FCC RF Test Report

APPLICANT	:	ZTE CORPORATION
EQUIPMENT	:	LTE uFi
BRAND NAME	:	ZTE
MODEL NAME	:	MF97B_T
FCC ID	:	SRQ-MF97B-T
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was completed and tested on Mar. 07, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures 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.

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APPENDIX A. CONDUCTED TEST RESULTS

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4O2101-02E	Rev. 01	This is a variant product of MF97B_T. The product change description could be referred to Appendix D. The test cases were performed on original report which can be referred to Sporton Report Number FR4O2101E with FCC ID: SRQ-MF97B. Based on the original test report, Conducted power, Conducted of WIFI 5GHz 802. 11n HT40 and radiated spurious emissions were full tested for the differences.	Mar. 16, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm/MHz &15.209(a)	Pass	Under limit 5.22 dB at 30.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 15.81 dB at 0.170 MHz
3.6	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

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 Feature of Equipment Under Test

Product Feature	
Equipment	LTE uFi
Brand Name	ZTE
Model Name	MF97B_T
FCC ID	SRQ-MF97B-T
EUT supports Radios application	WCDMA/HSPA/DC-HSDPA /HSPA+(16QAM uplink is not supported)/LTE/ WLAN 2.4GHz 802. 11b/g/n HT20/HT40/ WLAN 5GHz 802. 11n HT20/HT40/ Bluetooth v2.1 + EDR/Bluetooth v4.0 LE
HW Version	d96C
SW Version	SPRO2BV1.0.0B01
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

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	802.11n HT20 : 13.26 dBm / 0.0212 W 802.11n HT40 : 11.91 dBm / 0.0155 W
99% Occupied Bandwidth	802.11n HT20 : 19.05 MHz 802.11n HT40 : 36.80 MHz
Type of Modulation	802.11n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
Antenna Type / Gain	Chain Port 0 : IFA Antenna with gain 2.1 dBi Chain Port 1 : IFA Antenna with gain 2.1 dBi
Antenna Function Description	

	Chain Port 0	Chain Port 1
802.11n SISO	V	V
802.11n MIMO	V	V

1.5 Modification of EUT

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

1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.	
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958	
Test Site No.	**Sporton Site No.**	
	TH01-KS	CO01-KS

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Registration No.**
	03CH01-SZ	831040

Note: The test site complies with ANSI C63.4 2009 requirement.

1.7 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5745 ~ 5805 MHz Band 4 (U-NII-3)	149	5745	**159**	**5795**
	151	**5755**	161	5805
	153	5765	165	5825
	157	5785		

Note: The above Frequency and Channel in boldface were 802.11n HT40.

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

WLAN 5GHz 802.11n-HT20 Output Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 149	5745	0	10.46	CH 165	11.57	11.54	11.62	11.64	11.59	11.61	11.65
CH 157	5785	0	10.90								
CH 165	5825	0	**11.66**								
CH 149	5745	1	10.22	CH 165	10.21	10.28	10.48	10.51	10.54	10.50	10.57
CH 157	5785	1	9.99								
CH 165	5825	1	**10.58**								
CH 149	5745	0+1(0)	**9.76**	CH 149	9.53	9.48	9.59	9.61	9.63	9.67	9.70
CH 157	5785	0+1(0)	9.65								
CH 165	5825	0+1(0)	9.63								
CH 149	5745	0+1(1)	**10.69**	CH 149	10.55	10.48	10.61	10.63	10.62	10.65	10.67
CH 157	5785	0+1(1)	9.99								
CH 165	5825	0+1(1)	10.29								
CH 149	5745	0+1	**13.26**	CH 149	13.08	13.02	13.14	13.16	13.16	13.20	13.22
CH 157	5785	0+1	12.83								
CH 165	5825	0+1	12.98								

WLAN 5GHz 802.11n-HT40 Output Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 151	5755	0	**9.01**	CH 151	8.96	8.95	9.00	8.98	8.97	8.94	8.92
CH 159	5795	0	8.16								
CH 151	5755	1	**9.71**	CH 151	9.61	9.57	9.60	9.64	9.67	9.69	9.70
CH 159	5795	1	9.23								
CH 151	5755	0+1(0)	**7.97**	CH 151	7.81	7.93	7.92	7.96	7.91	7.95	7.94
CH 159	5795	0+1(0)	7.84								
CH 151	5755	0+1(1)	**9.66**	CH 151	9.54	9.48	9.63	9.64	9.65	9.62	9.60
CH 159	5795	0+1(1)	9.17								
CH 151	5755	0+1	**11.91**	CH 151	11.77	11.79	11.87	11.89	11.88	11.88	11.86
CH 159	5795	0+1	11.57								

Note: Chain Port 0+1 is a calculated result from sum of the power Chain Port 0+1(0) and Chain Port 0+1(1).

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

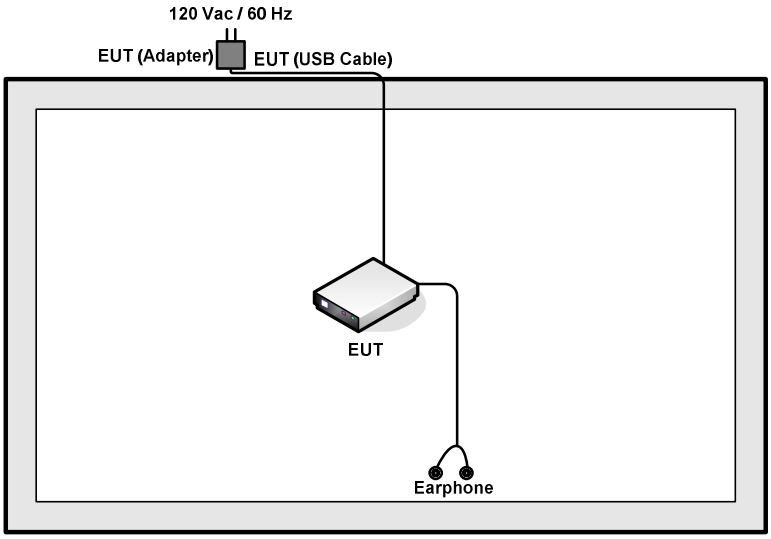
Modulation	Data Rate
802.11n HT20	MCS0
802.11n HT40	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (5G) Link + Earphone + USB Cable (Charging from Adapter)
Remark: For Radiated Test Cases, The tests were performance with Adapter, Earphone and USB Cable.	

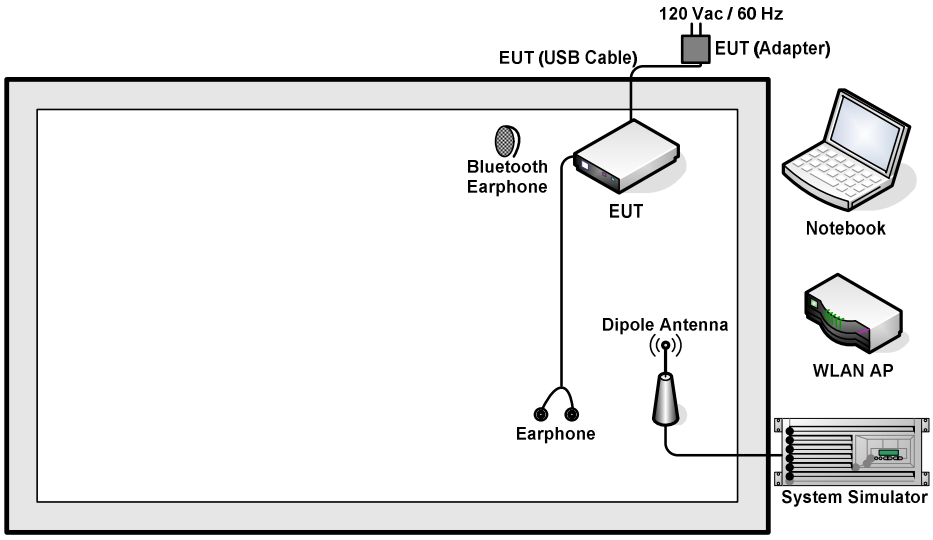
Ch. #		Band IV：5745-5805 MHz	
		802.11n HT20	802.11n HT40
L	Low	149	151
M	Middle	157	-
H	High	165	159

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 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.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
3.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
4.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
5.	Earphone	Lenovo	SH100	N/A	Unshielded, 1.2 m	N/A
6.	Earphone	Apple	MC690ZP/A	N/A	Shielded, 1.0 m	N/A
7.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 7.5 dB.

Offset (dB) = RF cable loss(dB).

= 7.5 (dB)

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

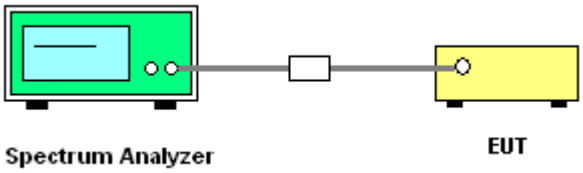
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

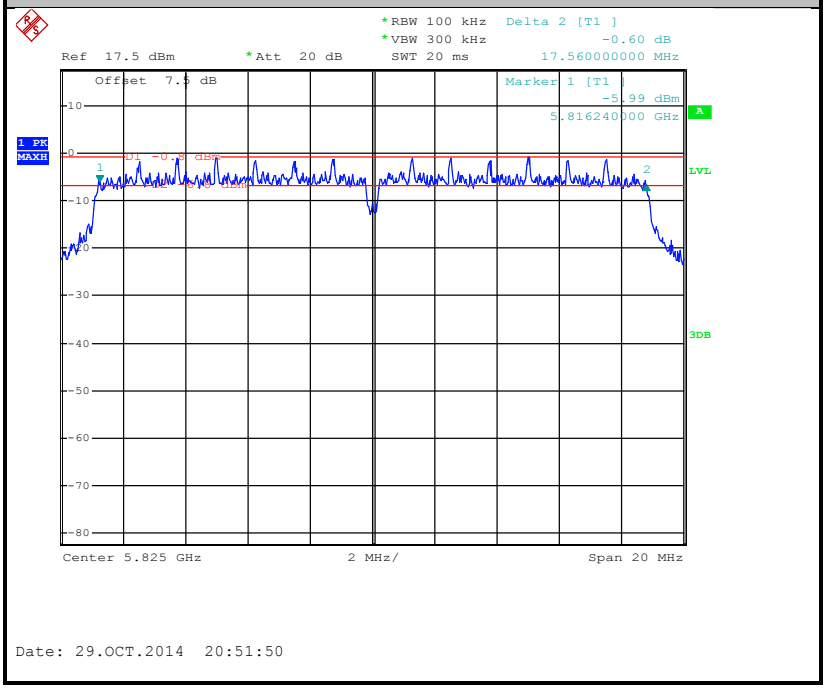
3.1.4 Test Setup



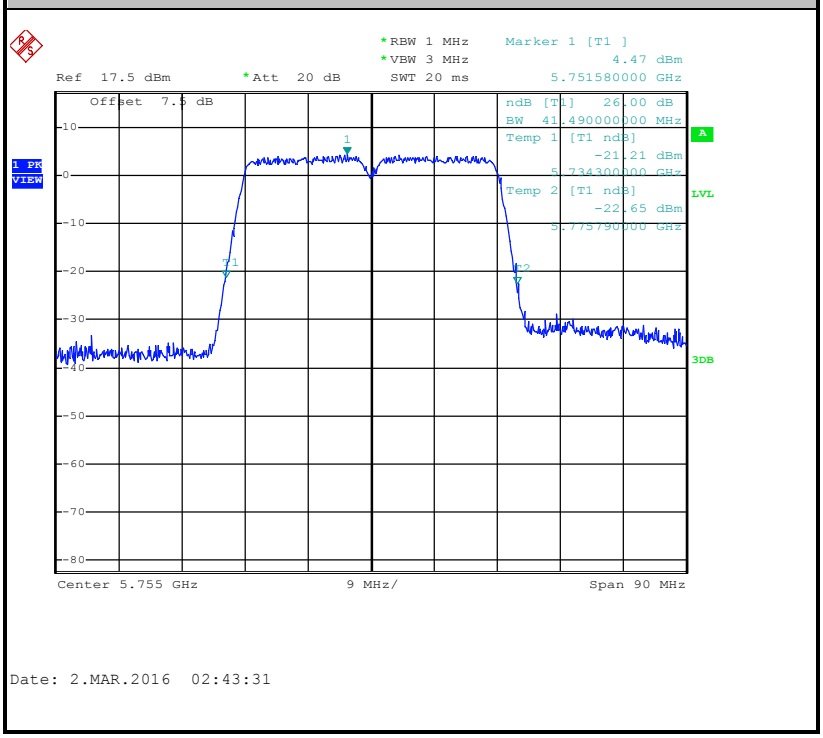
3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

Please refer to Appendix A.

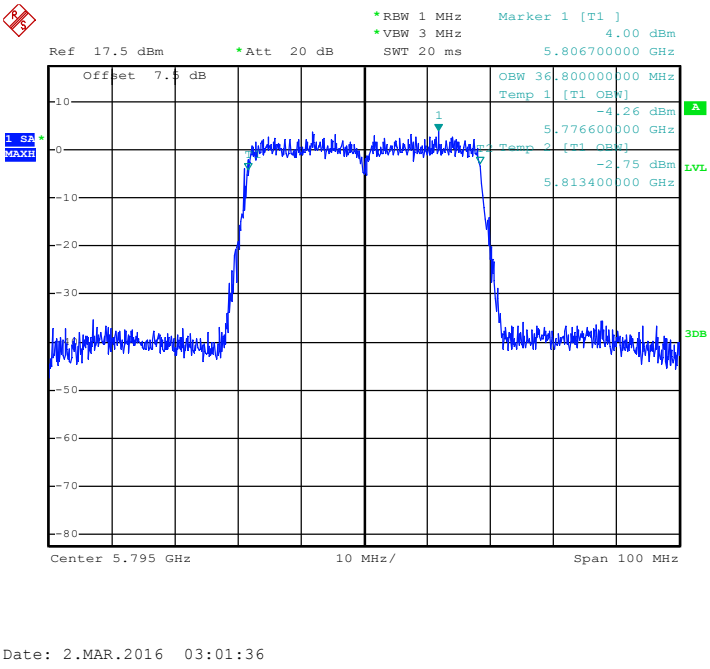
Minimum 6dB Bandwidth



Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Measuring Instruments

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

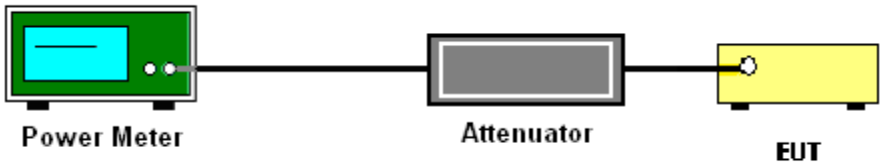
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01. Section F) Maximum power spectral density.

 # Method SA-2 #

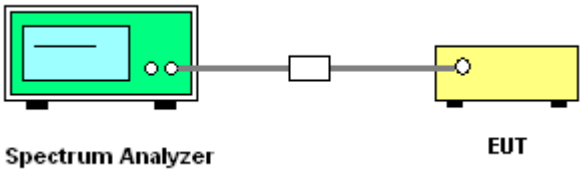
(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 300 kHz.
   - Set VBW ≥ 1 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - Add 10 log(500kHz/RBW) to the test result.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
4. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (c): Measure and add 10 log(NANT) dB, where NANT is the number of outputs.

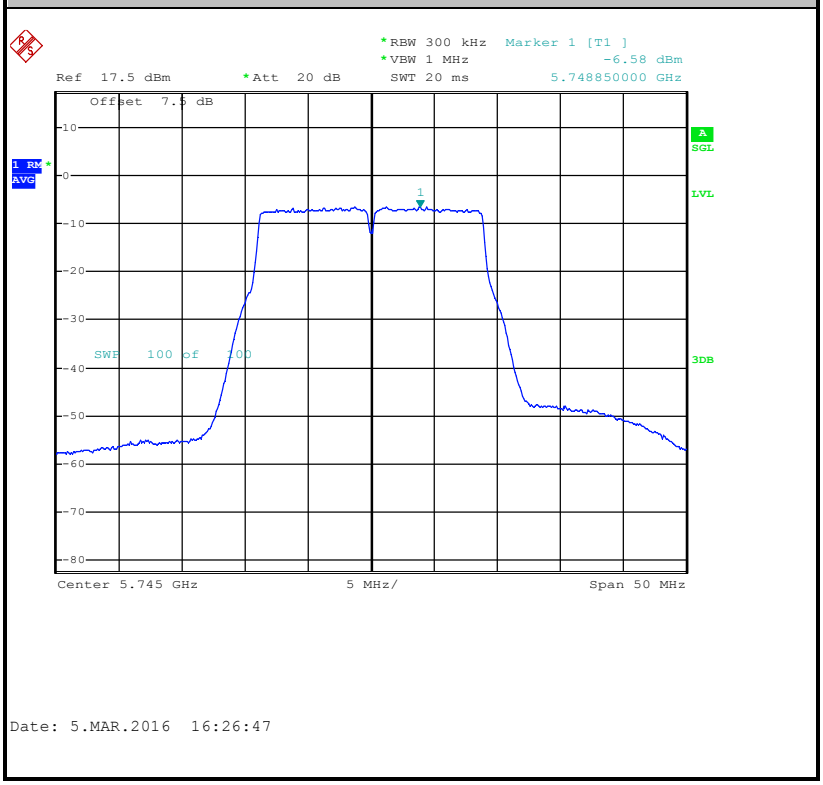
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/300kHz)



3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5725-5850 MHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBμV/m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBμV/m).

(2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
- 27	68.3

(3) KDB 789033 D02 General UNII Test Procedures New Rules v01r01 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

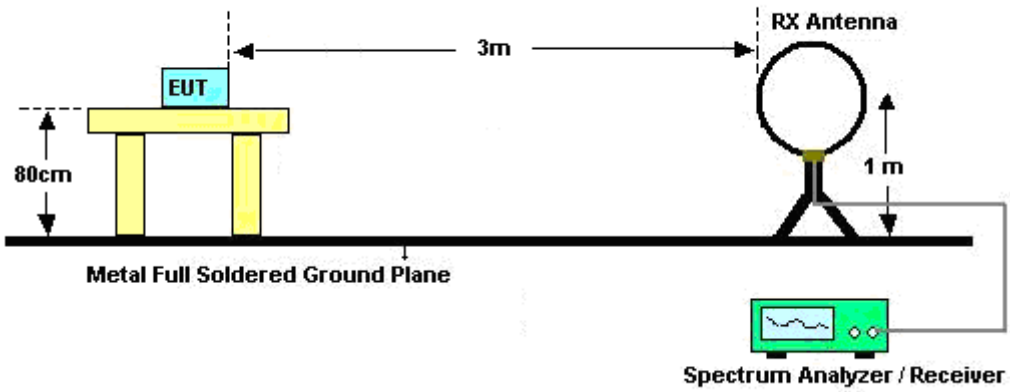
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1+2	802.11n HT20	93.02	1.33	0.75	1kHz
1+2	802.11n HT40	87.26	0.67	1.50	3kHz

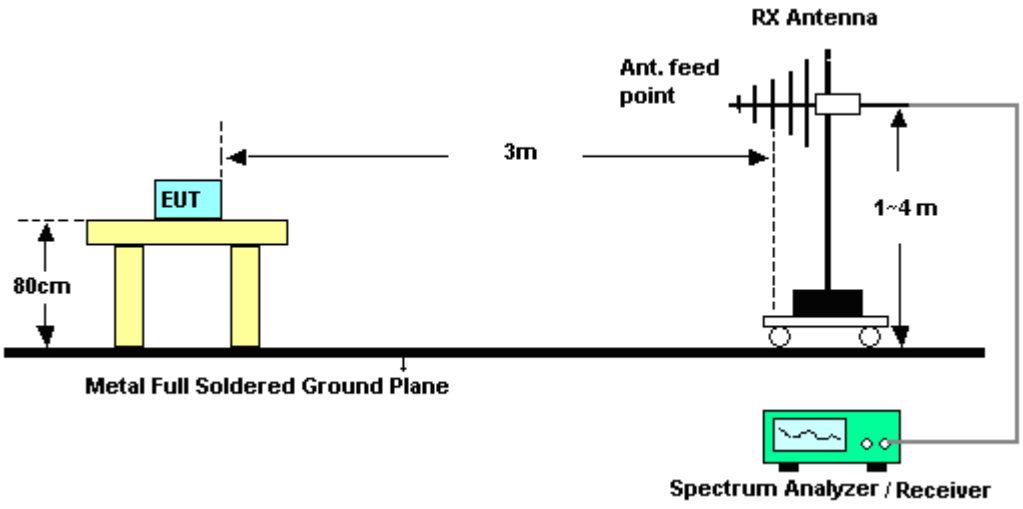
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and 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 adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

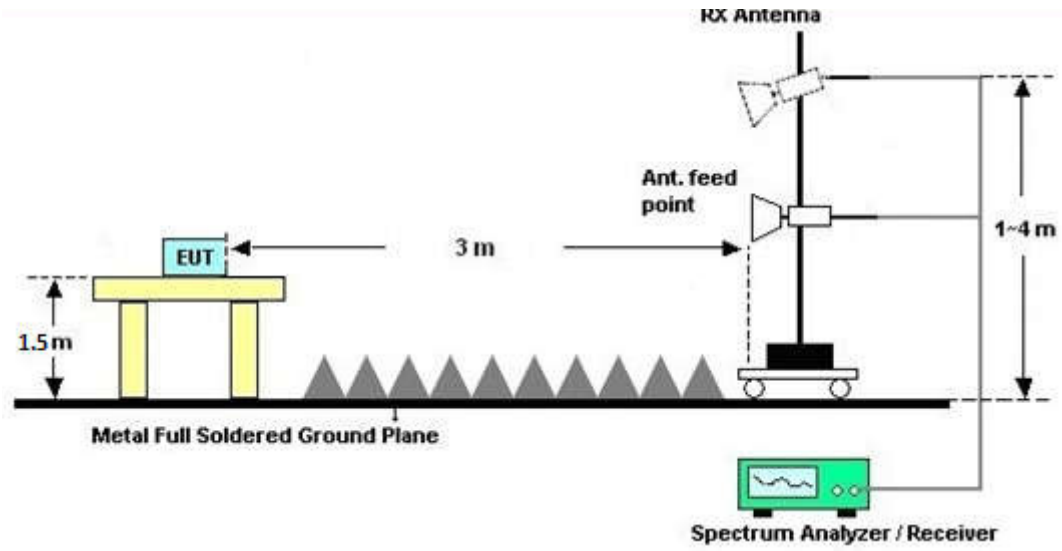
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B.

3.4.7 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B.

3.5 AC Conducted Emission Measurement

3.5.1 Limit 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 (dBμV)	
	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.

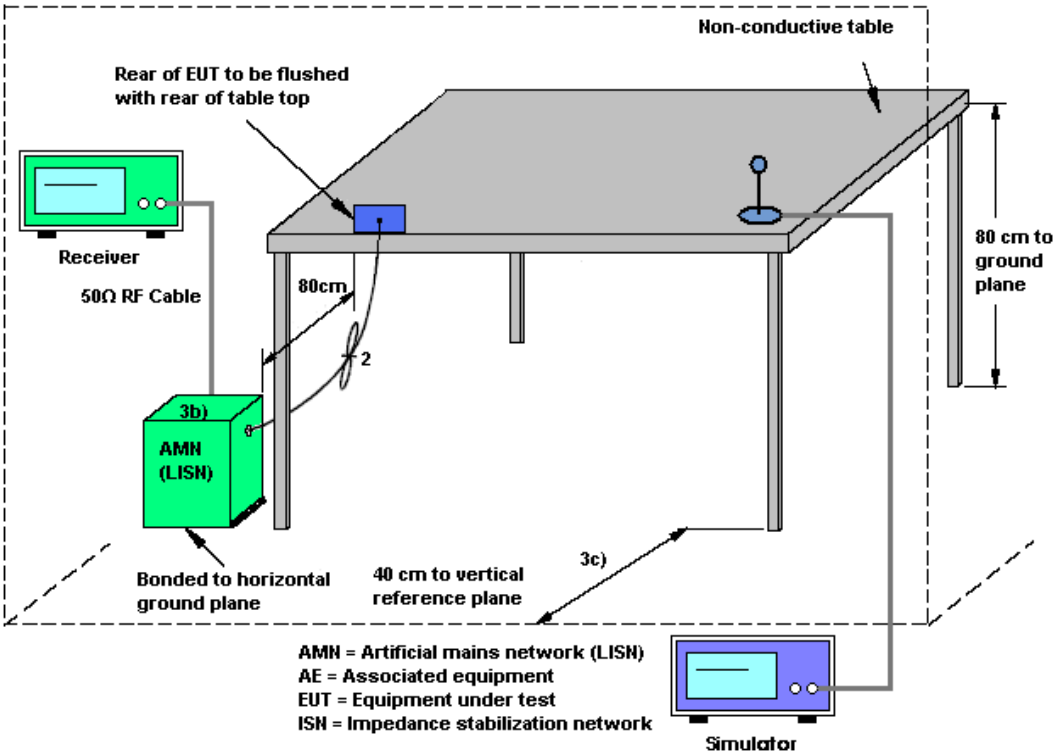
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

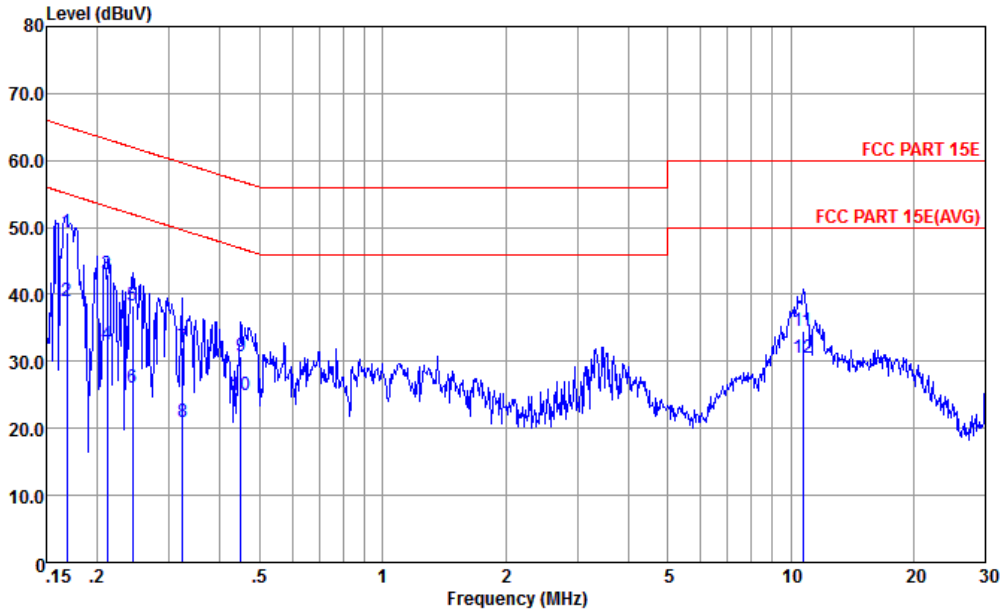
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.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

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

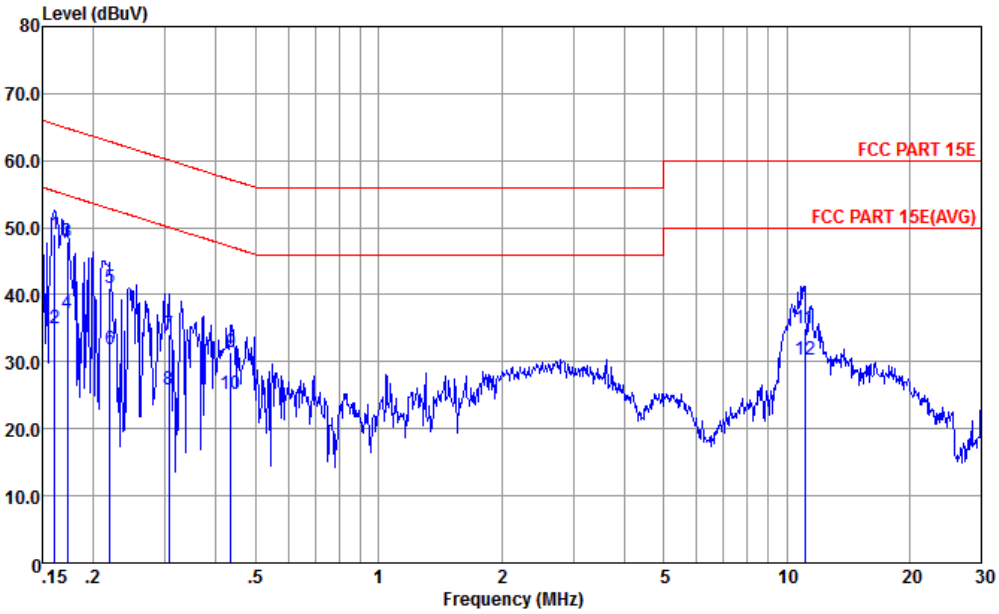
Test Mode :	Mode 1	**Temperature :**	22~24℃
Test Engineer :	Eligah Wang	**Relative Humidity :**	41~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (5G) Link + Earphone + USB Cable (Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15E LISN-L20140306 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.17	49.22	-15.81	65.03	37.20	1.60	10.42	QP
2	0.17	39.02	-16.01	55.03	27.00	1.60	10.42	Average
3	0.21	42.98	-20.16	63.14	31.50	0.97	10.51	QP
4	0.21	32.58	-20.56	53.14	21.10	0.97	10.51	Average
5	0.24	38.22	-23.73	61.95	26.81	0.89	10.52	QP
6	0.24	26.02	-25.93	51.95	14.61	0.89	10.52	Average
7	0.32	32.04	-27.58	59.62	20.90	0.55	10.59	QP
8	0.32	21.04	-28.58	49.62	9.90	0.55	10.59	Average
9	0.45	30.67	-26.22	56.89	19.80	0.25	10.62	QP
10	0.45	24.97	-21.92	46.89	14.10	0.25	10.62	Average
11	10.73	34.56	-25.44	60.00	23.40	0.20	10.96	QP
12	10.73	30.46	-19.54	50.00	19.30	0.20	10.96	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wang	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (5G) Link + Earphone + USB Cable (Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15E LISN-N20140306 NEUTRAL

	Freq MHz	Level dBuV	Over Limit dB	Limit Line dBuV	Read Level dBuV	LISN Factor dB	Cable Loss dB	Remark
1 *	0.16	48.92	-16.51	65.43	36.80	1.73	10.39	QP
2	0.16	35.02	-20.41	55.43	22.90	1.73	10.39	Average
3	0.17	47.99	-16.82	64.81	36.10	1.45	10.44	QP
4	0.17	37.28	-17.53	54.81	25.39	1.45	10.44	Average
5	0.22	40.97	-21.86	62.83	29.50	0.96	10.51	QP
6	0.22	31.77	-21.06	52.83	20.30	0.96	10.51	Average
7	0.31	34.18	-25.88	60.06	22.90	0.70	10.58	QP
8	0.31	25.88	-24.18	50.06	14.60	0.70	10.58	Average
9	0.44	31.48	-25.67	57.15	20.50	0.36	10.62	QP
10	0.44	25.18	-21.97	47.15	14.20	0.36	10.62	Average
11	11.08	35.08	-24.92	60.00	23.89	0.22	10.97	QP
12	11.08	30.38	-19.62	50.00	19.19	0.22	10.97	Average

3.6 Frequency Stability Measurement

3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

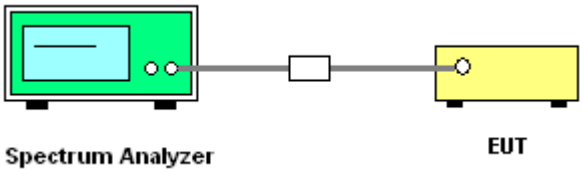
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

3.6.4 Test Setup



3.6.5 Test Result of Frequency Stability

Please refer to Appendix A.

3.7 Automatically Discontinue Transmission

3.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.7.2 Measuring Instruments

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

3.7.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.8 Antenna Requirements

3.8.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

The EUT supports CDD mode.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

	Chain Port 0 (dBi)	Chain Port 1 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
Band IV	2.10	2.10	2.10	5.11	0.00	0.00

Power limit reduction = Composite gain – 6dBi, (min = 0)

PSD limit reduction = Composite gain + PSD Array gain – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014 Oct. 24, 2015	Oct. 29, 2014~ Mar. 05, 2016	Oct. 27, 2015 Oct. 23, 2016	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Feb. 27, 2014 Jan. 20, 2016	Oct. 29, 2014~ Mar. 05, 2016	Feb. 26, 2015 Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Feb. 27, 2014 Jan. 20, 2016	Oct. 29, 2014~ Mar. 05, 2016	Feb. 26, 2015 Jan. 19, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 25, 2014 Oct. 24, 2015	Oct. 29, 2014~ Mar. 05, 2016	Oct. 24, 2015 Oct. 23, 2016	Conducted (TH01-KS)
EMI Test Receiver&SA	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2015	Mar. 07, 2016	May 25, 2016	Radiation (03CH01-SZ)
Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz;Max 30dBm	Jun. 07, 2015	Mar. 07, 2016	Jun. 06, 2016	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 06, 2015	Mar. 07, 2016	May 05, 2016	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	23188	30MHz-2GHz	Oct. 17, 2015	Mar. 07, 2016	Oct. 16, 2016	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 17, 2015	Mar. 07, 2016	Oct. 16, 2016	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Aug. 19, 2015	Mar. 07, 2016	Aug. 18, 2016	Radiation (03CH01-SZ)
Amplifier	HP	8447F	3113A04622	9kHz ~1300MHz / 30 dB	Aug. 07, 2015	Mar. 07, 2016	Aug. 06, 2016	Radiation (03CH01-SZ)
Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1889561	1GHz~18GHz	Oct. 20, 2015	Mar. 07, 2016	Oct. 19, 2016	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 05, 2015	Mar. 07, 2016	May 04, 2016	Radiation (03CH01-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 12, 2016	Mar. 07, 2016	Jan. 11, 2017	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 18, 2015	Mar. 07, 2016	Jul. 17, 2016	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Mar. 07, 2016	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Mar. 07, 2016	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Mar. 07, 2016	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2014	Jan. 07, 2015	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Jan. 07, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Jan. 07, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Jan. 07, 2015	Oct. 24, 2015	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.3dB

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

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

Appendix A. Conducted Test Results

Report Number : FR4O2101-02E

Test Engineer:	Issac Song	Temperature:	24~25	°C
Test Date:	2014/10/29~2016/3/5	Relative Humidity:	49~51	%

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)		Pass/Fail
					Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	
HT20	MCS0	1	149	5745	19.00		23.60		17.60		0.5	0.5	Pass
HT20	MCS0	1	157	5785	19.00		23.50		17.60		0.5	0.5	Pass
HT20	MCS0	1	165	5825	19.00		23.60		17.60		0.5	0.5	Pass
HT40	MCS0	1	151	5755		36.70		41.49		36.32	0.5	0.5	Pass
HT40	MCS0	1	159	5795		36.60		41.40		36.32	0.5	0.5	Pass
HT20	MCS0	2	149	5745	18.80	18.80	23.40	23.20	17.60	17.56	0.5		Pass
HT20	MCS0	2	157	5785	19.00	18.95	23.60	23.30	17.60	17.60	0.5		Pass
HT20	MCS0	2	165	5825	19.05	19.05	23.30	23.20	17.56	17.60	0.5		Pass
HT40	MCS0	2	151	5755	36.60	36.60	41.31	41.13	36.32	36.32	0.5		Pass
HT40	MCS0	2	159	5795	36.60	36.80	41.40	41.13	36.32	36.40	0.5		Pass

TEST RESULTS DATA
Average Power Table

Band IV															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)			Pass/Fail
					Ant 0	Ant 1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1		
HT20	MCS0	1	149	5745	0.31	0.34	10.46	10.22		30.00	30.00	2.10	2.10		Pass
HT20	MCS0	1	157	5785	0.31	0.34	10.90	9.99		30.00	30.00	2.10	2.10		Pass
HT20	MCS0	1	165	5825	0.31	0.34	11.66	10.58		30.00	30.00	2.10	2.10		Pass
HT40	MCS0	1	151	5755	0.60	0.59	9.01	9.71		30.00	30.00	2.10	2.10		Pass
HT40	MCS0	1	159	5795	0.60	0.59	8.16	9.23		30.00	30.00	2.10	2.10		Pass
HT20	MCS0	2	149	5745	0.34	0.31	9.76	10.69	13.26	30.00		2.10			Pass
HT20	MCS0	2	157	5785	0.34	0.31	9.65	9.99	12.83	30.00		2.10			Pass
HT20	MCS0	2	165	5825	0.34	0.31	9.63	10.29	12.98	30.00		2.10			Pass
HT40	MCS0	2	151	5755	0.62	0.59	7.97	9.66	11.91	30.00		2.10			Pass
HT40	MCS0	2	159	5795	0.62	0.59	7.84	9.17	11.57	30.00		2.10			Pass

TEST RESULTS DATA
Power Spectral Density

Band IV																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		10log (500kHz /RBW) Factor (dB)		Average Power Density (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1	
HT20	MCS0	1	149	5745	0.31	0.34	2.22	2.22	-2.28			30.00	30.00	2.10	2.10	Pass
HT20	MCS0	1	157	5785	0.31	0.34	2.22	2.22	-1.85			30.00	30.00	2.10	2.10	Pass
HT20	MCS0	1	165	5825	0.31	0.34	2.22	2.22	-2.28			30.00	30.00	2.10	2.10	Pass
HT40	MCS0	1	151	5755	0.60	0.59	2.22	2.22		-2.14		30.00	30.00	2.10	2.10	Pass
HT40	MCS0	1	159	5795	0.60	0.59	2.22	2.22		-2.50		30.00	30.00	2.10	2.10	Pass
HT20	MCS0	2	149	5745	0.34	0.31	2.22				-1.04	30.00		5.11		Pass
HT20	MCS0	2	157	5785	0.34	0.31	2.22				-1.26	30.00		5.11		Pass
HT20	MCS0	2	165	5825	0.34	0.31	2.22				-1.32	30.00		5.11		Pass
HT40	MCS0	2	151	5755	0.62	0.59	2.22				-4.74	30.00		5.11		Pass
HT40	MCS0	2	159	5795	0.62	0.59	2.22				-4.80	30.00		5.11		Pass

TEST RESULTS DATA
Frequency Stability

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (°C)	Voltage (V)	Note
HT20	6Mbps	1	149	5745	5745.000	0.000	0.00	20	3.5	
HT20	6Mbps	1	149	5745	5745.000	0.000	0.00	20	4.2	
HT20	6Mbps	1	149	5745	5745.000	0.000	0.00	20	3.8	
HT20	6Mbps	1	149	5745	5745.000	0.000	0.00	-30	3.8	
HT20	6Mbps	1	149	5745	5745.000	0.000	0.00	50	3.8	

Appendix B. Radiated Test Results

15E Band 4 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 149 5745MHz		5714.76	57.69	-10.61	68.3	51.52	32.33	7.36	33.52	250	69	P	H
		5720.84	67.02	-11.28	78.3	60.82	32.36	7.36	33.52	250	69	P	H
	*	5745	105.95	-	-	99.68	32.39	7.41	33.53	250	69	P	H
		5745	97.83	-	-	91.56	32.39	7.41	33.53	250	69	A	H
		5711.48	51.53	-16.77	68.3	45.36	32.33	7.36	33.52	227	60	P	V
		5724.92	59.96	-18.34	78.3	53.76	32.36	7.36	33.52	227	60	P	V
	*	5745	101.55	-	-	95.28	32.39	7.41	33.53	227	60	P	V
		5745	94.35	-	-	88.08	32.39	7.41	33.53	227	60	A	V
802.11n HT20 CH 157 5785MHz		5700.52	48.18	-20.12	68.3	42	32.33	7.36	33.51	250	69	P	H
		5720.6	49.56	-28.74	78.3	43.36	32.36	7.36	33.52	250	69	P	H
	*	5785	105.89	-	-	99.54	32.44	7.45	33.54	250	69	P	H
		5785	97.5	-	-	91.15	32.44	7.45	33.54	250	69	A	H
		5850.56	48.85	-29.45	78.3	42.35	32.55	7.51	33.56	250	69	P	H
		5862.64	47.9	-20.4	68.3	41.37	32.58	7.51	33.56	250	69	P	H
		5687.56	46.59	-21.71	68.3	40.44	32.3	7.36	33.51	249	60	P	V
		5720.52	46.62	-31.68	78.3	40.42	32.36	7.36	33.52	249	60	P	V
	*	5785	100.4	-	-	94.05	32.44	7.45	33.54	249	60	P	V
		5785	91.9	-	-	85.55	32.44	7.45	33.54	249	60	A	V
		5853.04	46.42	-31.88	78.3	39.92	32.55	7.51	33.56	249	60	P	V
		5870.88	47.8	-20.5	68.3	41.24	32.61	7.51	33.56	249	60	P	V

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 165 5825MHz	*	5825	105.3	-	-	98.85	32.52	7.48	33.55	250	69	P	H
		5825	96.27	-	-	89.82	32.52	7.48	33.55	250	69	A	H
		5853.2	59.72	-18.58	78.3	53.22	32.55	7.51	33.56	250	69	P	H
		5860	53.65	-14.65	68.3	47.12	32.58	7.51	33.56	250	69	P	H
	*	5825	102.11	-	-	95.66	32.52	7.48	33.55	230	64	P	V
		5825	92.51	-	-	86.06	32.52	7.48	33.55	230	64	A	V
		5853.92	56.12	-22.18	78.3	49.59	32.58	7.51	33.56	230	64	P	V
		5862.64	54.86	-13.44	68.3	48.33	32.58	7.51	33.56	230	64	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 149 5745MHz		11490	47.59	-26.41	74	57.23	39.06	11.05	59.75	250	0	P	H
		17232	49.37	-18.93	68.3	51.58	41.39	14.65	58.25	150	0	P	H
		11490	46.69	-27.31	74	56.33	39.06	11.05	59.75	250	0	P	V
		17232	50.1	-18.2	68.3	52.31	41.39	14.65	58.25	150	0	P	V
802.11n HT20 CH 157 5785MHz		11570	46.5	-27.5	74	56.34	38.98	11.01	59.83	250	0	P	H
		17352	50.5	-17.8	68.3	51.34	42.18	14.78	57.8	150	0	P	H
		11570	46.17	-27.83	74	56.01	38.98	11.01	59.83	250	0	P	V
		17352	48.93	-19.37	68.3	49.77	42.18	14.78	57.8	150	0	P	V
802.11n HT20 CH 165 5825MHz		11650	46.44	-27.56	74	56.45	38.92	10.97	59.9	250	0	P	H
		17475	49.27	-19.03	68.3	48.74	42.98	14.9	57.35	150	0	P	H
		11650	46.66	-27.34	74	56.67	38.92	10.97	59.9	250	0	P	V
		17475	47.81	-20.49	68.3	47.28	42.98	14.9	57.35	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		5711.8	61.81	-6.49	68.3	55.64	32.33	7.36	33.52	250	69	P	H
		5715.56	63.44	-14.86	78.3	57.27	32.33	7.36	33.52	250	69	P	H
	*	5755	101.2	-	-	94.91	32.41	7.41	33.53	250	69	P	H
		5755	92.97	-	-	86.68	32.41	7.41	33.53	250	69	A	H
		5851.28	48.04	-30.26	78.3	41.54	32.55	7.51	33.56	250	69	P	H
		5875.68	48.31	-19.99	68.3	41.75	32.61	7.51	33.56	250	69	P	H
		5711.48	57.28	-11.02	68.3	51.11	32.33	7.36	33.52	221	60	P	V
		5716.52	57.63	-20.67	78.3	51.46	32.33	7.36	33.52	221	60	P	V
	*	5755	96.84	-	-	90.55	32.41	7.41	33.53	221	60	P	V
		5755	88.07	-	-	81.78	32.41	7.41	33.53	221	60	A	V
		5850.96	45.71	-32.59	78.3	39.21	32.55	7.51	33.56	221	60	P	V
		5881.84	48.13	-20.17	68.3	41.57	32.61	7.51	33.56	221	60	P	V
802.11n HT40 CH 159 5795MHz		5711	49.48	-18.82	68.3	43.31	32.33	7.36	33.52	249	69	P	H
		5723.4	50.98	-27.32	78.3	44.78	32.36	7.36	33.52	249	69	P	H
	*	5795	100.95	-	-	94.57	32.47	7.45	33.54	249	69	P	H
		5795	92.49	-	-	86.11	32.47	7.45	33.54	249	69	A	H
		5852.88	53.31	-24.99	78.3	46.81	32.55	7.51	33.56	249	69	P	H
		5876.64	50.21	-18.09	68.3	43.65	32.61	7.51	33.56	249	69	P	H
		5690.12	46.15	-22.15	68.3	40	32.3	7.36	33.51	219	63	P	V
		5724.2	45.46	-32.84	78.3	39.26	32.36	7.36	33.52	219	63	P	V
	*	5795	96.64	-	-	90.26	32.47	7.45	33.54	219	63	P	V
		5795	88.23	-	-	81.85	32.47	7.45	33.54	219	63	A	V
		5855.36	49.22	-29.08	78.3	42.69	32.58	7.51	33.56	219	63	P	V
		5863.68	48.26	-20.04	68.3	41.73	32.58	7.51	33.56	219	63	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		11510	46.27	-27.73	74	55.94	39.04	11.05	59.76	250	0	P	H
		17265	46.94	-21.36	68.3	48.76	41.62	14.69	58.13	150	0	P	H
		11510	46.95	-27.05	74	56.62	39.04	11.05	59.76	250	0	P	V
		17265	46.3	-22	68.3	48.12	41.62	14.69	58.13	150	0	P	V
802.11n HT40 CH 159 5795MHz		11590	46.88	-27.12	74	56.75	38.97	11.01	59.85	250	0	P	H
		17385	47.35	-20.95	68.3	47.79	42.41	14.82	57.67	150	0	P	H
		11590	46.19	-27.81	74	56.06	38.97	11.01	59.85	250	0	P	V
		17385	47.85	-20.45	68.3	48.29	42.41	14.82	57.67	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Emission below 1GHz

5GHz WIFI 802.11n HT40

(LF @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
0+1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11n HT40 LF		30.97	29.24	-10.76	40	42.35	17.67	1	31.78	-	-	P	H
		81.41	24.28	-15.72	40	45.19	9.62	1.14	31.67	-	-	P	H
		299.66	37.72	-8.28	46	53.31	13.8	1.94	31.33	100	360	P	H
		399.57	30.09	-15.91	46	42.71	16.5	2.12	31.24	-	-	P	H
		499.48	27.51	-18.49	46	38.36	17.89	2.41	31.15	-	-	P	H
		714.82	29.26	-16.74	46	38.13	19.6	2.75	31.22	-	-	P	H
		30	34.78	-5.22	40	47.36	18.2	1	31.78	200	72	P	V
		299.66	28.48	-17.52	46	44.07	13.8	1.94	31.33	-	-	P	V
		399.57	27.36	-18.64	46	39.98	16.5	2.12	31.24	-	-	P	V
		714.82	27.47	-18.53	46	36.34	19.6	2.75	31.22	-	-	P	V
		796.3	26.71	-19.29	46	34.87	20.17	2.91	31.24	-	-	P	V
		900.09	25.9	-20.1	46	32.99	21.1	3.09	31.28	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency per 15.209(c).
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix D. Product Equality Declaration

ZTE CORPORATION

Product Change Description

As the applicant of the below model, [ZTE Corporation] declares that the product,

[MF97B_T]

[ZTE Corporation]

is the variant of the initial certified product,

[MF97B]

[ZTE Corporation]

[Project Number: 14ZTE147]

SOFTWARE MODIFICATIONS:

Protocol Stack changes: NO
MMS/STK changes: NO
JAVA changes: NO
Other changes detailed: YES, merged applications and mandatory requirements that new carrier needed and ZTE updated software to disable/enable bands as below.
MF97B for AT&T
E-UTRA CA: CA_4A-17A/CA_2A-17A/CA_4A-29A/CA_2A-29A
E-UTRA FDD: Band 2/Band 4/Band 5/Band 17/Band 29
UMTS FDD: Band I/Band II/Band V
WiFi: 802.11 a/ac/b/g/n/MIMO

MF97B_T for TMO
E-UTRA CA: **CA B4A_B12A**
E-UTRA FDD: Band 2/Band 4/Band 5/**Band12**
UMTS FDD: Band II/**Band IV**/Band V
WiFi: 802.11 b/g/n

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HARDWARE MODIFICATION:

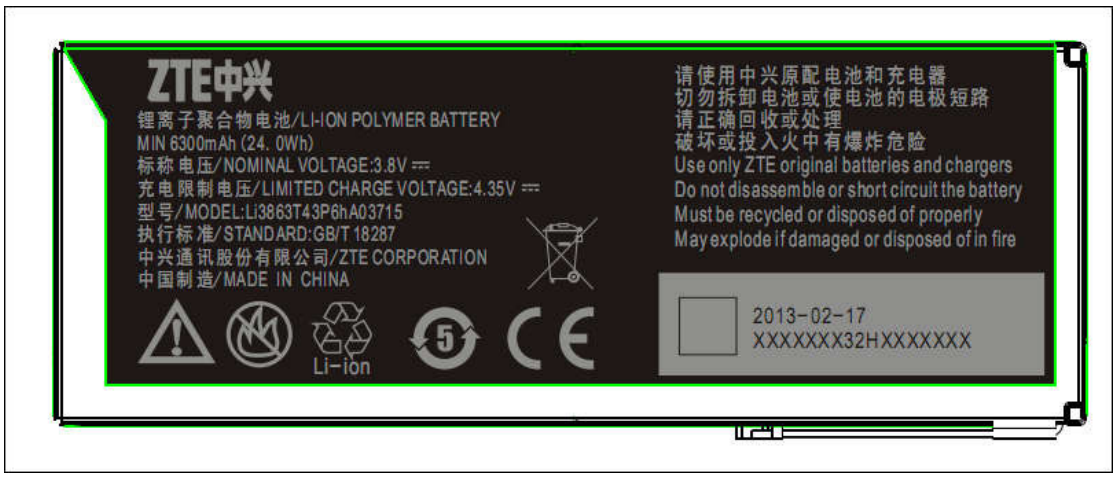
Band changes: NO
Power Amplifier changes: NO
Antenna changes: **YES, new antenna for WiFi/Bluetooth.**
PCB Layout changes: NO
Components on PCB changes: NO
LCD changes: NO
Speaker changes: NO
Camera changes: NO
Vibrator changes: NO
Bluetooth changes: NO
FM changes: NO
Other changes: NO

MECHANICAL MODIFICATIONS:

Use new metal front/back cover or keypad: NO
Mechanical shell changes: NO
Other changes detailed: NO

ACCESSORY MODIFICATIONS:

Battery changes: **YES, new battery.**
Please refer to below photo.
Original



Updated

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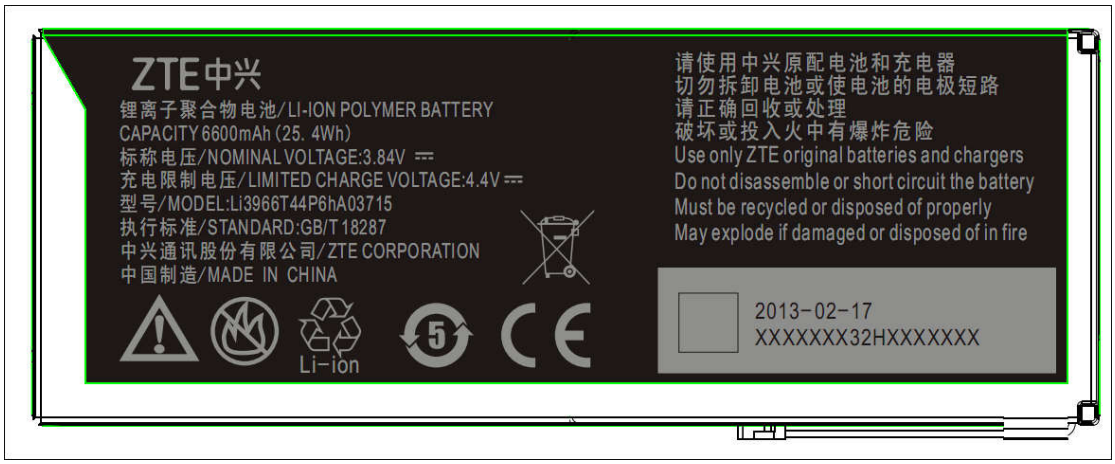

AC Adaptor changes: NO
Earphone changes: NO

Min Zhang

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