FCC Test Report

APPLICANT	:	**Ness Corporation**
EQUIPMENT	:	**Hub**
BRAND NAME	:	**Mezzo**
MODEL NAME	:	**Mezzo-915**
FCC ID	:	**O2K-MEZZO915LTE**
STANDARD	:	**FCC 47 CFR FCC Part 15 Subpart B**
CLASSIFICATION	:	**Certification**

The product was received on Dec. 14, 2017 and testing was completed on Jan. 10, 2018. 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.

NVLAP TESTING
NVLAP LAB CODE 600156-0

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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC7D1404	Rev. 01	Initial issue of report	Feb. 14, 2018

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 17.65 dB at 0.41 MHz
3.2	15.109	Radiated Emission	< 15.109 limits	PASS	Under limit 0.14 dB at 428.67 MHz for Quasi-Peak

1. General Description

1.1. Applicant

Ness Corporation
4/167 Prospect Hwy, SEVEN HILLS, NSW 2147 AUSTRALIA

1.2. Manufacturer

Ness Corporation
4/167 Prospect Hwy, SEVEN HILLS, NSW 2147 AUSTRALIA

1.3. Product Feature of Equipment Under Test

Product Feature	
Equipment	Hub
Brand Name	Mezzo
Model Name	Mezzo-915
FCC ID	O2K-MEZZO915LTE
EUT supports Radios application	WCDMA/HSDPA/LTE/SRD/Z-wave WLAN 2.4GHz 802.11b/g/n HT20/HT40
HW Version	2
SW Version	00.02.17
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 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 802.11b/g/n: 2412 MHz ~ 2462 MHz Z-wave: 908.4 MHz ~ 916 MHz SRD: 903 MHz ~ 927 MHz
Rx Frequency	WCDMA Band V: 871.4 MHz ~ 891.6 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 802.11b/g/n: 2412 MHz ~ 2462 MHz Z-wave: 908.4 MHz ~ 916 MHz SRD: 903 MHz ~ 927 MHz
Antenna Type	WWAN : Fixed Internal Antenna WLAN : Fixed Internal Antenna Z-wave: Fixed Internal Antenna SRD: Fixed Internal Antenna
Type of Modulation	WCDMA: BPSK (Uplink) HSDPA: QPSK LTE: QPSK / 16QAM 802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Z-wave: 2FSK/2GFSK SRD: GFSK

1.5. Modification of EUT

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

1.6. Test Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No are CN5018 and CN5019.

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 Test Firm Registration No.**
	CO01-SZ	251365

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 Test Firm Registration No.**
	03CH01-SZ	577730

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

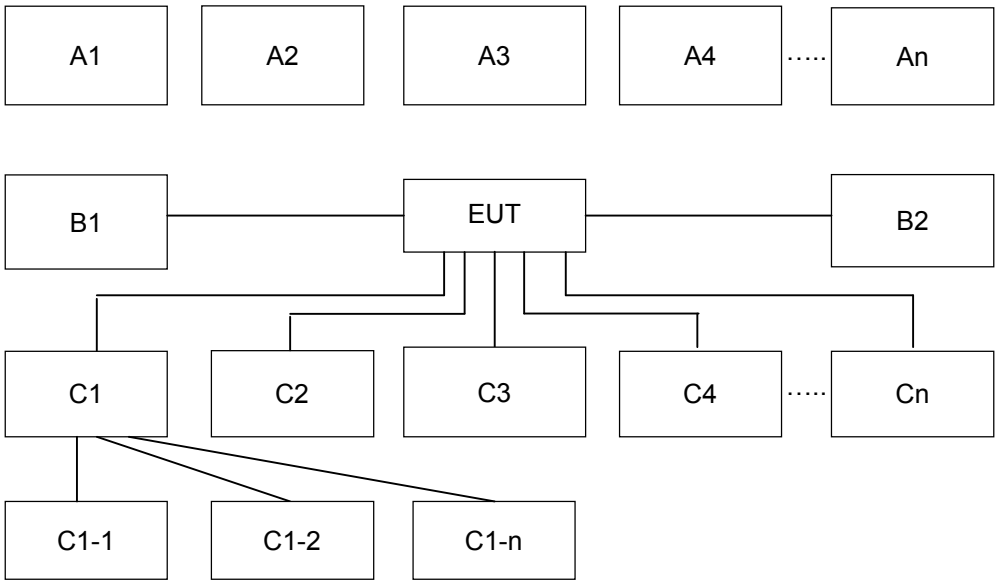
2.1. Test Mode

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 : WCDMA Band V Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Adapter Mode 2 : WCDMA Band II Idle + WLAN Idle (2.4G) + SRD TX + Power From Adapter
Radiated Emissions < 1GHz	Mode 1 : WCDMA Band V Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Adapter Mode 2 : WCDMA Band II Idle + WLAN Idle (2.4G) + SRD TX + Power From Adapter Mode 3 : LTE Band 13 Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Battery
Radiated Emissions ≥ 1GHz	Mode 1 : WCDMA Band V Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Adapter
Remark: The worst case of AC is mode 1, only the test data of this mode was reported. The worst case of RE < 1G is mode 1, only the test data of this mode was reported.	

2.2. Connection Diagram of Test System



Conduction Test Setup									
No.	Wireless Station	Connection Type	Test Mode						
			1	2	-	-	-	-	-	-
A1	System Simulator	GSM/ WCDMA/LTE	X	X	-	-	-	-	-	-
A2	Mobile Phone	WiFi	X	X	-	-	-	-	-	-
No.	**Power Source**	**Connection Type**	**1**	**2**	-	-	-	-	-	-
B1	AC : 120V/60Hz	AC Power Cable	X	X	-	-	-	-	-	-

Radiation Test Setup									
No.	Wireless Station	Connection Type	Test Mode						
			1	2	3	-	-	-	-	-
A1	System Simulator	WCDMA/LTE	X	X	X	-	-	-	-	-
A2	Mobile Phone	WiFi	X	X	X	-	-	-	-	-
No.	**Power Source**	**Connection Type**	**1**	**2**	**3**	-	-	-	-	-
B1	AC : 120V/60Hz	AC Power Cable	X	X	-	-	-	-	-	-

2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station(LTE)	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	System Simulator	R&S	CMU 500	N/A	N/A	Unshielded, 1.8 m
3.	Mobile phone	iPhone 6S	A1700	ATS01SZ0039	N/A	N/A

2.4. EUT Operation Test Setup

The EUT was WLAN Idle with mobile phone, and the Z-wave and SRD function were performed during the test.

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.

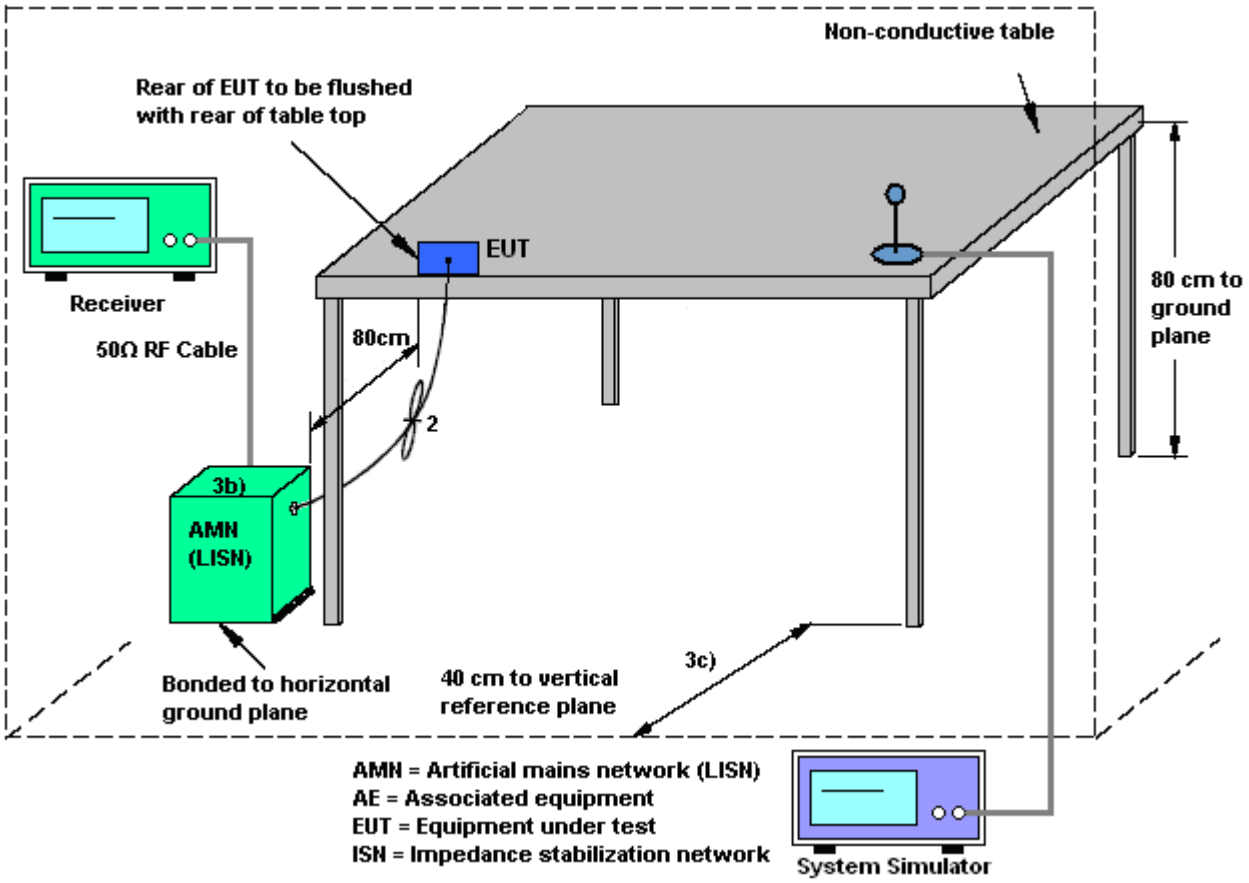
3.1.2 Measuring Instruments

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

3.1.3 Test Procedure

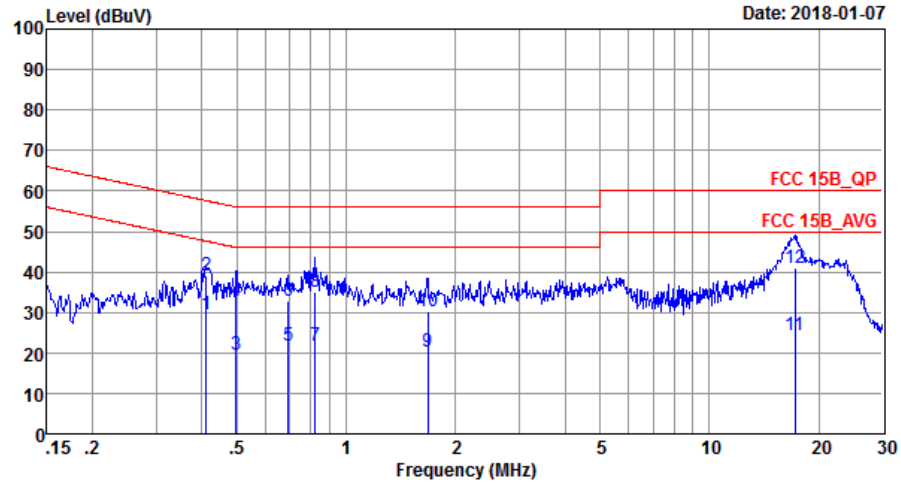
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.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

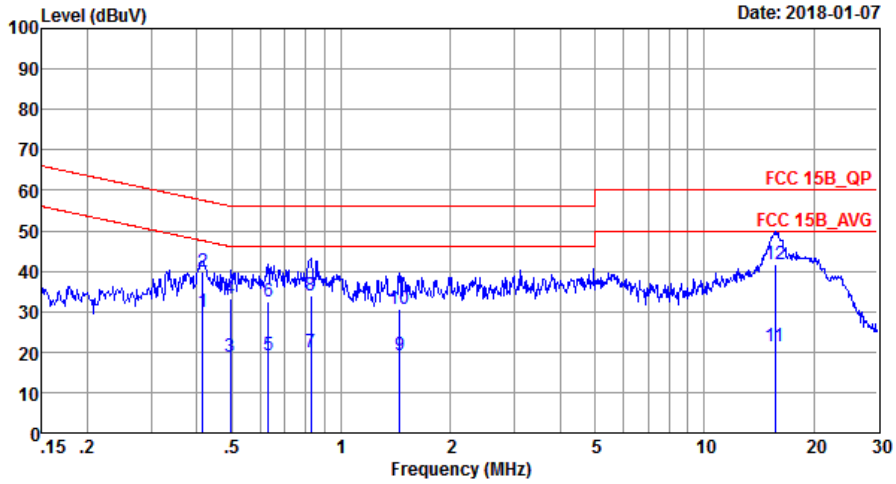
Test Mode :	Mode 1	Temperature :	24~25℃
Test Engineer :	Vikki Peng	Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Adapter		




```
Site      : CO01-SZ
Condition: FCC 15B_QP LISN_20170907_L LINE
Project   : 7D1404
Mode      : Mode 1
```

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.41	29.51	-18.08	47.59	19.40	0.03	10.08	Average
2		0.41	39.01	-18.58	57.59	28.90	0.03	10.08	QP
3		0.50	19.50	-26.55	46.05	9.40	0.02	10.08	Average
4		0.50	32.80	-23.25	56.05	22.70	0.02	10.08	QP
5		0.69	21.80	-24.20	46.00	11.70	0.02	10.08	Average
6		0.69	32.80	-23.20	56.00	22.70	0.02	10.08	QP
7		0.82	21.63	-24.37	46.00	11.50	0.04	10.09	Average
8		0.82	35.03	-20.97	56.00	24.90	0.04	10.09	QP
9		1.68	20.30	-25.70	46.00	10.10	0.10	10.10	Average
10		1.68	30.10	-25.90	56.00	19.90	0.10	10.10	QP
11		17.20	24.46	-25.54	50.00	13.20	0.88	10.38	Average
12		17.20	41.06	-18.94	60.00	29.80	0.88	10.38	QP

Test Mode :	Mode 1	Temperature :	24~25℃
Test Engineer :	Vikki Peng	Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Adapter		



Site : CO01-SZ
Condition: FCC 15B_QP LISN_20170907_N NEUTRAL
Project : 7D1404
Mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.41	29.90	-17.65	47.55	19.80	0.02	10.08	Average
2		0.41	39.70	-17.85	57.55	29.60	0.02	10.08	QP
3		0.49	18.70	-27.40	46.10	8.60	0.02	10.08	Average
4		0.49	33.10	-23.00	56.10	23.00	0.02	10.08	QP
5		0.63	19.20	-26.80	46.00	9.10	0.02	10.08	Average
6		0.63	32.30	-23.70	56.00	22.20	0.02	10.08	QP
7		0.83	19.82	-26.18	46.00	9.70	0.03	10.09	Average
8		0.83	34.02	-21.98	56.00	23.90	0.03	10.09	QP
9		1.45	19.05	-26.95	46.00	8.90	0.05	10.10	Average
10		1.45	30.65	-25.35	56.00	20.50	0.05	10.10	QP
11		15.63	21.57	-28.43	50.00	10.80	0.37	10.40	Average
12		15.63	41.67	-18.33	60.00	30.90	0.37	10.40	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 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

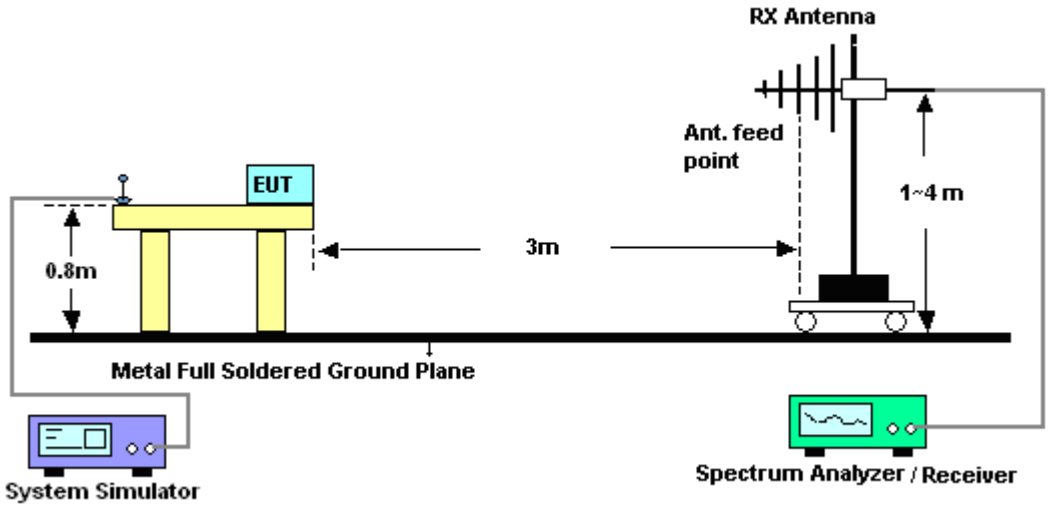
The measuring equipment is listed in the section 4 of this test report.

3.2.3. Test Procedures

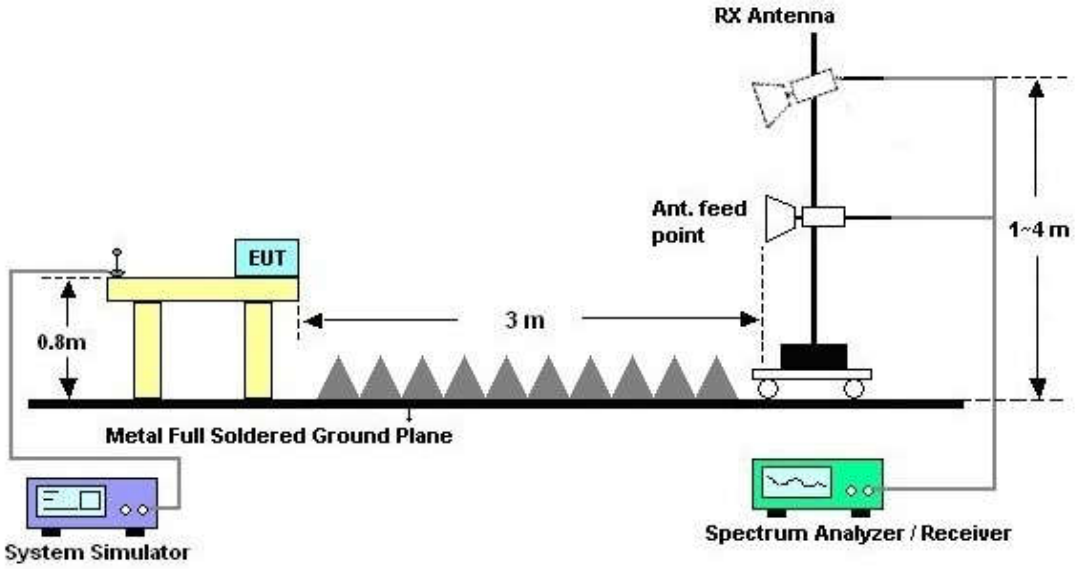
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna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

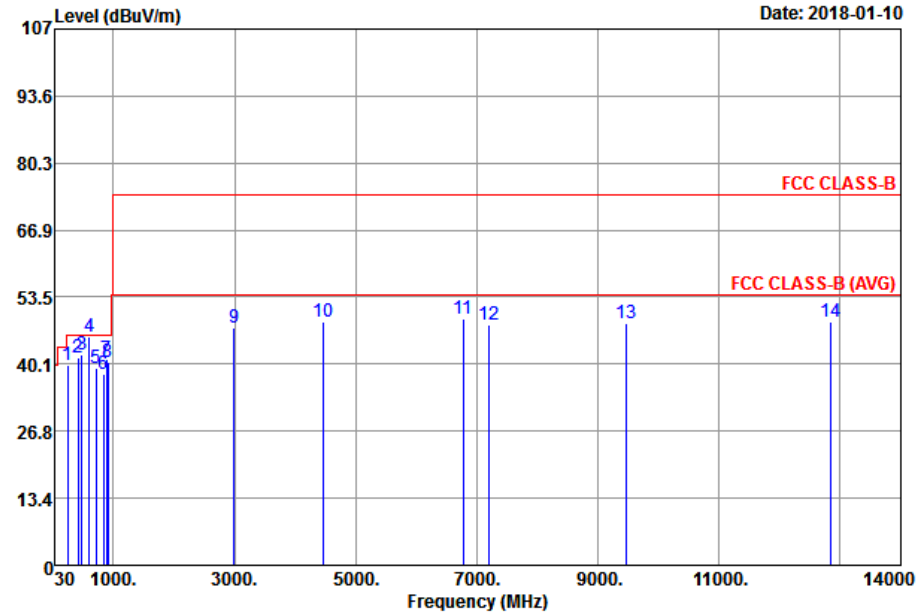


For radiated emissions above 1GHz



3.2.5. Test Result of Radiated Emission

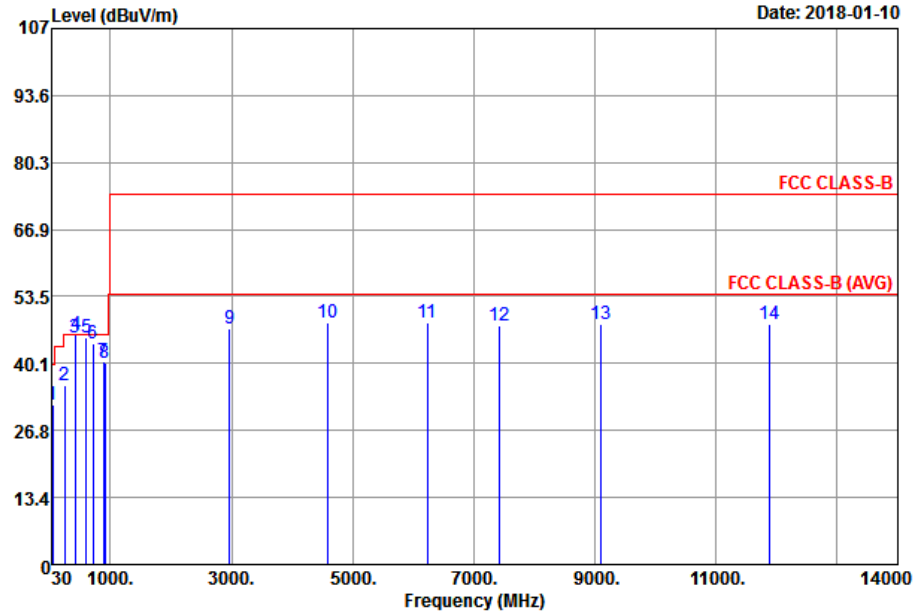
Test Mode :	Mode 1	**Temperature :**	24~25℃
Test Engineer :	Vikki Peng	**Relative Humidity :**	48~49%
Test Distance :	3m	**Polarization :**	Horizontal
Function Type :	WCDMA Band V Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Adapter		
Remark :	#7 is system simulator signal which can be ignored. #8 is Z-wave RF signal which can be ignored		



Site : 03CH01-SZ
Condition : FCC CLASS-B 3m LF_ANT(35407)_6 HORIZONTAL
Project : 7D1404
Mode : Mode 1
SN : 1712041504000326
Plane : Y

	Freq	Level	Over Limit	Limit Line	Read 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	250.19	39.80	-6.20	46.00	48.54	20.40	1.86	31.00	---	---	Peak
2	420.91	41.50	-4.50	46.00	44.70	25.43	2.47	31.10	---	---	Peak
3	480.08	42.10	-3.90	46.00	45.16	25.39	2.65	31.10	---	---	Peak
4	600.36	45.65	-0.35	46.00	47.04	26.80	3.01	31.20	100	46	QP
5	719.67	39.48	-6.52	46.00	40.50	26.88	3.34	31.24	---	---	Peak
6	839.95	38.08	-7.92	46.00	38.83	26.88	3.67	31.30	---	---	Peak
7	881.40	41.16			40.80	27.89	3.77	31.30	---	---	Peak
8	916.00	40.66			39.29	28.81	3.86	31.30	---	---	Peak
9	2988.00	47.51	-26.49	74.00	63.28	32.64	8.91	57.32	---	---	Peak
10	4468.00	48.69	-25.31	74.00	63.08	33.86	10.54	58.79	---	---	Peak
11	6770.00	49.05	-24.95	74.00	56.77	34.98	15.80	58.50	100	0	Peak
12	7212.00	47.99	-26.01	74.00	57.42	35.27	13.55	58.25	---	---	Peak
13	9462.00	48.26	-25.74	74.00	54.05	36.39	13.04	55.22	---	---	Peak
14	12836.00	48.64	-25.36	74.00	52.37	38.67	15.11	57.51	---	---	Peak

Test Mode :	Mode 1	Temperature :	24~25℃
Test Engineer :	Vikki Peng	Relative Humidity :	48~49%
Test Distance :	3m	Polarization :	Vertical
Function Type :	WCDMA Band V Idle + WLAN Idle (2.4G) + Z-wave TX + Power From Adapter		
Remark :	#7 is system simulator signal which can be ignored. #8 is Z-wave RF signal which can be ignored		



Site : 03CH01-SZ
Condition : FCC CLASS-B 3m LF_ANT(35407)_6 VERTICAL
Project : 7D1404
Mode : Mode 1
SN : 1712041504000326
Plane : Y

	Freq	Level	Over Limit	Limit Line	Read 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	42.61	31.97	-8.03	40.00	42.54	20.72	0.41	31.70	---	---	Peak
2	250.19	35.73	-10.27	46.00	44.47	20.40	1.86	31.00	---	---	Peak
3	414.12	45.28	-0.72	46.00	48.81	25.13	2.44	31.10	100	164	Peak
4	428.67	45.86	-0.14	46.00	48.70	25.77	2.49	31.10	100	41	QP
5	600.36	45.41	-0.59	46.00	46.80	26.80	3.01	31.20	100	4	QP
6	719.67	44.07	-1.93	46.00	45.09	26.88	3.34	31.24	---	---	Peak
7	881.40	40.56			40.20	27.89	3.77	31.30	---	---	Peak
8	916.00	40.20			38.83	28.81	3.86	31.30	---	---	Peak
9	2966.00	47.12	-26.88	74.00	63.25	32.58	8.62	57.33	---	---	Peak
10	4584.00	48.23	-25.77	74.00	62.31	33.87	10.64	58.59	---	---	Peak
11	6236.00	48.37	-25.63	74.00	57.18	34.67	14.12	57.60	100	0	Peak
12	7430.00	47.83	-26.17	74.00	56.63	35.68	13.06	57.54	---	---	Peak
13	9104.00	48.04	-25.96	74.00	53.73	36.24	12.96	54.89	---	---	Peak
14	11872.00	47.99	-26.01	74.00	49.49	38.31	14.97	54.78	---	---	Peak

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Apr. 20, 2017	Jan. 10, 2018	Apr. 19, 2018	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	23188	30MHz-2GHz	Apr. 25, 2017	Jan. 10, 2018	Apr. 24, 2018	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	119436	1GHz~18GHz	Jul. 28, 2017	Jan. 10, 2018	Jul. 27, 2018	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 20, 2017	Jan. 10, 2018	Apr.19, 2018	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1707137	1GHz~18GHz	Oct.19, 2017	Jan. 10, 2018	Oct 18, 2018	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jan. 10, 2018	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 10, 2018	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 10, 2018	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	Jan. 07, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	Jan. 07, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov.01, 2017	Jan. 07, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 19, 2017	Jan. 07, 2018	Jul. 18, 2018	Conduction (CO01-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))	2.6 dB

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

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

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

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