90	-20.65	54.55	23.80	0.03		Average
4 *	0.18	52.99	-11.56	64.55	42.89	0.03	10.07	QP
5	0.24	30.10	-21.85	51.95	20.00	0.03	10.07	Average
6	0.24	46.30	-15.65	61.95	36.20	0.03	10.07	QP
7	0.32	27.71	-22.00	49.71	17.60	0.03	10.08	Average
8	0.32	40.91	-18.80	59.71	30.80	0.03	10.08	QP
9	0.59	23.00	-23.00	46.00	12.90	0.02	10.08	Average
10	0.59	39.60	-16.40	56.00	29.50	0.02	10.08	QP
11	3.01	28.07	-17.93	46.00	17.90	0.03	10.14	Average
12	3.01	35.87	-20.13	56.00	25.70	0.03	10.14	QP

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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  $(dB\mu V/m) = 20 \log Emission level (\mu V/m)$
- 9. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level

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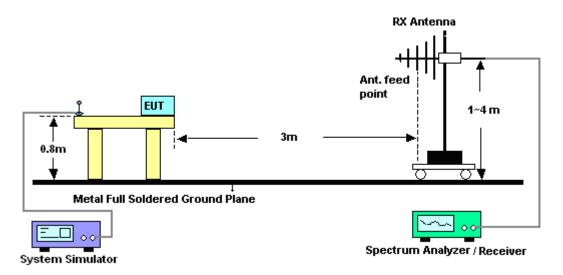
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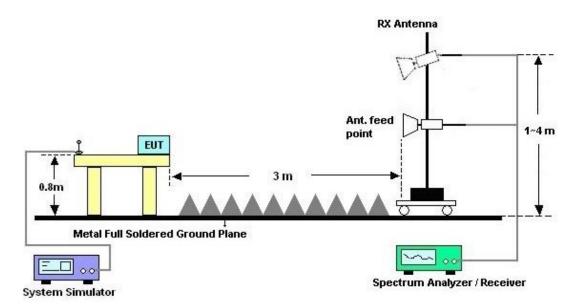
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## 3.2.4. Test Setup of Radiated Emission

### For radiated emissions from 30MHz to 1GHz



### For radiated emissions above 1GHz

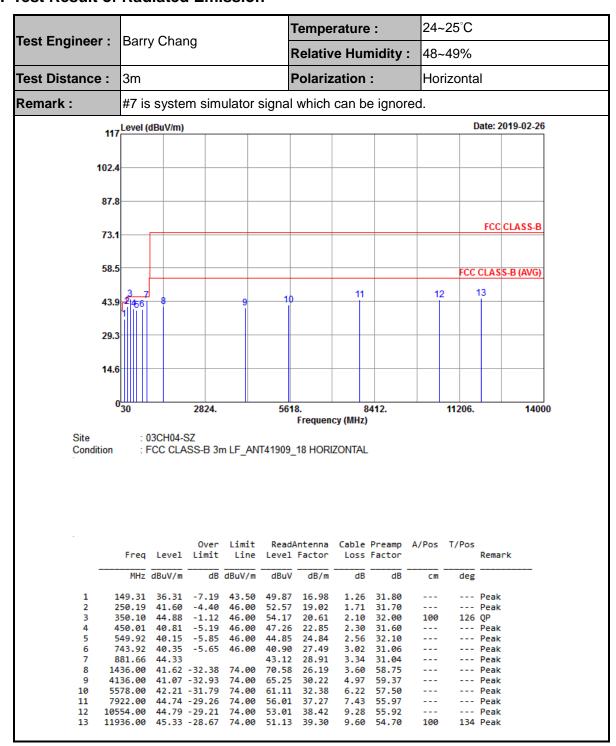


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### 3.2.5. Test Result of Radiated Emission



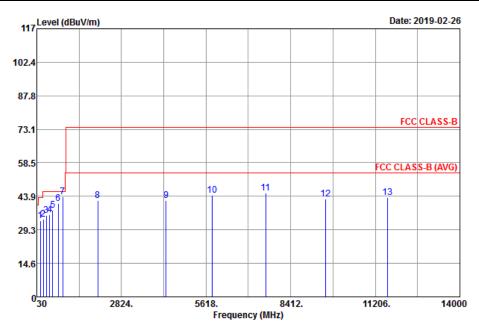
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Toot Engineer		Temperature :	24~25°C
Test Engineer :	Dairy Chang	Relative Humidity :	48~49%
Test Distance :	3m	Polarization :	Vertical
		·	·

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



Site : 03CH04-SZ

Condition : FCC CLASS-B 3m LF\_ANT41909\_18 VERTICAL

	Freq	Level	Over Limit	Limit Line		Antenna Factor		Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	149.31	33.33	-10.17	43.50	46.89	16.98	1.26	31.80			Peak
2	250.19	33.96	-12.04	46.00	44.93	19.02	1.71	31.70			Peak
3	350.10	35.45	-10.55	46.00	44.74	20.61	2.10	32.00			Peak
4	450.01	35.95	-10.05	46.00	42.40	22.85	2.30	31.60			Peak
5	549.92	37.82	-8.18	46.00	42.52	24.84	2.56	32.10			Peak
6	743.92	40.67	-5.33	46.00	41.22	27.49	3.02	31.06	100	28	Peak
7	881.66	43.56			42.35	28.91	3.34	31.04			Peak
8	2046.00	42.09	-31.91	74.00	69.40	26.55	4.39	58.25			Peak
9	4294.00	42.08	-31.92	74.00	65.47	30.56	5.13	59.08			Peak
10	5830.00	44.23	-29.77	74.00	62.69	32.57	6.29	57.32			Peak
11	7588.00	45.43	-28.57	74.00	57.87	37.52	7.04	57.00	100	118	Peak
12	9572.00	42.81	-31.19	74.00	50.80	38.76	8.56	55.31			Peak
13	11604.00	43.39	-30.61	74.00	49.74	39.30	9.53	55.18			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 Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 19, 2018	Feb. 26, 2019	Apr. 18, 2019	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Aug 28, 2018	Feb. 26, 2019	Aug 27, 2019	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBE CK	BBHA9120D	9120D-1355	1GHz~18GHz	Mar. 29, 2018	Feb. 26, 2019	Mar. 28, 2019	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBE CK	BBHA9170	9170#679	15GHz~40GHz	Apr 20 2018	Feb. 26, 2019	Apr 19, 2019	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct.18, 2018	Feb. 26, 2019	Oct 17, 2019	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P- R	1989346	1GHz~18GHz	Jul. 30, 2018	Feb. 26, 2019	Jul. 29, 2019	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Feb. 26, 2019	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Feb. 26, 2019	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Feb. 26, 2019	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 23, 2018	Feb. 20, 2019~ Feb. 25, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Oct. 18, 2018	Feb. 20, 2019~ Feb. 25, 2019	Oct. 17, 2019	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Dec. 23, 2018	Feb. 20, 2019~ Feb. 25, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	61602000089 1	100Vac~250Vac	Jul. 18, 2018	Feb. 20, 2019~ Feb. 25, 2019	Jul. 17, 2019	Conduction (CO01-SZ)

NCR: No Calibration Required

Sporton International (Shenzhen) 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	2.6 dB
of 95% (U = 2Uc(y))	2.0 UB

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence	5.0 dB
of 95% (U = 2Uc(y))	3.0 dB

### **Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)**

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

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