



# FCC Test Report

**APPLICANT** : ZTE CORPORATION  
**EQUIPMENT** : LTE/WCDMA/CDMA/GSM(GPRS)  
Multi-Mode Digital Mobile Phone  
**BRAND NAME** : ZTE  
**MODEL NAME** : Z610DL  
**FCC ID** : SRQ-Z610DL  
**STANDARD** : FCC 47 CFR FCC Part 15 Subpart B  
**CLASSIFICATION** : Certification

The product was received on Oct. 20, 2017 and testing was completed on Nov. 24, 2017. 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.



Approved by: James Huang / Manager

**Sporton International (Kunshan) Inc.**  
**No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335**  
**China**



# TABLE OF CONTENTS

**REVISION HISTORY..... 3**

**SUMMARY OF TEST RESULT ..... 4**

**1. GENERAL DESCRIPTION ..... 5**

    1.1. Applicant..... 5

    1.2. Manufacturer ..... 5

    1.3. Product Feature of Equipment Under Test ..... 5

    1.4. Product Specification of Equipment Under Test ..... 6

    1.5. Modification of EUT ..... 7

    1.6. Test Location ..... 8

    1.7. Applicable Standards ..... 8

**2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST ..... 9**

    2.1. Test Mode ..... 9

    2.2. Connection Diagram of Test System ..... 11

    2.3. Support Unit used in test configuration and system ..... 12

    2.4. EUT Operation Test Setup ..... 12

**3. TEST RESULT ..... 13**

    3.1. Test of AC Conducted Emission Measurement ..... 13

    3.2. Test of Radiated Emission Measurement ..... 21

**4. LIST OF MEASURING EQUIPMENT ..... 27**

**5. UNCERTAINTY OF EVALUATION ..... 28**

**APPENDIX A. SETUP PHOTOGRAPHS**



### REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC7O2002	Rev. 01	Initial issue of report	Dec. 22, 2017



### 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 5.55 dB at 0.153 MHz
3.2	15.109	Radiated Emission	< 15.109 limits	PASS	Under limit 7.03 dB at 44.85 MHz



# 1. General Description

## 1.1. Applicant

**ZTE CORPORATION**

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.2. Manufacturer

**ZTE CORPORATION**

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.3. Product Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	LTE/WCDMA/CDMA/GSM(GPRS) Multi-Mode Digital Mobile Phone
<b>Brand Name</b>	ZTE
<b>Model Name</b>	Z610DL
<b>FCC ID</b>	SRQ-Z610DL
<b>EUT supports Radios application</b>	CDMA/EV-DO/GSM/GPRS/EGPRS/WCDMA/HSPA/HSPA+ (16QAM uplink is not supported)/LTE/WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth v3.0 + EDR / Bluetooth v4.0 LE Bluetooth v4.1 LE / Bluetooth v4.2 LE
<b>IMEI Code</b>	Conduction: 990008950012810 Radiation: 990008950012539
<b>HW Version</b>	Z610DLHW1.0
<b>SW Version</b>	Z610DLV1.0.0B03
<b>EUT Stage</b>	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.



### 1.4. Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx Frequency</b>	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 12 : 699.7 MHz ~ 715.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 66 : 1710.7 MHz ~ 1779.3 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 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
<b>Rx Frequency</b>	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 12 : 729.7 MHz ~ 745.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 66 : 2110.7 MHz~ 2199.3 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 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz GNSS : 1559 MHz ~ 1610 MHz FM : 88~108 MHz
<b>Antenna Type</b>	WWAN: PIFA Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GNSS: PIFA Antenna FM: External headset Antenna



<b>Type of Modulation</b>	GSM: GMSK GPRS: GMSK EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK WCDMA : BPSK (Uplink) HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (16QAM uplink is not supported) LTE: QPSK / 16QAM CDMA2000 : QPSK CDMA2000 1xEV-DO : 8PSK 802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n/ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) Bluetooth LE : GFSK Bluetooth (1Mbps) : GFSK Bluetooth (2Mbps) : $\pi/4$ -DQPSK Bluetooth (3Mbps) : 8-DPSK GNSS : BPSK FM : FM
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Note: GNSS = GPS + Glonass

### 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) and the FCC designation No is CN5013.

<b>Test Site</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC Test Firm Registration No.</b>
	CO01-KS	03CH02-KS	630927

**Note:** The test site complies with ANSI C63.4 2014 requirement.

### 1.7. Applicable Standards

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

- ♦ FCC 47 CFR FCC 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.

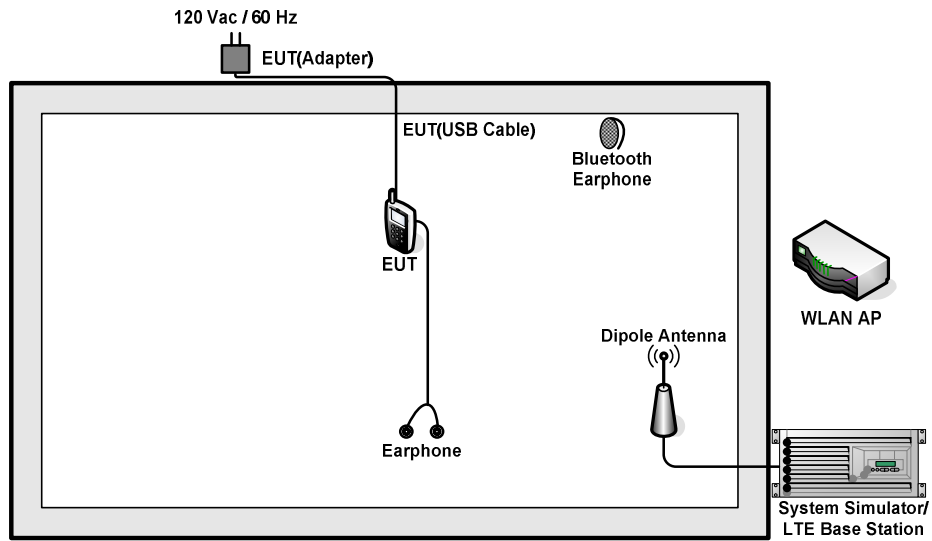
Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
AC Conducted Emission	Mode 1: GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Bottom Antenna<Fig.1>
	Mode 2: GSM1900 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Charging from Adapter) + Earphone + Camera(Front) + Bottom Antenna<Fig.1>
	Mode 3: WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + MPEG4 + Bottom Antenna<Fig.1>
	Mode 4: LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Data Link with Notebook) + Earphone + GNSS Rx + Bottom Antenna<Fig.2>
	Mode 5: LTE Band 5 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Top Antenna<Fig.1>

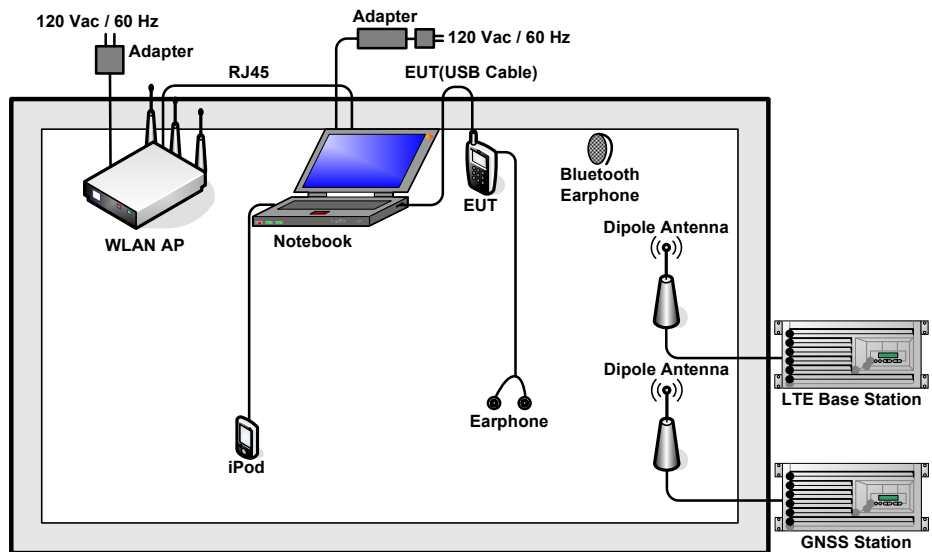


Radiated Emissions < 1GHz	<p>Mode 1: GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Bottom Antenna&lt;Fig.1&gt;</p> <p>Mode 2: GSM1900 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Charging from Adapter) + Earphone + Camera(Front) + Bottom Antenna&lt;Fig.1&gt;</p> <p>Mode 3: WCDMA Band V Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + MPEG4 + Bottom Antenna&lt;Fig.1&gt;</p> <p>Mode 4: LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Data Link with Notebook) + Earphone + GNSS Rx + Bottom Antenna&lt;Fig.2&gt;</p> <p>Mode 5: LTE Band 5 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Top Antenna&lt;Fig.1&gt;</p>
Radiated Emissions ≥ 1GHz	<p>Mode 1: LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Data Link with Notebook) + Earphone + GNSS Rx + Bottom Antenna&lt;Fig.2&gt;</p> <p>Mode 2: LTE Band 5 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Top Antenna&lt;Fig.1&gt;</p>
<p><b>Remark:</b></p> <ol style="list-style-type: none"> <li>1. The worst case of AC is mode 1; and the USB Link mode of AC is mode 4, the test data of these modes are reported.</li> <li>2. The worst case of RE &lt; 1G is mode 5; and the USB Link mode of RE is mode 4, the test data of these modes are reported.</li> <li>3. Data Link with Notebook means data application transferred mode between EUT and Notebook.</li> </ol>	

## 2.2. Connection Diagram of Test System



<Fig.1>



<Fig.2>

### 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	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	LTE Base Station	Anritus	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	GNSS Station	ADIVIC	MP9000	N/A	N/A	Unshielded, 1.8 m
4.	GNSS Station	RACELOGIC	RLLS03-2RP	N/A	N/A	Unshielded, 1.8 m
5.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
6.	WLAN AP	TP-LINK	TL-WDR5600	N/A	N/A	Unshielded, 1.8m
7.	WLAN AP	D-link	DIR-855	KA2DIR855A2	N/A	Unshielded,1.8m
8.	Notebook	Lenovo	G40-80	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
9.	Notebook	Dell	Latitude3440	NA	NA	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
10.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
11.	iPod	Apple	A1199	Fcc DoC	Shielded, 1.2m	N/A
12.	SD Card	Kingston	SDC4/4GB	N/A	N/A	N/A
13.	SD Card	SanDisk	Uitra	N/A	N/A	N/A
14.	Earphone	Lenovo	LH102	N/A	N/A	Unshielded,1.2m
15.	Earphone	Lenovo	SH100	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 GNSS function to make the EUT receive continuous signals from GNSS station.
3. Execute “Video Player” to play MPEG4 files.
4. Turn on camera to capture images.

### 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.

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.

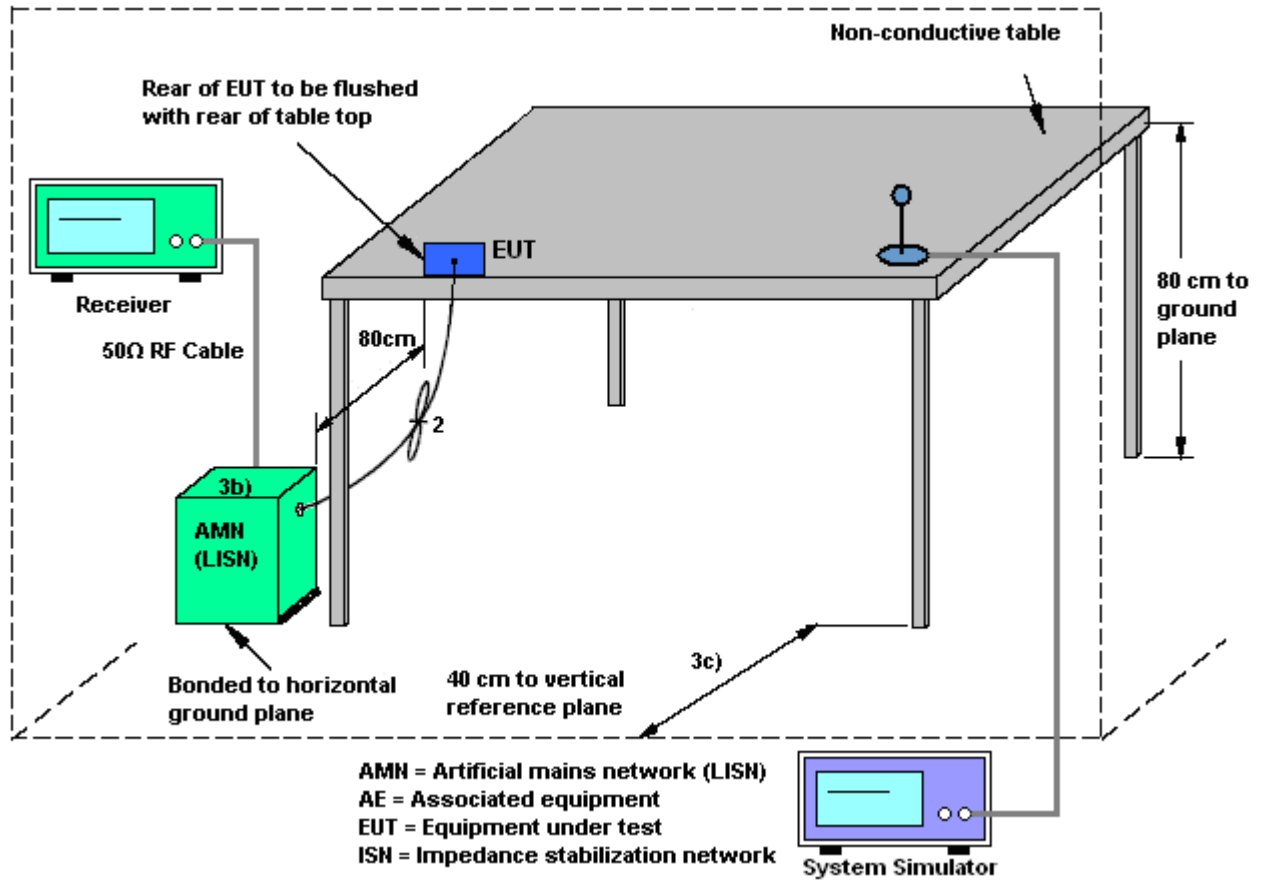
##### 3.1.2 Measuring Instruments

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.

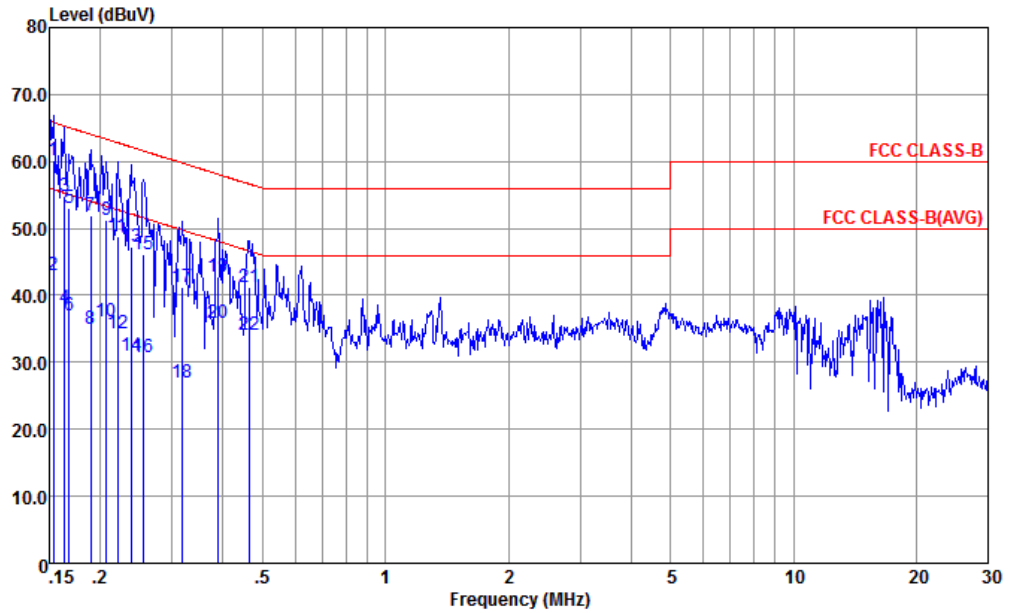
### 3.1.4 Test Setup





3.1.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	23~25°C
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Bottom Antenna		

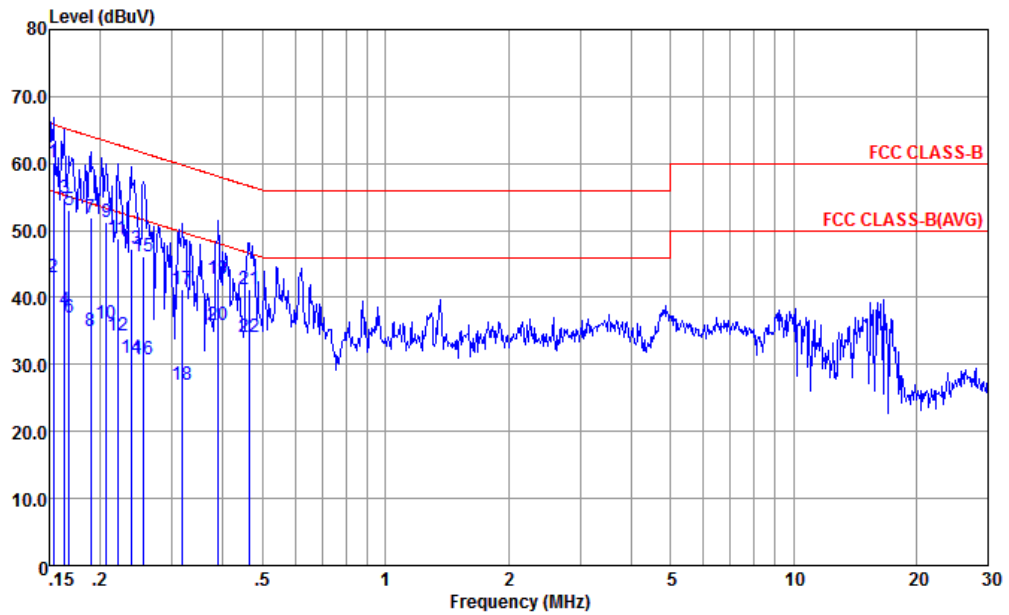


Site : CO01-KS  
 Condition : FCC CLASS-B LISN-L-171013-060103 LINE  
 Project : (FC) 702002  
 mode : Mode 1  
 : 990008950012810 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.153	60.27	-5.55	65.82	49.50	0.16	10.61	QP
2	0.153	42.97	-12.85	55.82	32.20	0.16	10.61	Average
3	0.163	54.84	-10.46	65.30	44.10	0.17	10.57	QP
4	0.163	38.04	-17.26	55.30	27.30	0.17	10.57	Average
5	0.168	52.93	-12.15	65.08	42.20	0.18	10.55	QP
6	0.168	37.03	-18.05	55.08	26.30	0.18	10.55	Average
7	0.189	51.98	-12.08	64.06	41.30	0.19	10.49	QP
8	0.189	34.98	-19.08	54.06	24.30	0.19	10.49	Average
9	0.207	51.26	-12.06	63.32	40.61	0.20	10.45	QP
10	0.207	36.16	-17.16	53.32	25.51	0.20	10.45	Average
11	0.221	48.86	-13.93	62.79	38.20	0.21	10.45	QP
12	0.221	34.26	-18.53	52.79	23.60	0.21	10.45	Average
13	0.238	47.25	-14.92	62.17	36.60	0.21	10.44	QP
14	0.238	30.95	-21.22	52.17	20.30	0.21	10.44	Average
15	0.255	46.15	-15.45	61.60	35.49	0.22	10.44	QP
16	0.255	30.85	-20.75	51.60	20.19	0.22	10.44	Average
17	0.318	41.25	-18.50	59.75	30.60	0.23	10.42	QP



Test Mode :	Mode 1	Temperature :	23~25°C
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Bottom Antenna		



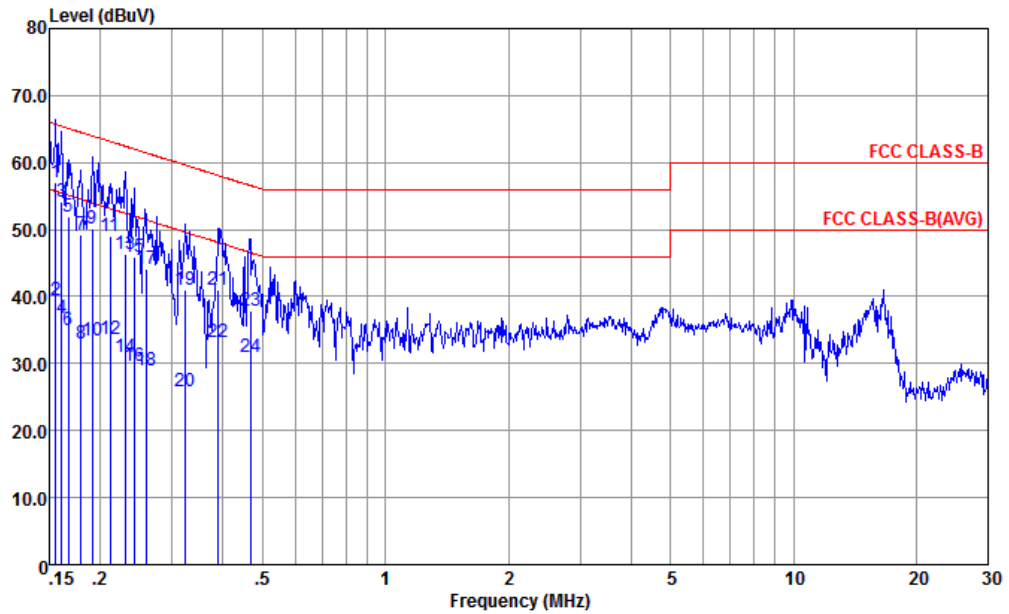
Site : CO01-KS  
 Condition : FCC CLASS-B LISN-L-171013-060103 LINE  
 Project : (FC) 702002  
 mode : Mode 1  
 : 990008950012810 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.318	26.95	-22.80	49.75	16.30	0.23	10.42	Average
19	0.389	42.85	-15.23	58.08	32.20	0.24	10.41	QP
20	0.389	35.85	-12.23	48.08	25.20	0.24	10.41	Average
21	0.464	41.20	-15.43	56.63	30.60	0.26	10.34	QP
22	0.464	34.10	-12.53	46.63	23.50	0.26	10.34	Average





Test Mode :	Mode 1	Temperature :	23~25°C
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Bottom Antenna		

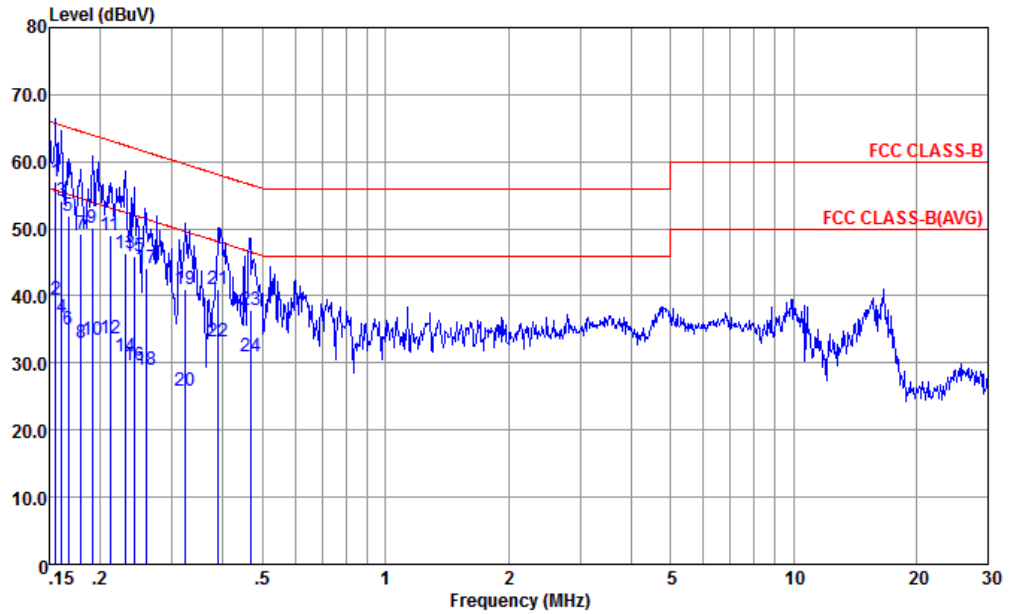


Site : CO01-KS  
 Condition : FCC CLASS-B LISN-N-171013-060103 NEUTRAL  
 Project : (FC) 702002  
 mode : Mode 1  
 : 990008950012810 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.156	57.08	-8.61	65.69	46.20	0.28	10.60	QP
2	0.156	39.48	-16.21	55.69	28.60	0.28	10.60	Average
3	0.161	54.16	-11.27	65.43	43.30	0.28	10.58	QP
4	0.161	36.66	-18.77	55.43	25.80	0.28	10.58	Average
5	0.167	51.94	-13.18	65.12	41.10	0.28	10.56	QP
6	0.167	35.04	-20.08	55.12	24.20	0.28	10.56	Average
7	0.180	49.30	-15.20	64.50	38.50	0.28	10.52	QP
8	0.180	32.90	-21.60	54.50	22.10	0.28	10.52	Average
9	0.191	50.06	-13.92	63.98	39.30	0.28	10.48	QP
10	0.191	33.36	-20.62	53.98	22.60	0.28	10.48	Average
11	0.212	49.03	-14.11	63.14	38.30	0.28	10.45	QP
12	0.212	33.63	-19.51	53.14	22.90	0.28	10.45	Average
13	0.230	46.33	-16.11	62.44	35.60	0.28	10.45	QP
14	0.230	30.93	-21.51	52.44	20.20	0.28	10.45	Average
15	0.242	45.92	-16.12	62.04	35.20	0.28	10.44	QP
16	0.242	29.62	-22.42	52.04	18.90	0.28	10.44	Average
17	0.259	44.22	-17.25	61.47	33.50	0.28	10.44	QP



Test Mode :	Mode 1	Temperature :	23~25°C
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Bottom Antenna		

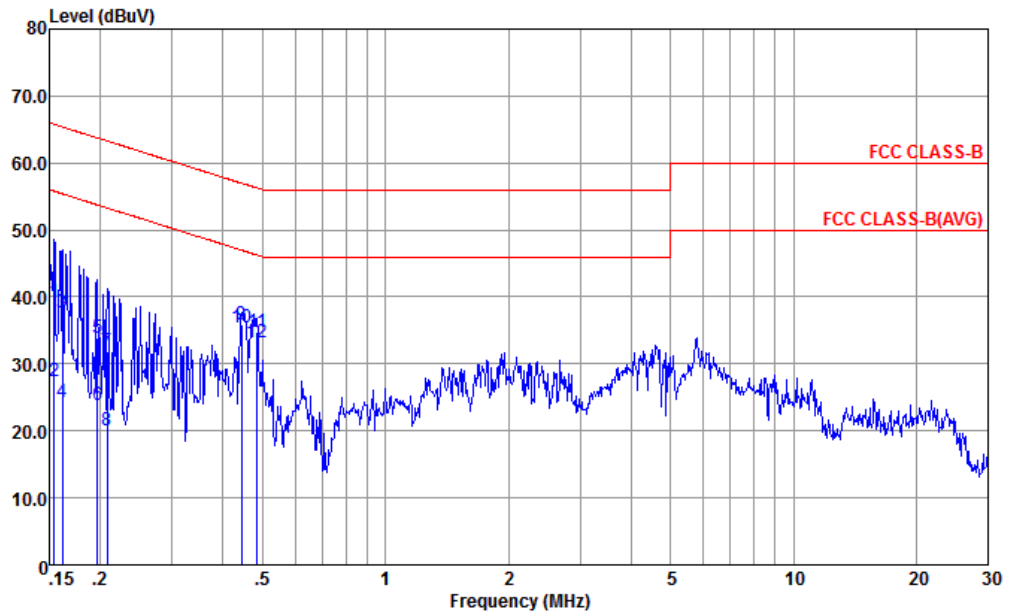


Site : CO01-KS  
 Condition : FCC CLASS-B LISN-N-171013-060103 NEUTRAL  
 Project : (FC) 702002  
 mode : Mode 1  
 : 990008950012810 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.259	28.92	-22.55	51.47	18.20	0.28	10.44	Average
19	0.322	41.01	-18.65	59.66	30.30	0.29	10.42	QP
20	0.322	25.91	-23.75	49.66	15.20	0.29	10.42	Average
21	0.389	41.00	-17.08	58.08	30.30	0.29	10.41	QP
22	0.389	33.30	-14.78	48.08	22.60	0.29	10.41	Average
23	0.466	37.83	-18.75	56.58	27.20	0.29	10.34	QP
24	0.466	30.93	-15.65	46.58	20.30	0.29	10.34	Average



Test Mode :	Mode 4	Temperature :	23~25°C
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Data Link with Notebook) + Earphone + GNSS Rx + Bottom Antenna		

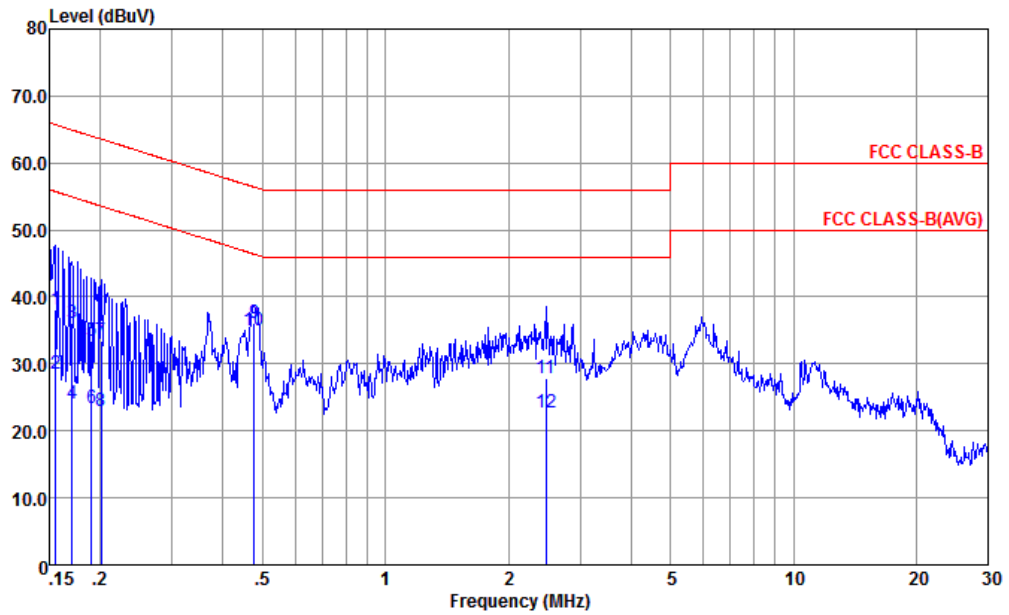


Site : CO01-KS  
 Condition : FCC CLASS-B LISN-L-161017-060103 LINE  
 Project : (FC) 702002  
 mode : Mode 4  
 : 990008950012810 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.154	39.23	-26.55	65.78	28.10	0.53	10.60	QP
2	0.154	27.33	-28.45	55.78	16.20	0.53	10.60	Average
3	0.162	37.66	-27.72	65.38	26.60	0.48	10.58	QP
4	0.162	24.26	-31.12	55.38	13.20	0.48	10.58	Average
5	0.197	33.95	-29.81	63.76	23.19	0.29	10.47	QP
6	0.197	23.95	-29.81	53.76	13.19	0.29	10.47	Average
7	0.208	31.92	-31.35	63.27	21.20	0.27	10.45	QP
8	0.208	20.02	-33.25	53.27	9.30	0.27	10.45	Average
9	0.444	35.83	-21.15	56.98	25.20	0.27	10.36	QP
10 *	0.444	35.33	-11.65	46.98	24.70	0.27	10.36	Average
11	0.484	34.79	-21.48	56.27	24.20	0.27	10.32	QP
12	0.484	33.09	-13.18	46.27	22.50	0.27	10.32	Average



Test Mode :	Mode 4	Temperature :	23~25°C
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Data Link with Notebook) + Earphone + GNSS Rx + Bottom Antenna		



Site : CO01-KS  
 Condition : FCC CLASS-B LISN-N-161017-060103 NEUTRAL  
 Project : (FC) 702002  
 mode : Mode 4  
 : 990008950012810 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.156	38.04	-27.65	65.69	27.10	0.34	10.60	QP
2	0.156	28.44	-27.25	55.69	17.50	0.34	10.60	Average
3	0.170	36.08	-28.86	64.94	25.19	0.34	10.55	QP
4	0.170	24.08	-30.86	54.94	13.19	0.34	10.55	Average
5	0.190	33.42	-30.60	64.02	22.61	0.33	10.48	QP
6	0.190	23.32	-30.70	54.02	12.51	0.33	10.48	Average
7	0.201	33.39	-30.19	63.58	22.61	0.33	10.45	QP
8	0.201	22.99	-30.59	53.58	12.21	0.33	10.45	Average
9	0.476	36.00	-20.41	56.41	25.29	0.38	10.33	QP
10 *	0.476	34.90	-11.51	46.41	24.19	0.38	10.33	Average
11	2.474	27.80	-28.20	56.00	17.20	0.40	10.20	QP
12	2.474	22.70	-23.30	46.00	12.10	0.40	10.20	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:

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

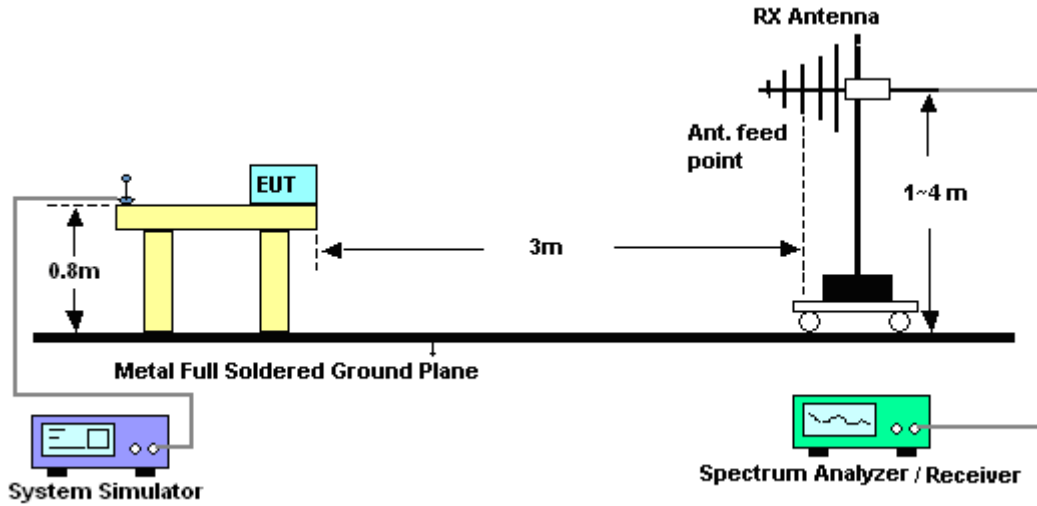
The measuring equipment is listed in the section 4 of this test report.

#### 3.2.3. Test Procedures

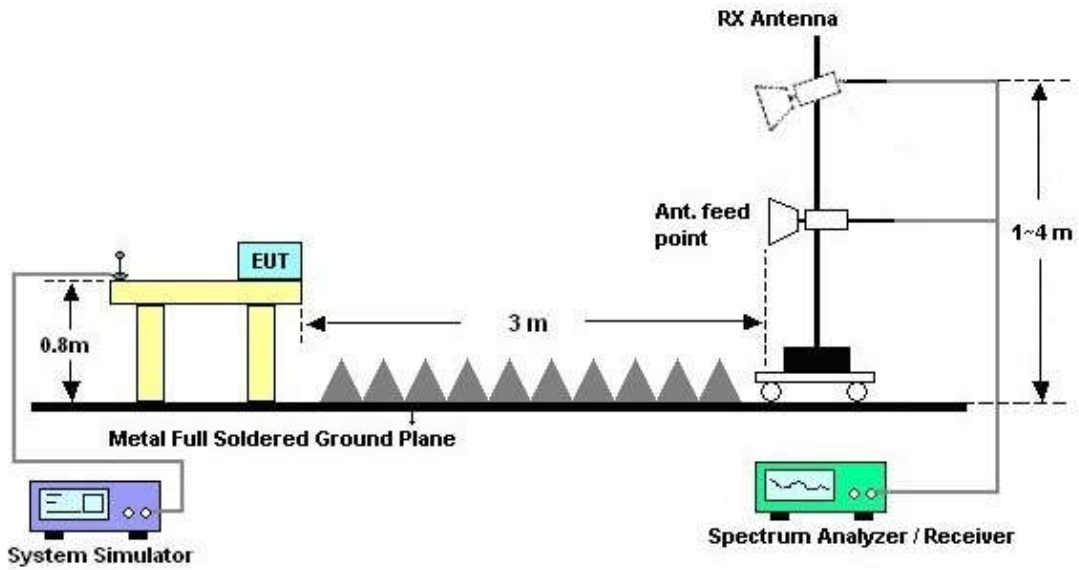
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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 (dBµV/m) = 20 log Emission level (µV/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



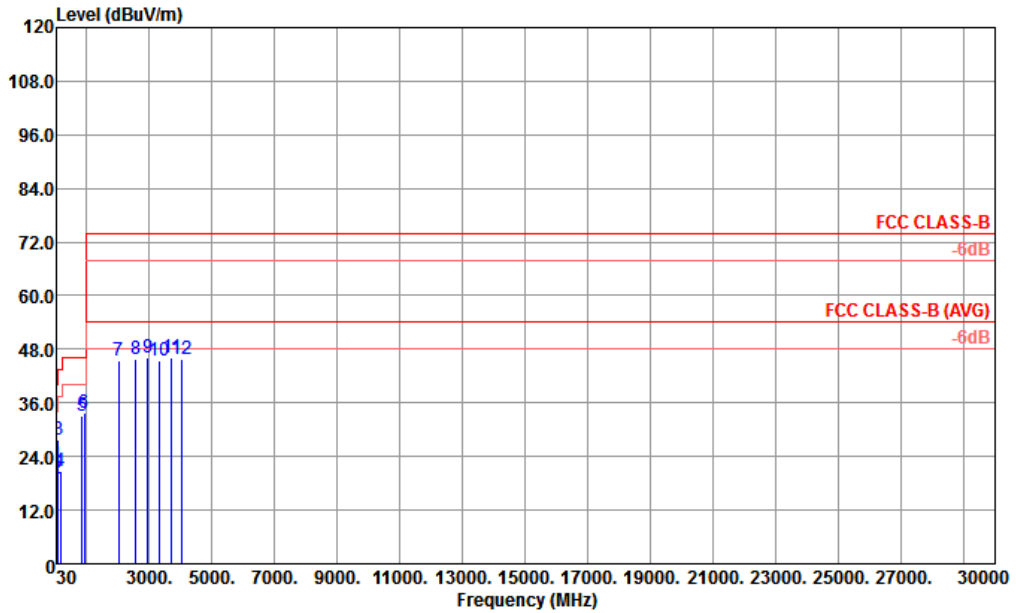
For radiated emissions above 1GHz





3.2.5. Test Result of Radiated Emission

Test Mode :	Mode 4	Temperature :	21~22°C
Test Engineer :	Leo Liao	Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Data Link with Notebook) + Earphone + GNSS Rx + Bottom Antenna		

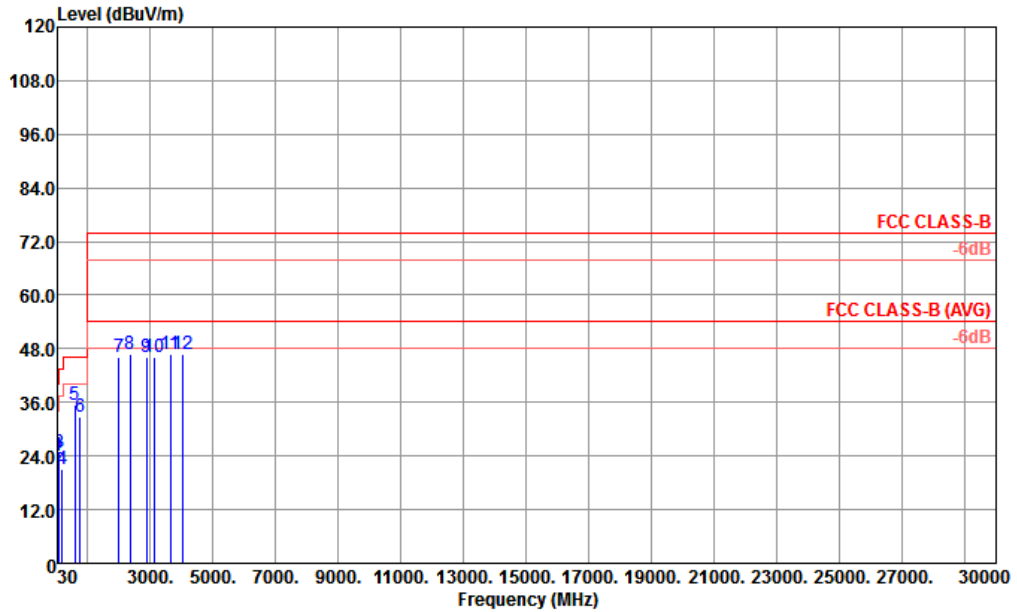


Site : 03CH02-KS  
 Condition : FCC CLASS-B 3m 02 LF ANT HORIZONTAL  
 Mode : 4  
 TMET : 990008950012539 #8

	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	31.08	22.22	-17.78	40.00	28.43	25.23	0.59	32.03	---	---	Peak
2	61.59	19.21	-20.79	40.00	37.53	13.00	0.81	32.13	---	---	Peak
3	88.59	27.78	-15.72	43.50	42.04	16.80	0.97	32.03	---	---	Peak
4	153.66	20.63	-22.87	43.50	33.83	17.36	1.27	31.83	---	---	Peak
5	862.10	32.94	-13.06	46.00	30.51	27.19	3.06	27.82	---	---	Peak
6	912.50	33.87	-12.13	46.00	30.43	27.74	3.12	27.42	100	0	Peak
7	2022.00	45.41	-28.59	74.00	43.13	30.36	4.67	32.75	---	---	Peak
8	2568.00	45.77	-28.23	74.00	39.40	31.59	5.31	30.53	---	---	Peak
9	2958.00	46.18	-27.82	74.00	36.83	32.45	5.94	29.04	---	---	Peak
10	3324.00	45.48	-28.52	74.00	36.38	33.28	6.25	30.43	---	---	Peak
11	3708.00	46.27	-27.73	74.00	35.46	34.37	6.55	30.11	---	---	Peak
12	4047.00	45.92	-28.08	74.00	34.56	35.18	6.86	30.68	---	---	Peak



Test Mode :	Mode 4	Temperature :	21~22°C
Test Engineer :	Leo Liao	Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Vertical
Function Type :	LTE Band 4 Idle + Bluetooth Idle + WLAN Idle(5G) + USB Cable (Data Link with Notebook) + Earphone + GNSS Rx + Bottom Antenna		



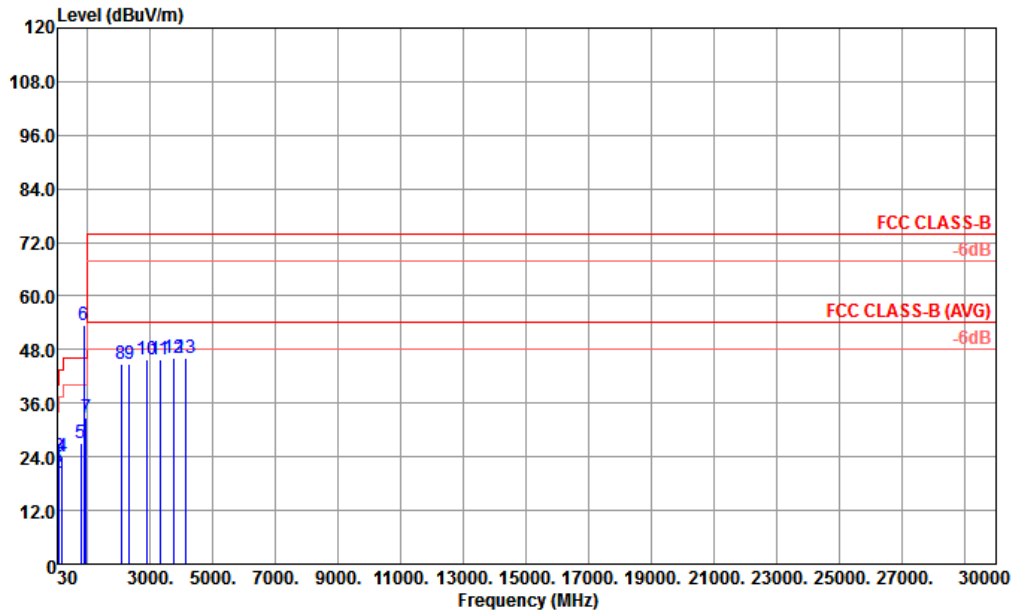
Site : 03CH02-KS  
 Condition : FCC CLASS-B 3m 02 LF ANT VERTICAL  
 Mode : 4  
 IMEI : 990008950012539 #8

	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	30.27	23.96	-16.04	40.00	29.82	25.60	0.57	32.03	---	---	Peak
2	60.24	23.56	-16.44	40.00	41.83	13.10	0.79	32.16	---	---	Peak
3	91.02	24.73	-18.77	43.50	38.81	16.97	0.97	32.02	---	---	Peak
4	194.16	21.14	-22.36	43.50	35.41	16.00	1.42	31.69	---	---	Peak
5	599.60	35.29	-10.71	46.00	37.74	24.60	2.62	29.67	100	0	Peak
6	757.80	32.88	-13.12	46.00	32.03	26.67	2.79	28.61	---	---	Peak
7	1996.00	46.03	-27.97	74.00	43.72	30.30	4.63	32.62	---	---	Peak
8	2354.00	46.70	-27.30	74.00	41.90	31.25	5.09	31.54	---	---	Peak
9	2876.00	46.27	-27.73	74.00	37.88	32.20	5.88	29.69	---	---	Peak
10	3123.00	46.17	-27.83	74.00	37.17	32.92	6.10	30.02	---	---	Peak
11	3633.00	46.94	-27.06	74.00	36.63	33.92	6.49	30.10	---	---	Peak
12	4041.00	46.71	-27.29	74.00	35.35	35.18	6.86	30.68	---	---	Peak





Test Mode :	Mode 5	Temperature :	21~22°C
Test Engineer :	Leo Liao	Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	LTE Band 5 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Top Antenna		
Remark :	#6 is system simulator signal which can be ignored.		

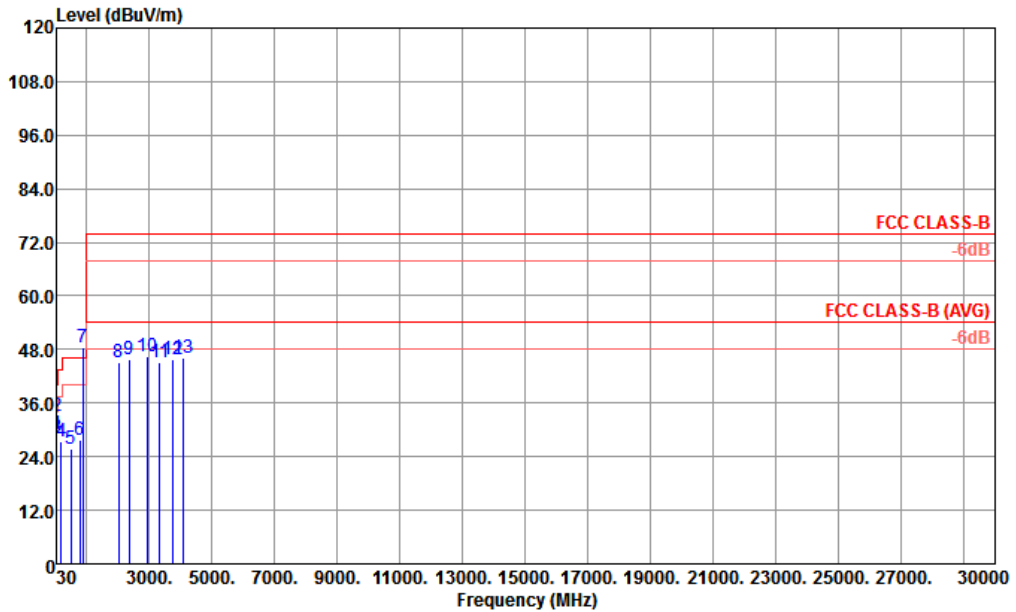


Site : 03CH02-KS  
 Condition : FCC CLASS-B 3m 02 LF ANT HORIZONTAL  
 Mode : 5  
 IMEI : 990008950012539 #8

	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	31.35	22.65	-17.35	40.00	28.85	25.23	0.60	32.03	---	---	Peak
2	45.12	20.53	-19.47	40.00	32.18	19.80	0.66	32.11	---	---	Peak
3	100.20	24.10	-19.40	43.50	37.12	17.90	1.01	31.93	---	---	Peak
4	193.62	23.98	-19.52	43.50	38.25	16.00	1.42	31.69	---	---	Peak
5	778.10	27.11	-18.89	46.00	26.28	26.58	2.72	28.47	---	---	Peak
6 *	880.30	53.32			50.56	27.35	3.08	27.67	---	---	Peak
7	950.30	32.66	-13.34	46.00	28.09	28.50	3.20	27.13	100	0	Peak
8	2072.00	44.88	-29.12	74.00	42.62	30.53	4.75	33.02	---	---	Peak
9	2328.00	44.81	-29.19	74.00	40.45	31.19	5.07	31.90	---	---	Peak
10	2908.00	45.93	-28.07	74.00	37.19	32.30	5.91	29.47	---	---	Peak
11	3300.00	45.78	-28.22	74.00	36.79	33.23	6.25	30.49	---	---	Peak
12	3750.00	46.02	-27.98	74.00	34.85	34.70	6.59	30.12	---	---	Peak
13	4125.00	46.12	-27.88	74.00	34.60	35.32	7.09	30.89	---	---	Peak



Test Mode :	Mode 5	Temperature :	21~22°C
Test Engineer :	Leo Liao	Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Vertical
Function Type :	LTE Band 5 Idle + Bluetooth Idle + WLAN Idle(2.4G) + USB Cable (Charging from Adapter) + Earphone + Camera(Rear) + Top Antenna		
Remark :	#7 is system simulator signal which can be ignored.		



Site : 03CH02-KS  
 Condition : FCC CLASS-B 3m 02 LF ANT VERTICAL  
 Mode : 5  
 IMEI : 990008950012539 #8

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	31.62	29.01	-10.99	40.00	35.21	25.23	0.60	32.03	---	---	Peak
2	44.85	32.97	-7.03	40.00	44.62	19.80	0.66	32.11	100	0	Peak
3	53.22	28.37	-11.63	40.00	45.13	14.60	0.75	32.11	---	---	Peak
4	196.32	27.35	-16.15	43.50	41.66	15.94	1.43	31.68	---	---	Peak
5	497.40	25.69	-20.31	46.00	30.61	23.03	2.37	30.32	---	---	Peak
6	782.30	27.65	-18.35	46.00	26.82	26.57	2.70	28.44	---	---	Peak
7 *	878.90	48.63			45.90	27.33	3.08	27.68	---	---	Peak
8	2020.00	45.28	-28.72	74.00	43.04	30.36	4.63	32.75	---	---	Peak
9	2344.00	45.64	-28.36	74.00	40.87	31.22	5.09	31.54	---	---	Peak
10	2954.00	46.53	-27.47	74.00	37.20	32.45	5.92	29.04	---	---	Peak
11	3324.00	45.08	-28.92	74.00	35.98	33.28	6.25	30.43	---	---	Peak
12	3768.00	45.82	-28.18	74.00	34.67	34.73	6.59	30.17	---	---	Peak
13	4095.00	46.14	-27.86	74.00	34.66	35.26	7.01	30.79	---	---	Peak



### 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. 20, 2017	Nov. 23, 2017	Apr. 19, 2018	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	Nov. 23, 2017	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	Nov. 23, 2017	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	Nov. 23, 2017	Oct. 11, 2018	Conduction (CO01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Aug. 08, 2017	Nov. 24, 2017	Aug. 07, 2018	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz~44GHz, MAX 30dB	Apr. 18, 2017	Nov. 24, 2017	Apr. 17, 2018	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz~2GHz	Jan. 22, 2017	Nov. 24, 2017	Jan. 21, 2018	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 21, 2017	Nov. 24, 2017	Oct. 20, 2018	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 15, 2017	Nov. 24, 2017	Feb. 14, 2018	Radiation (03CH01-KS)
Amplifier	SONOMA	310N	187289	9kHz~1GHz	Aug. 07, 2017	Nov. 24, 2017	Aug. 06, 2018	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1-26.5GHz Gain 30dB	Oct. 12, 2017	Nov. 24, 2017	Oct. 11, 2018	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35-H G	1887435	18GHz~40GHz	Oct. 12, 2017	Nov. 24, 2017	Oct. 11, 2018	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	61601000247 3	N/A	NCR	Nov. 24, 2017	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Nov. 24, 2017	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Nov. 24, 2017	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% ( $U = 2Uc(y)$ )	2.3dB
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.2dB
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### Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.7dB
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### Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.3dB
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