



FCC RF Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : LTE/WCDMA/GSM (GPRS) Multi-Mode Digital Mobile Phone
BRAND NAME : ZTE
MODEL NAME : Z999
FCC ID : SRQ-Z999
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Oct.13, 2017 and testing was completed on Nov. 20, 2017. 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.



Approved by: James Huang / Manager

Sporton International (Kunshan) Inc.

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Not Required	-
3.1	15.407(a)	Maximum Conducted Output Power	FCC ≤ 24 dBm (depend on band)	Pass	-
-	15.407(a)	Power Spectral Density	FCC ≤ 11 dBm (depend on band)	Not Required	-
3.2	15.407(b)	Unwanted Emissions	15.407(b) 15.209(a)	Pass	Under limit 11.95 dB at 5025.48 MHz
-	15.207	AC Conducted Emission	15.207(a)	Not Required	-
-	15.407(g)	Frequency Stability	Within Operation Band	Not Required	-
3.3	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.4	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

Remark: Not Required means the changes dose not affected the test result.



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/WCDMA/GSM (GPRS) Multi-Mode Digital Mobile Phone
Brand Name	ZTE
Model Name	Z999
FCC ID	SRQ-Z999
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/LTE/NFC/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ WLAN 5GHz 802.11a/n HT20/HT40/ WLAN5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0 + EDR/ Bluetooth v 4.0 LE/ Bluetooth v4.1 LE
IMEI Code	Conducted: 863132030005034 Radiation: 865800030028028
HW Version	Z999HWV1.0
SW Version	Z999V1.0.0B25
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report for Z999: ZTE now switch WLAN Antenna 1 and 2's function. This means WLAN Antenna 2 now support Bluetooth and WIFI while WLAN antenna 1 only supports WIFI MIMO function. The product equality declaration could be referred to Appendix E. Based on the similarity between two models, we only retest conducted power and the worst case of RSE for differences, all the other test cases were quoted on original report which can be referred to original test report (Sporton Report Number FR760101E).



1.4 Product Specification of Equipment Under Test

Standards-related Product Specification										
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz									
Maximum Output Power to Antenna	<p><5180 MHz ~ 5240 MHz> <Ant. 2> 802.11a : 13.53 dBm / 0.0225 W 802.11n HT20 : 12.69 dBm / 0.0186 W 802.11n HT40 : 12.36 dBm / 0.0172 W 802.11ac VHT20 : 9.26 dBm / 0.0084 W 802.11ac VHT40 : 9.79 dBm / 0.0095 W 802.11ac VHT80 : 9.70 dBm / 0.0093 W</p> <p>MIMO <Ant. 1+2> 802.11n HT20 : 16.11 dBm / 0.0408 W 802.11n HT40 : 15.69 dBm / 0.0371 W 802.11ac VHT20 : 12.74 dBm / 0.0188 W 802.11ac VHT40 : 13.22 dBm / 0.0210 W 802.11ac VHT80 : 13.06 dBm / 0.0202 W</p>									
Antenna Type / Gain	<p><5180 MHz ~ 5240 MHz> Ant. 1 : PIFA Antenna with gain 0.73 dBi Ant. 2 : PIFA Antenna with gain 4.63 dBi</p>									
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)									
Antenna Function Description	<table border="1"> <thead> <tr> <th></th> <th>Ant. 1</th> <th>Ant. 2</th> </tr> </thead> <tbody> <tr> <td>802.11 a/n/ac SISO</td> <td>-</td> <td>√</td> </tr> <tr> <td>802.11 n/ac MIMO</td> <td>√</td> <td>√</td> </tr> </tbody> </table>		Ant. 1	Ant. 2	802.11 a/n/ac SISO	-	√	802.11 n/ac MIMO	√	√
	Ant. 1	Ant. 2								
802.11 a/n/ac SISO	-	√								
802.11 n/ac MIMO	√	√								

Note:

1. MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.
2. For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing have assessed only 802.11an HT20/ HT40 by referring to their maximum conducted power.

1.5 Modification of EUT

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



1.6 Testing 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.

Test Site	Sporton International (Kunshan) Inc.	
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	Sporton Site No.	FCC Test Firm Registration No.
	TH01-KS	630927

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

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

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.
	03CH04-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 Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04
- ♦ 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 were recorded in this report.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5180-5240 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42#	5210		

Note:

1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "#" were 802.11ac VHT80.



2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

Single Antenna (Antenna 2)

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

MIMO Antenna (Antenna 1+2)

Modulation	Data Rate
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0



Ch. #		Band I : 5180-5240 MHz
		802.11a
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I : 5180-5240 MHz
		802.11n HT20
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I : 5180-5240 MHz
		802.11n HT40
L	Low	38
M	Middle	-
H	High	46

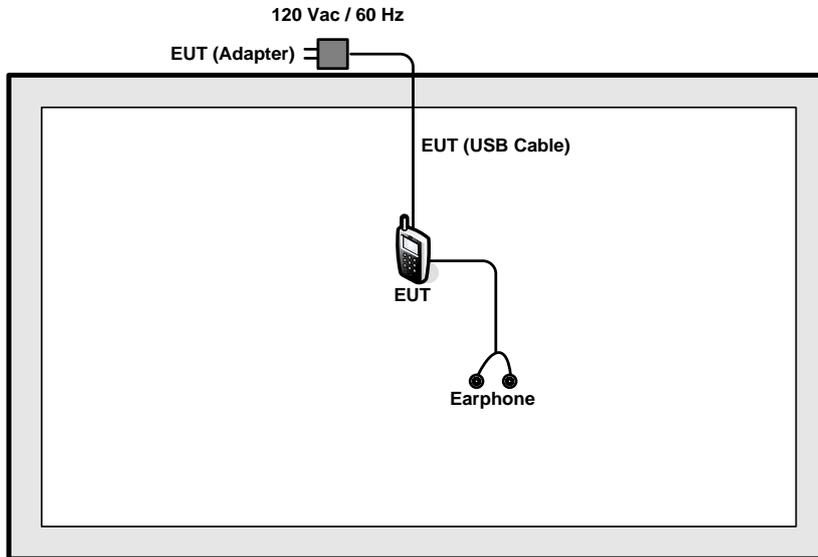
Ch. #		Band I : 5180-5240 MHz
		802.11an VHT20
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I : 5180-5240 MHz
		802.11ac VHT40
L	Low	38
M	Middle	-
H	High	46

Ch. #		Band I : 5180-5240 MHz
		802.11ac VHT80
L	Low	-
M	Middle	42
H	High	-

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Earphone	Apple	MC690ZP/A	N/A	Unshielded, 1.0 m	N/A

2.5 EUT Operation Test Setup

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



2.6 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 7.1 dB.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 7.1 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 Maximum Conducted Output Power Measurement

3.1.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

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.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

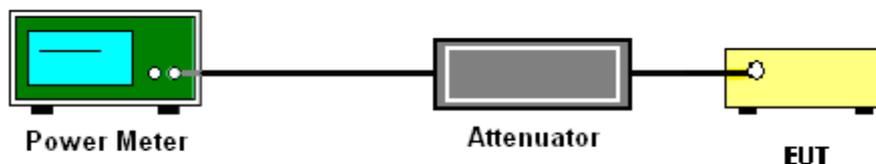
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 for CDD modes.

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.

3.1.4 Test Setup

For normal channel:



3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.2 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.2.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.
- (2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits 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.

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



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

(3) KDB789033 D01 v01r04 G)2)c)

- (i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.³
- (ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.⁴

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

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 testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. 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



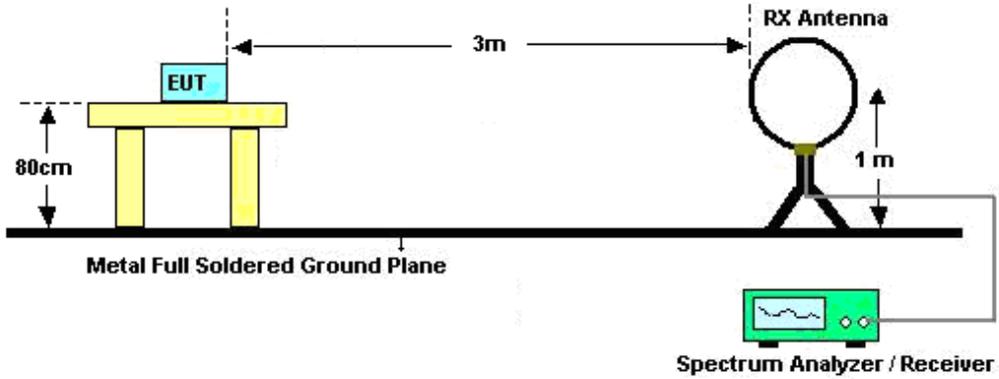
- Sweep time = auto
- Trace mode = max hold

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

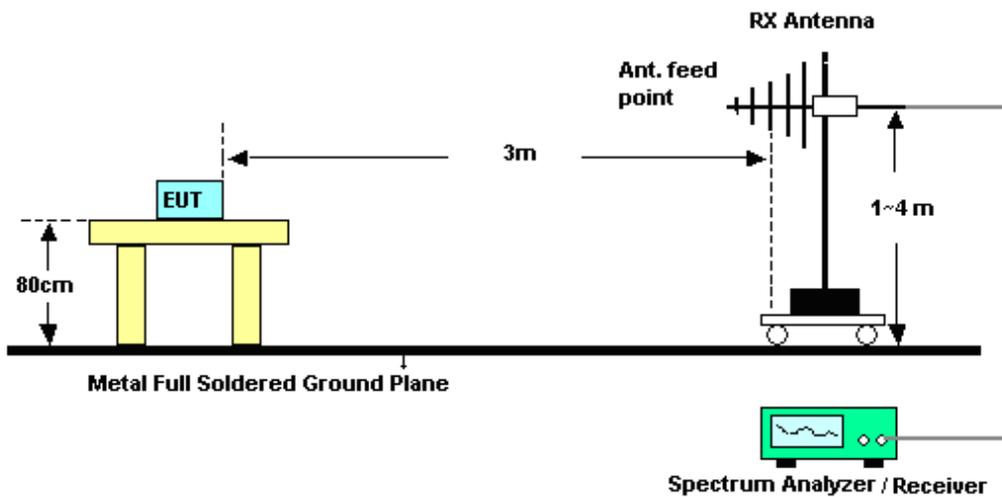
- RBW = 1 MHz
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. 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.

3.2.4 Test Setup

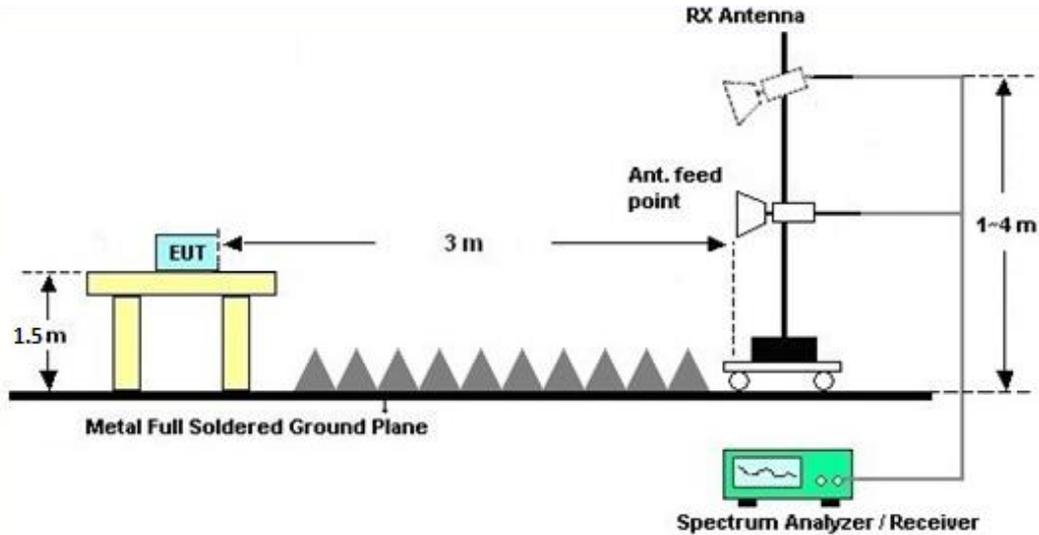
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated Spurious 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 was not reported.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

3.2.7 Duty Cycle

Please refer to Appendix C.

3.2.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix B.



3.3 Automatically Discontinue Transmission

3.3.1 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.

3.3.2 Measuring Instruments

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

3.3.3 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.



3.4 Antenna Requirements

3.4.1 Standard Applicable

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.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.4.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

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

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

For power measurements on IEEE 802.11 devices,

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

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

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.

	Ant 1 (dBi)	Ant 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
Band I	0.73	4.63	4.63	5.91	0.00	0.00

$$\text{Power limit reduction} = \text{Composite gain} - 6\text{dBi, (min = 0)}$$

$$\text{PSD limit reduction} = \text{Composite gain} + \text{PSD Array gain} - 6\text{dBi, (min = 0)}$$



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 08, 2017	Nov. 10, 2017	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 19, 2017	Nov. 10, 2017	Jan. 19, 2018	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 19, 2017	Nov. 10, 2017	Jan. 19, 2018	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 20, 2017	Nov. 20, 2017	Apr. 19, 2018	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 20, 2017	Nov. 20, 2017	Apr. 19, 2018	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2017	Nov. 20, 2017	May 13, 2018	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May 16, 2017	Nov. 20, 2017	May 15, 2018	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	Jan. 12, 2017	Nov. 20, 2017	Jan. 11, 2018	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	May 17, 2017	Nov. 20, 2017	May 16, 2018	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct.19, 2017	Nov. 20, 2017	Oct 18, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1989346	1GHz~18GHz	Jul. 27, 2017	Nov. 20, 2017	Jul. 26, 2018	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5G Hz	Apr. 20, 2017	Nov. 20, 2017	Apr. 19, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul.21, 2017	Nov. 20, 2017	Jul.20, 2018	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	Nov. 20, 2017	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Nov. 20, 2017	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Nov. 20, 2017	NCR	Radiation (03CH04-SZ)

NCR: No Calibration Required



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1dB
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Appendix A. Conducted Test Results

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2017/11/10	Relative Humidity:	51~54	%

TEST RESULTS DATA
Average Power Table

FCC Band I															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail	
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	36	5180		0.21		13.50				24.00		4.63	Pass
11a	6Mbps	1	44	5220		0.21		13.30				24.00		4.63	Pass
11a	6Mbps	1	48	5240		0.21		13.53				24.00		4.63	Pass
HT20	MCS0	1	36	5180		0.21		12.69				24.00		4.63	Pass
HT20	MCS0	1	44	5220		0.21		12.53				24.00		4.63	Pass
HT20	MCS0	1	48	5240		0.21		12.66				24.00		4.63	Pass
HT40	MCS0	1	38	5190		0.44		12.36				24.00		4.63	Pass
HT40	MCS0	1	46	5230		0.44		12.27				24.00		4.63	Pass
VHT20	MCS0	1	36	5180		0.22		9.26				24.00		4.63	Pass
VHT20	MCS0	1	44	5220		0.22		9.01				24.00		4.63	Pass
VHT20	MCS0	1	48	5240		0.22		9.13				24.00		4.63	Pass
VHT40	MCS0	1	38	5190		0.44		9.63				24.00		4.63	Pass
VHT40	MCS0	1	46	5230		0.44		9.79				24.00		4.63	Pass
VHT80	MCS0	1	42	5210		0.84		9.70				24.00		4.63	Pass
HT20	MCS0	2	36	5180	0.21	0.21	12.69	13.44	16.09			24.00		4.63	Pass
HT20	MCS0	2	44	5220	0.21	0.21	12.53	13.52	16.06			24.00		4.63	Pass
HT20	MCS0	2	48	5240	0.21	0.21	12.66	13.50	16.11			24.00		4.63	Pass
HT40	MCS0	2	38	5190	0.44	0.44	12.36	12.90	15.65			24.00		4.63	Pass
HT40	MCS0	2	46	5230	0.44	0.44	12.27	13.06	15.69			24.00		4.63	Pass
VHT20	MCS0	2	36	5180	0.22	0.22	9.26	10.14	12.74			24.00		4.63	Pass
VHT20	MCS0	2	44	5220	0.22	0.22	9.01	9.74	12.40			24.00		4.63	Pass
VHT20	MCS0	2	48	5240	0.22	0.22	9.13	9.88	12.53			24.00		4.63	Pass
VHT40	MCS0	2	38	5190	0.44	0.44	9.63	10.62	13.16			24.00		4.63	Pass
VHT40	MCS0	2	46	5230	0.44	0.44	9.79	10.60	13.22			24.00		4.63	Pass
VHT80	MCS0	2	42	5210	0.84	0.84	9.70	10.38	13.06			24.00		4.63	Pass



Appendix B. Radiated Spurious Emission

Band 1 - 5150~5250MHz WIFI 802.11a (Band Edge @ 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.
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5014.82	50.56	-23.44	74	41.59	31.91	6.06	29	185	287	P	H
		5016.9	41.25	-12.75	54	32.29	31.91	6.06	29.01	185	287	A	H
	*	5180	92.33	-	-	83.37	31.97	6.04	29.05	185	287	P	H
	*	5180	85.3	-	-	76.34	31.97	6.04	29.05	185	287	A	H
		5024.44	51.19	-22.81	74	42.23	31.91	6.06	29.01	102	33	P	V
		5029.12	41.31	-12.69	54	32.35	31.91	6.06	29.01	102	33	A	V
	*	5180	87.65	-	-	78.69	31.97	6.04	29.05	102	33	P	V
	*	5180	81.61	-	-	72.65	31.97	6.04	29.05	102	33	A	V
802.11a CH 44 5220MHz		5064.48	49.99	-24.01	74	41.03	31.93	6.05	29.02	175	287	P	H
		5006.24	41.15	-12.85	54	32.18	31.91	6.06	29	175	287	A	H
	*	5220	91.74	-	-	82.78	31.99	6.03	29.06	175	287	P	H
	*	5220	84.32	-	-	75.36	31.99	6.03	29.06	175	287	A	H
		5418.24	49.54	-24.46	74	40.58	32.07	6.01	29.12	175	287	P	H
		5453.52	40.11	-13.89	54	31.11	32.08	6.06	29.14	175	287	A	H
		5048.36	51.77	-22.23	74	42.82	31.92	6.05	29.02	107	34	P	V
		5026.52	41.35	-12.65	54	32.39	31.91	6.06	29.01	107	34	A	V
	*	5220	87.72	-	-	78.76	31.99	6.03	29.06	107	34	P	V
	*	5220	80.5	-	-	71.54	31.99	6.03	29.06	107	34	A	V
		5454.96	48.34	-25.66	74	39.34	32.08	6.06	29.14	107	34	P	V
	5437.92	40.18	-13.82	54	31.18	32.07	6.06	29.13	107	34	A	V	



802.11a CH 48 5240MHz		5004.68	49.67	-24.33	74	40.7	31.91	6.06	29	171	290	P	H
		5006.5	41.28	-12.72	54	32.31	31.91	6.06	29	171	290	A	H
	*	5240	92.99	-	-	84.04	31.99	6.03	29.07	171	290	P	H
	*	5240	85.64	-	-	76.69	31.99	6.03	29.07	171	290	A	H
		5447.52	49.06	-24.94	74	40.05	32.08	6.06	29.13	171	290	P	H
		5450.88	40.24	-13.76	54	31.24	32.08	6.06	29.14	171	290	A	H
		5138.32	50.7	-23.3	74	41.75	31.95	6.04	29.04	113	32	P	V
		5004.94	41.37	-12.63	54	32.4	31.91	6.06	29	113	32	A	V
	*	5240	88.03	-	-	79.08	31.99	6.03	29.07	113	32	P	V
	*	5240	81.27	-	-	72.32	31.99	6.03	29.07	113	32	A	V
		5381.28	48.49	-25.51	74	39.55	32.05	6.01	29.12	113	32	P	V
		5456.4	40.18	-13.82	54	31.18	32.08	6.06	29.14	113	32	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 2	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)
802.11a CH 36 5180MHz		10360	46.81	-27.19	74	54.74	38.69	9.23	55.85	152	260	P	H
		15540	48.96	-25.04	74	54.88	38.88	11.93	56.73	189	238	P	H
		10360	47.39	-26.61	74	55.32	38.69	9.23	55.85	152	260	P	V
		15540	48.63	-25.37	74	54.55	38.88	11.93	56.73	189	238	P	V
802.11a CH 44 5220MHz		10440	46.68	-27.32	74	54.56	38.75	9.25	55.88	150	230	P	H
		15660	49.3	-24.7	74	54.91	38.81	12.07	56.49	160	225	P	H
		10440	46.58	-27.42	74	54.46	38.75	9.25	55.88	150	230	P	V
		15660	50.03	-23.97	74	55.64	38.81	12.07	56.49	160	225	P	V
802.11a CH 48 5240MHz		10480	46.99	-27.01	74	54.84	38.79	9.26	55.9	150	289	P	H
		15720	49.42	-24.58	74	54.89	38.77	12.11	56.35	150	291	P	H
		10480	46.24	-27.76	74	54.09	38.79	9.26	55.9	150	289	P	V
		15720	49.34	-24.66	74	54.81	38.77	12.11	56.35	150	291	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+2	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 38 5190MHz		5142.22	49.88	-24.12	74	40.92	31.96	6.04	29.04	173	289	P	H
		5025.48	42.05	-11.95	54	33.09	31.91	6.06	29.01	173	289	A	H
	*	5190	92.97	-	-	84.01	31.97	6.04	29.05	173	289	P	H
	*	5190	85.31	-	-	76.35	31.97	6.04	29.05	173	289	A	H
		5434.8	49.29	-24.71	74	40.29	32.07	6.06	29.13	173	289	P	H
		5458.6	40.85	-13.15	54	31.85	32.08	6.06	29.14	173	289	A	H
		5033.28	50	-24	74	41.04	31.91	6.06	29.01	116	20	P	V
		5020.8	41.95	-12.05	54	32.99	31.91	6.06	29.01	116	20	A	V
	*	5190	85.19	-	-	76.23	31.97	6.04	29.05	116	20	P	V
	*	5190	79.85	-	-	70.89	31.97	6.04	29.05	116	20	A	V
		5456.08	48.39	-25.61	74	39.39	32.08	6.06	29.14	116	20	P	V
	5428.36	40.85	-13.15	54	31.85	32.07	6.06	29.13	116	20	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1+2	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		10380	46.6	-27.4	74	54.51	38.71	9.24	55.86	150	360	P	H
HT40		15570	48.97	-25.03	74	54.79	38.86	11.98	56.66	155	360	P	H
CH 38		10380	46	-28	74	53.91	38.71	9.24	55.86	150	360	P	V
5190MHz		15570	48.94	-25.06	74	54.76	38.86	11.98	56.66	155	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz
WIFI 802.11n HT40 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 LF		30	23.63	-16.37	40	30.45	24.9	0.25	31.97	-	-	P	H
		106.63	20.28	-23.22	43.5	34.19	16.7	1.09	31.7	-	-	P	H
		387.93	24.64	-21.36	46	32.07	21.61	2.15	31.19	-	-	P	H
		728.4	29.23	-16.77	46	30.26	27.21	2.99	31.23	-	-	P	H
		831.22	31.3	-14.7	46	30.51	28.75	3.22	31.18	100	254	P	H
		987.39	31.29	-22.71	54	28.73	30.35	3.54	31.33	-	-	P	H
		30.97	22.95	-17.05	40	30.22	24.43	0.27	31.97	-	-	P	V
		239.52	19.01	-26.99	46	31.08	17.5	1.69	31.26	-	-	P	V
		466.5	25.84	-20.16	46	31.48	23.29	2.34	31.27	-	-	P	V
		610.06	26.28	-19.72	46	28.93	25.89	2.72	31.26	-	-	P	V
		822.49	29.33	-16.67	46	28.62	28.68	3.2	31.17	-	-	P	V
	923.37	29.95	-16.05	46	28.18	29.58	3.43	31.24	100	102	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.
!	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	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

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

For Peak Limit @ 2390MHz:

- 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)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

- 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)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

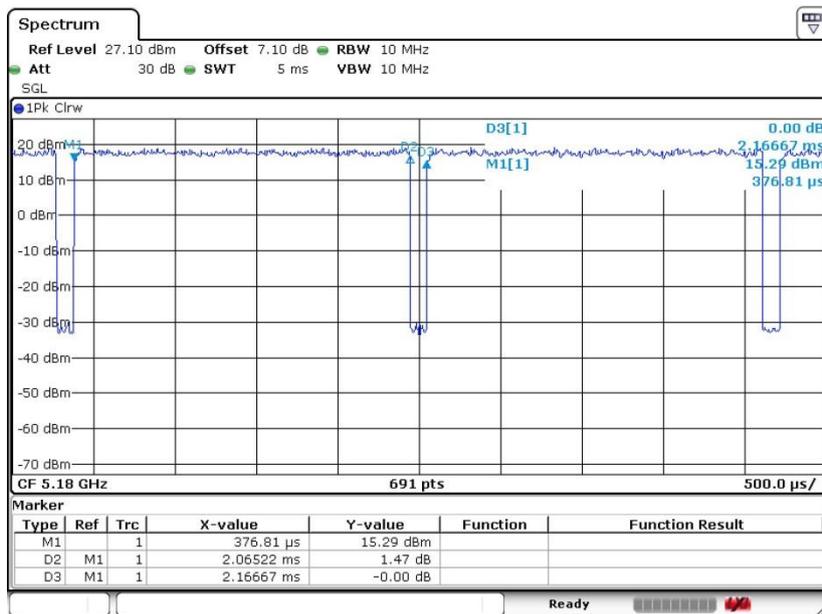
Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix C. Duty Cycle Plots

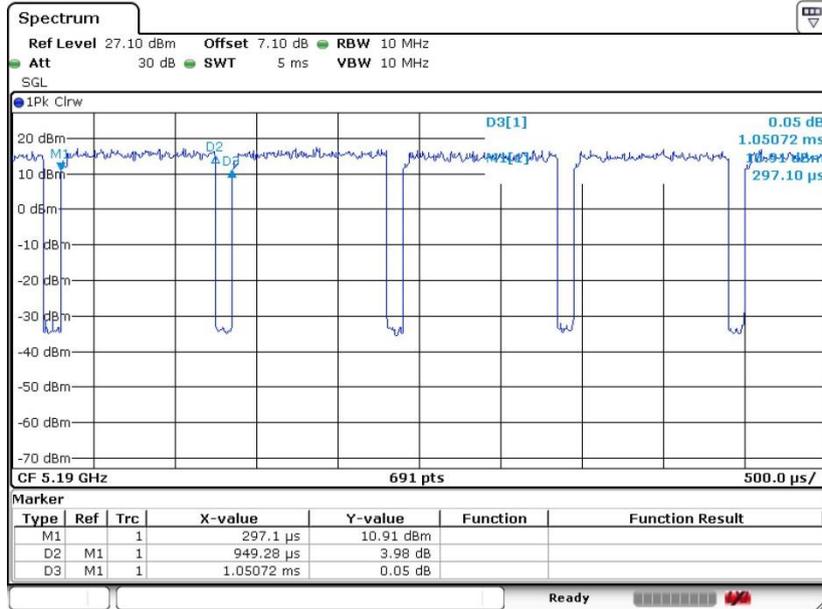
Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
2	802.11a	95.32	2.065	0.484	1kHz
1+2	802.11n40	90.35	0.949	1.054	3kHz

802.11a <Ant.2>





802.11n40 <Ant.1+2>





Appendix E. Product Equality Declaration

ZTE CORPORATION**Product Change Description**

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

[Z999]

[ZTE Corporation]

is the variant of the initial certified product,

[Z999]

[ZTE Corporation]

[Project Number:17ZTE191-01]

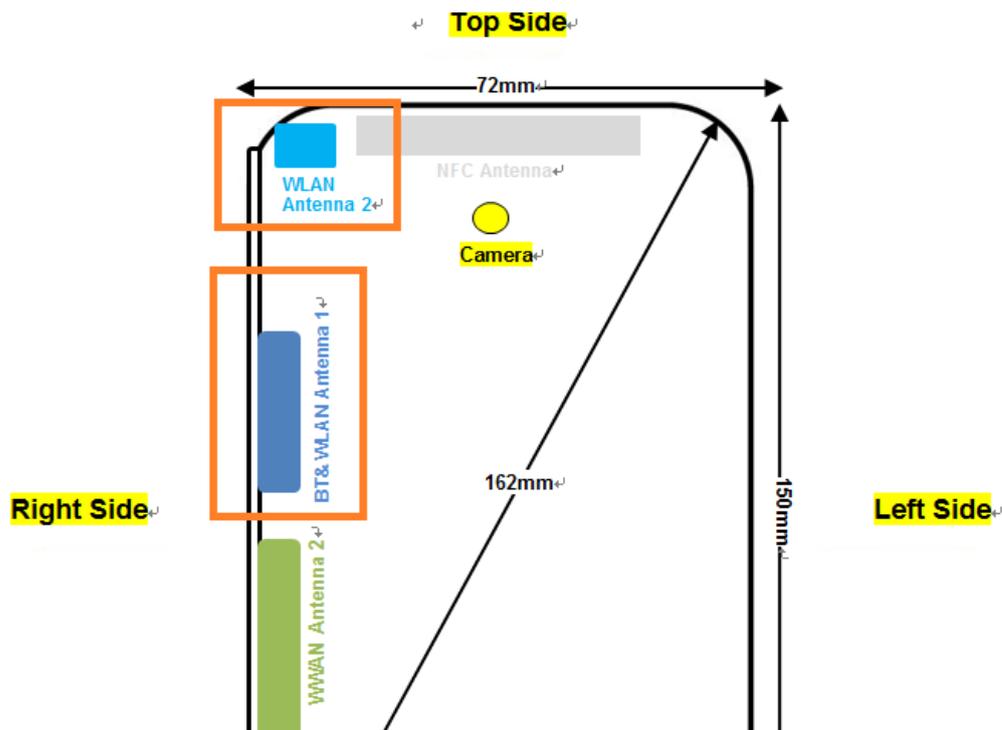
SOFTWARE MODIFICATIONS:

Protocol Stack changes: NO

MMS/STK changes: NO

JAVA changes: NO

Other changes detailed: Yes, ZTE now switch WLAN Antenna 1 and 2's function. This means WLAN Antenna 2 in below picture now support Bluetooth and WIFI while WLAN antenna 1 only supports WIFI MIMO function.



HARDWARE MODIFICATION:

Band changes: NO
Power Amplifier changes: NO
Antenna changes: NO
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: NO
AC Adaptor changes: NO

Earphone changes:NO

Min Zhang

APPROVED BY: Min Zhang

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