



FCC Test Report

APPLICANT : Huawei Technologies Co.,Ltd.
EQUIPMENT : LTE CPE
BRAND NAME : HUAWEI
MODEL NAME : B311-520
FCC ID : QISB311-520
STANDARD : 47 CFR Part 15 Subpart B
CLASSIFICATION : Certification

The product was received on Dec. 05, 2018 and testing was completed on Jan. 09, 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.

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Guangdong Province 518055, China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC8D0505	Rev. 01	Initial issue of report	Jan. 18, 2019



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 7.31 dB at 0.38 MHz
3.2	15.109	Radiated Emission	< 15.109 limits	PASS	Under limit 7.80 dB at 34.85 MHz for Quasi-Peak



1. General Description

1.1. Applicant

Huawei Technologies Co.,Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.2. Manufacturer

Huawei Technologies Co.,Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3. Product Feature of Equipment Under Test

Product Feature	
Equipment	LTE CPE
Brand Name	HUAWEI
Model Name	B311-520
FCC ID	QISB311-520
EUT supports Radios application	WCDMA/LTE WLAN 2.4GHz 802.11b/g/n (HT20/HT40)
IMEI Code	Conducted Emission: 867809040001220 Radiated Emission: 867809040002129
HW Version	WL3B311SW06
SW Version	8.0.1.1(H183SP3C00)
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.



1.4. Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	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 66 : 1710.7 MHz ~ 1779.3 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz
Rx Frequency	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 66 : 2110.7 MHz~ 2179.3 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz
Antenna Type	WWAN: Internal Antenna WWAN: 1dBi External Antenna (#1) WWAN 3dBi External Antenna (#2) WLAN : Internal Antenna
Type of Modulation	WCDMA : BPSK HSPA : QPSK DC-HSDPA : 64QAM LTE: QPSK / 16QAM 802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5. Accessories List

Specification of Accessory				
AC Adapter 1	Brand Name	HONOR	Model Name	HW-120100U01/HW-120100E01/ HW-120100B01/HW-120100A01
	Power Rating	I/P: 100 - 240 Vac, 0.5A; O/P: 12Vdc, 1.0A		
AC Adapter 2	Brand Name	Fuhua	Model Name	HW-120100U01/HW-120100E01/ HW-120100B01/HW-120100A01
	Power Rating	I/P: 100 - 240 Vac, 0.5A; O/P: 12Vdc, 1.0A		

1.6. Modification of EUT

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



1.7. 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.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration 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 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.
	03CH04-SZ	CN5019	577730

1.8. 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

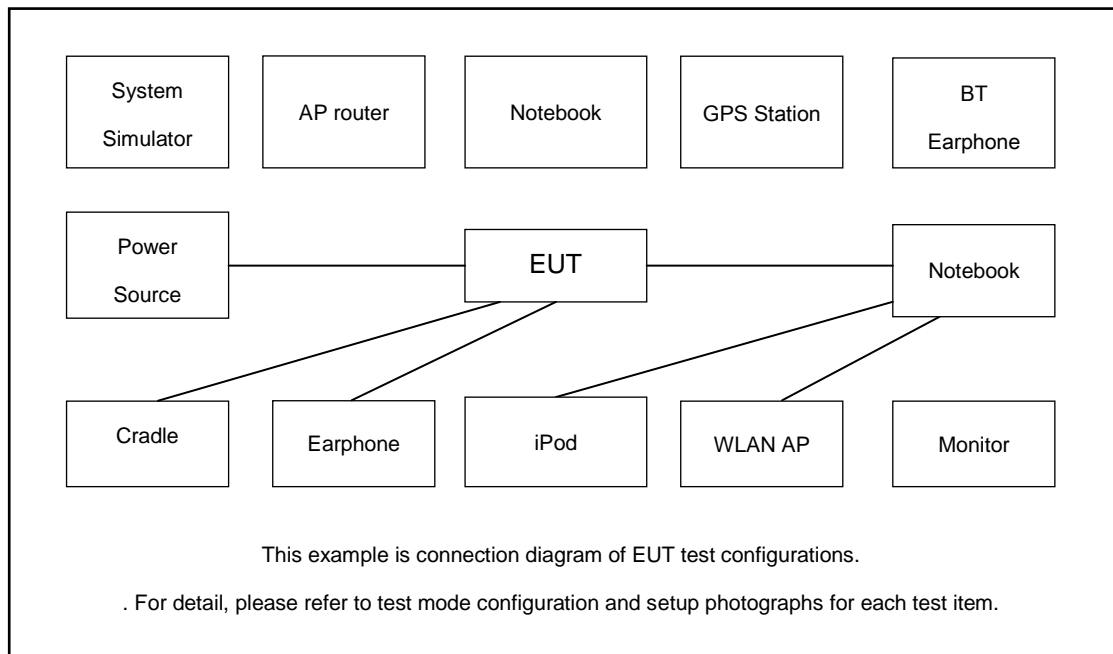
2.1. Test Mode

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: LTE Band 7 Idle(Use External Antenna #1) + Lan Link + RJ11 Link + WLAN Idle(2.4G) + Adapter 1 Mode 2: LTE Band 7 Idle(Use External Antenna #2) + Lan Link + RJ11 Link + WLAN Idle(2.4G) + Adapter 2
Radiated Emission	Mode 1: LTE Band 7 Idle(Use External Antenna #1) + Lan Link + RJ11 Link + WLAN Idle(2.4G) + Adapter 1 Mode 2: LTE Band 7 Idle(Use External Antenna #2) + Lan Link + RJ11 Link + WLAN Idle(2.4G) + Adapter 2
Remark: 1. The worst case of AC Conducted Emission is mode 2; only the test data of this mode is reported. 2. The worst case of Radiated Emission is mode 2; only the test data of this mode is reported.	

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.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	LCD Monitor	DELL	P2157QT	N/A	N/A	N/A
5.	iPod	Apple	MC69029/A	N/A	N/A	N/A
6.	Telephone exchange	POE Telephone exchange	DGS-1008P	N/A	N/A	Unshielded,1.8m
7.	Telephone	N/A	N/A	N/A	N/A	N/A
8.	Telephone	BOSSINI	HDC133TSDL	Fcc DoC	N/A	N/A
9.	LAN cable	Luxshare	LUX20150329001	N/A	shielded,1.0m	N/A
10.	LAN cable	Broad	WA0003	N/A	shielded,1.0m	N/A
11.	Telephone cable	Luxshare	LUX20170721001	N/A	shielded,1.5m	N/A
12.	Telephone cable	Broad	WA0015	N/A	shielded,1.5m	N/A
13.	Telephone cable	Comlink	A0603883039	N/A	shielded,1.5m	N/A
14.	Phone	MOTO	N/A	N/A	N/A	N/A



2.4. EUT Operation Test Setup

The EUT perform the following functions:

1. RJ-45 Link with Notebook and execute "Ping IP" function.
2. RJ-11 Link with telephone.
3. LTE Idle with Base station.
4. WIFI Idle with a Notebook.



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.

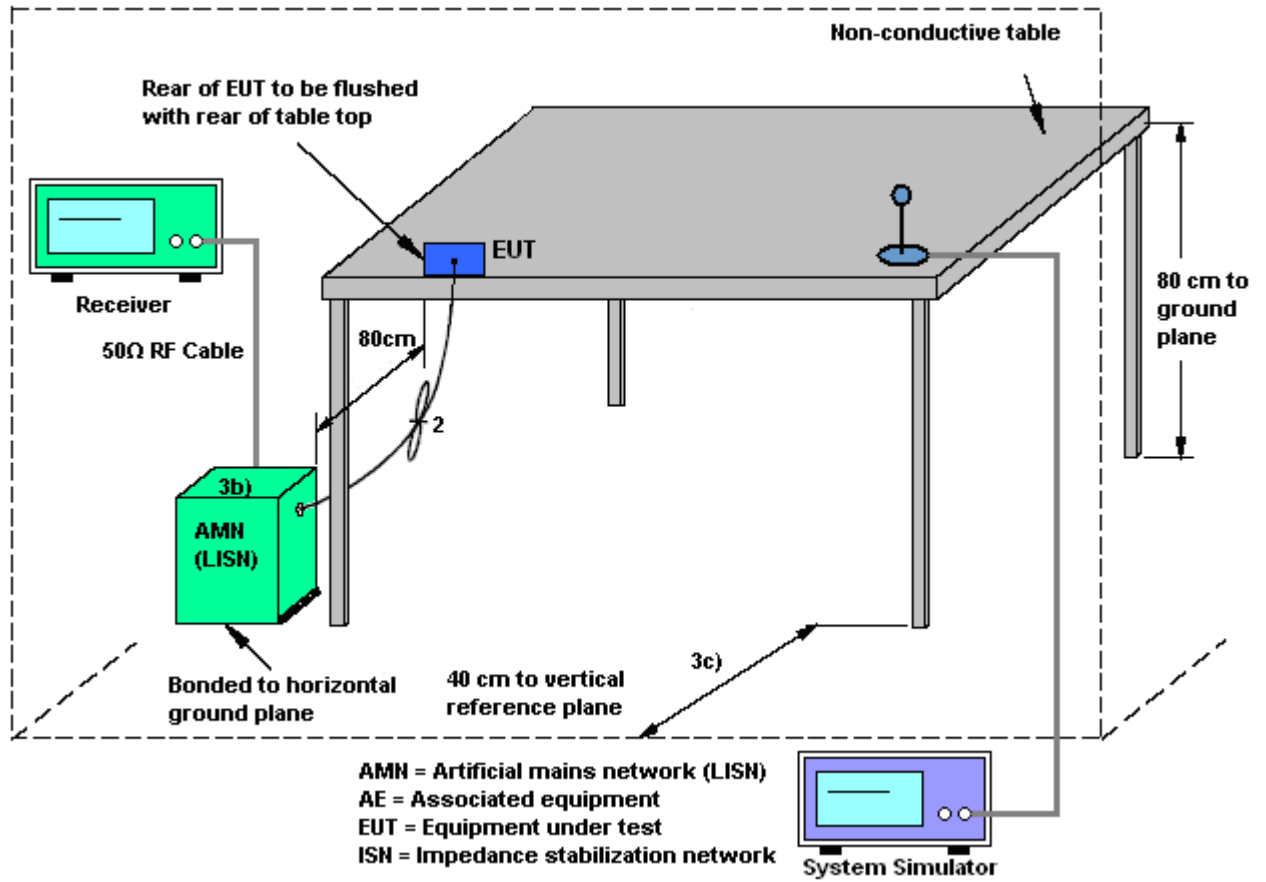
3.1.2 Measuring Instruments

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

3.1.3 Test Procedure

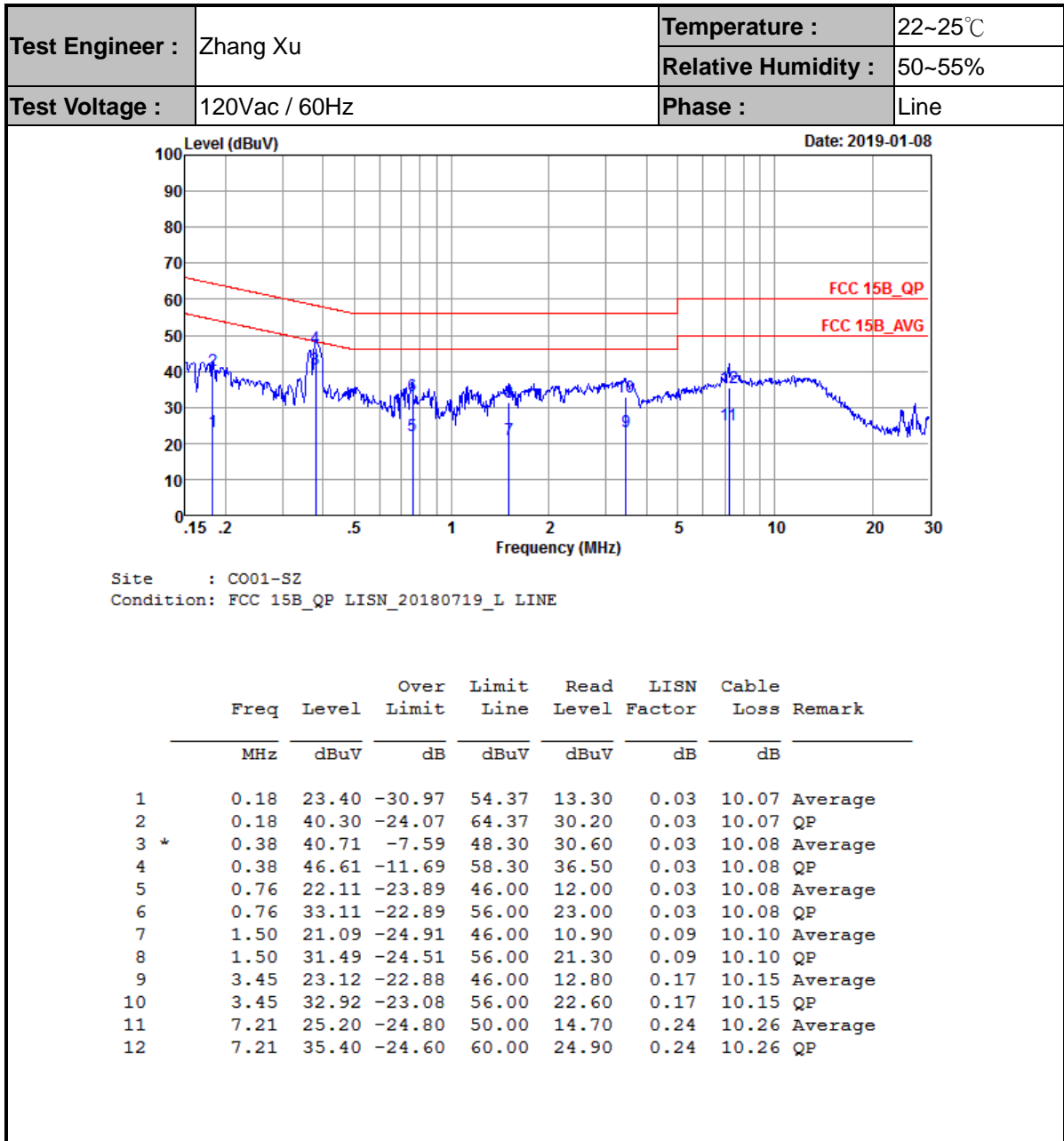
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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



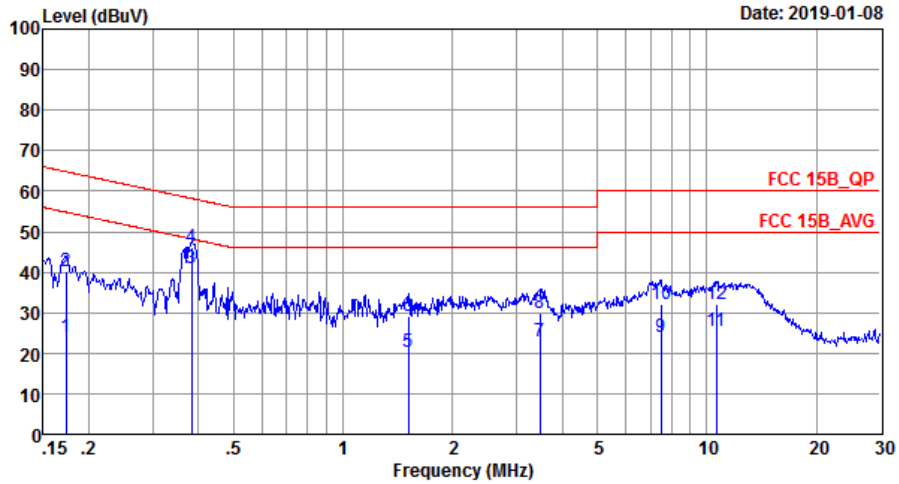


3.1.5 Test Result of AC Conducted Emission





Test Engineer :	Zhang Xu	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-SZ
 Condition: FCC 15B_QP LISN_20180719_N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.17	23.90	-30.91	54.81	13.80	0.03	10.07	Average
2	0.17	40.19	-24.62	64.81	30.09	0.03	10.07	QP
3 *	0.38	40.90	-7.31	48.21	30.80	0.02	10.08	Average
4	0.38	46.10	-12.11	58.21	36.00	0.02	10.08	QP
5	1.51	20.15	-25.85	46.00	10.00	0.05	10.10	Average
6	1.51	29.05	-26.95	56.00	18.90	0.05	10.10	QP
7	3.47	22.99	-23.01	46.00	12.80	0.04	10.15	Average
8	3.47	29.99	-26.01	56.00	19.80	0.04	10.15	QP
9	7.49	23.95	-26.05	50.00	13.59	0.09	10.27	Average
10	7.49	32.25	-27.75	60.00	21.89	0.09	10.27	QP
11	10.62	25.63	-24.37	50.00	15.10	0.18	10.35	Average
12	10.62	32.13	-27.87	60.00	21.60	0.18	10.35	QP



3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the 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

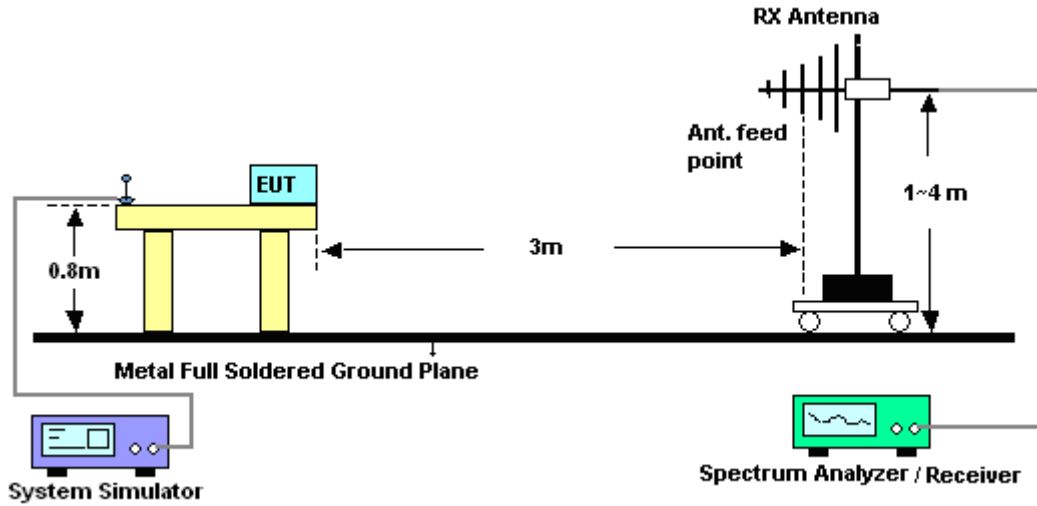
The measuring equipment is listed in the section 4 of this test report.

3.2.3. Test Procedures

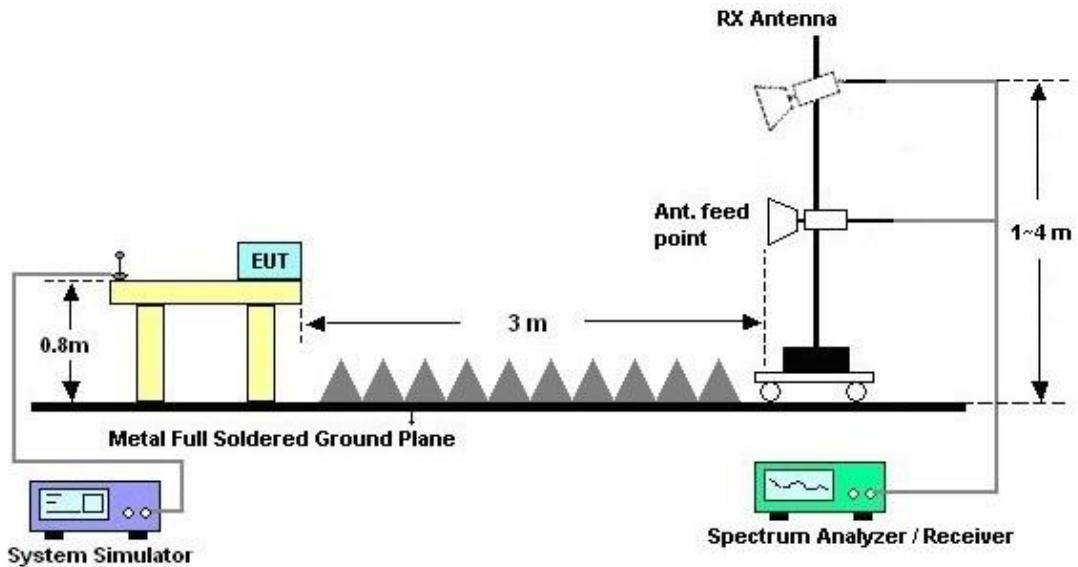
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna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



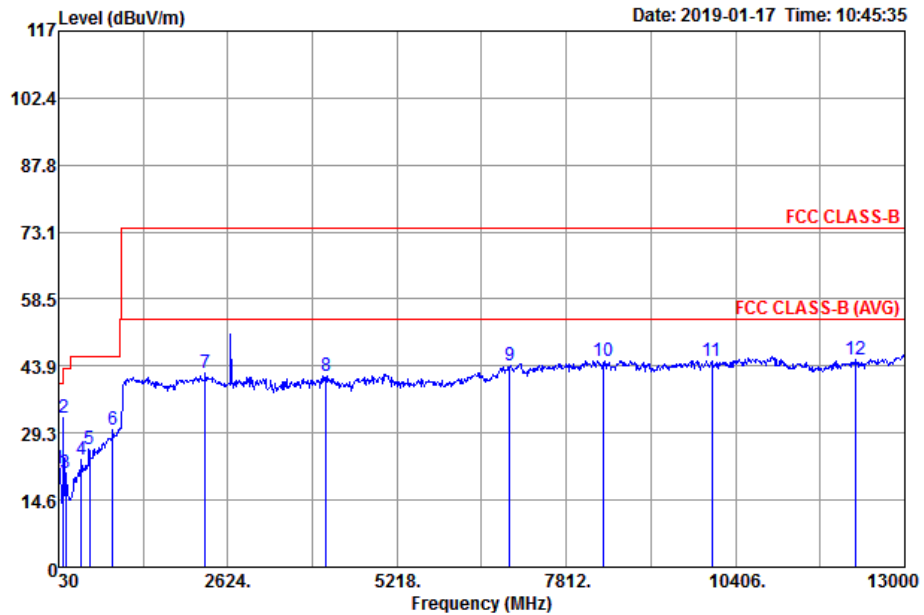
For radiated emissions above 1GHz





3.2.5. Test Result of Radiated Emission

Test Engineer :	Barry Chang	Temperature :	24~25°C
		Relative Humidity :	48~49%
Test Distance :	3m	Polarization :	Horizontal

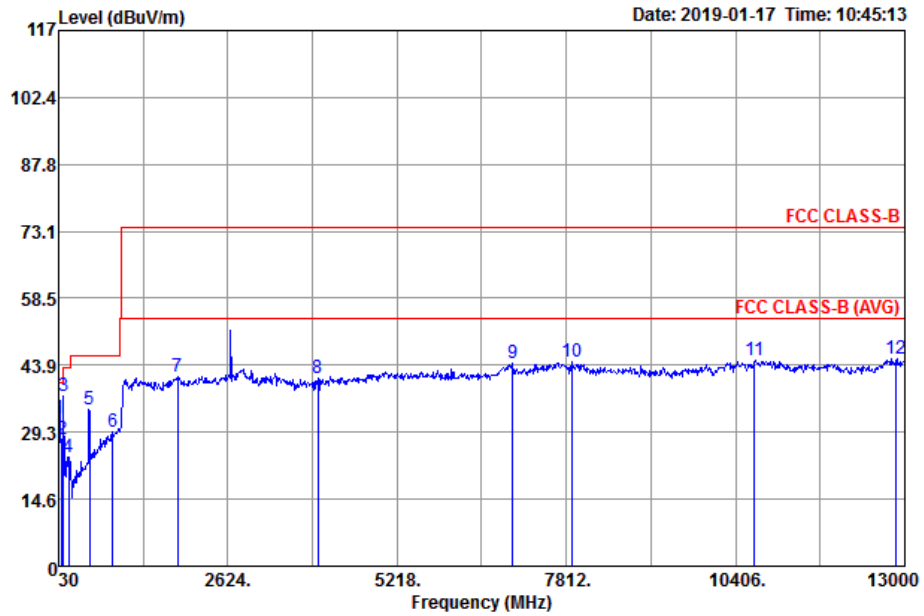


Site : 03CH04-SZ
 Condition : FCC CLASS-B 3m LF_ANT41909_18 HORIZONTAL

	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	34.85	21.46	-18.54	40.00	30.63	22.45	0.36	31.98	---	---	Peak
2	99.84	32.73	-10.77	43.50	47.29	16.10	1.06	31.72	189	137	Peak
3	137.67	20.54	-22.96	43.50	33.42	17.49	1.22	31.59	---	---	Peak
4	375.32	23.32	-22.68	46.00	31.17	21.22	2.13	31.20	---	---	Peak
5	500.45	25.82	-20.18	46.00	30.72	23.90	2.43	31.23	---	---	Peak
6	864.20	30.03	-15.97	46.00	29.10	28.82	3.29	31.18	---	---	Peak
7	2278.00	42.22	-31.78	74.00	67.81	27.83	4.61	58.03	---	---	Peak
8	4136.00	41.79	-32.21	74.00	65.97	30.22	4.97	59.37	---	---	Peak
9	6940.00	44.12	-29.88	74.00	60.34	35.46	7.10	58.78	---	---	Peak
10	8390.00	45.07	-28.93	74.00	55.94	37.28	7.20	55.35	---	---	Peak
11	10046.00	45.13	-28.87	74.00	53.74	37.95	9.16	55.72	---	---	Peak
12	12244.00	45.30	-28.70	74.00	51.61	39.44	9.68	55.43	100	76	Peak



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



Site : 03CH04-SZ
 Condition : FCC CLASS-B 3m LF_ANT41909_18 VERTICAL

	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	34.85	32.20	-7.80	40.00	41.37	22.45	0.36	31.98	167	302 QP
2	78.50	27.72	-12.28	40.00	45.48	13.25	0.84	31.85	---	---
3	99.84	37.28	-6.22	43.50	51.84	16.10	1.06	31.72	---	---
4	188.11	23.76	-19.74	43.50	38.61	15.04	1.49	31.38	---	---
5	500.45	34.21	-11.79	46.00	39.11	23.90	2.43	31.23	---	---
6	853.53	29.48	-16.52	46.00	28.64	28.77	3.26	31.19	---	---
7	1858.00	41.32	-32.68	74.00	70.17	25.40	4.17	58.42	---	---
8	4004.00	40.92	-33.08	74.00	65.81	30.02	4.66	59.57	---	---
9	6992.00	44.48	-29.52	74.00	60.49	35.64	7.22	58.87	---	---
10	7902.00	44.51	-29.49	74.00	55.83	37.28	7.43	56.03	---	---
11	10700.00	44.88	-29.12	74.00	52.98	38.56	9.32	55.98	---	---
12	12874.00	45.28	-28.72	74.00	53.24	39.82	9.85	57.63	100	175 Peak



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 23, 2018	Jan. 08, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Oct. 18, 2018	Jan. 08, 2019	Oct. 17, 2019	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Dec. 23, 2018	Jan. 08, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 18, 2018	Jan. 08, 2019	Jul. 17, 2019	Conduction (CO01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 19, 2018	Jan. 09, 2019	Apr. 18, 2019	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 19, 2018	Jan. 09, 2019	Apr. 18, 2019	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Aug. 28, 2018	Jan. 09, 2019	Aug. 27, 2019	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	Feb. 07, 2018	Jan. 09, 2019	Feb. 06, 2019	Radiation (03CH04-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 18, 2018	Jan. 09, 2019	Oct. 17, 2019	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1989346	1GHz~18GHz	Jul. 30, 2018	Jan. 09, 2019	Jul. 29, 2019	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Jan. 09, 2019	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 09, 2019	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 09, 2019	NCR	Radiation (03CH04-SZ)

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% ($U = 2Uc(y)$)	2.6dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

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