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.

James Huang

NVLAP TESTING
NVLAP LAB CODE 600155-0

Approved by: James Huang / Manager

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR760101-02E	Rev. 01	Initial issue of report	Nov. 29, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Not Required	-
3.1	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
-	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Not Required	-
3.2	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 13.96 dB at 947.62 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 Product 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/ WLAN 5GHz 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 FR760101F).

1.4 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Standards-related Product Specification</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>5745 MHz ~ 5825 MHz</td></tr>
<tr><td>Maximum Output Power</td><td><5745 MHz ~ 5825 MHz>
<Ant. 2>
802.11a : 11.47 dBm / 0.0140 W
802.11n HT20 : 12.45 dBm / 0.0176 W
802.11n HT40 : 12.46 dBm / 0.0176 W
802.11ac VHT20 : 9.21 dBm / 0.0083 W
802.11ac VHT40 : 9.46 dBm / 0.0088 W
802.11ac VHT80 : 9.69 dBm / 0.0093 W
MIMO <Ant. 1 + 2>
802.11n HT20 : 14.84 dBm / 0.0305 W
802.11n HT40 : 15.13 dBm / 0.0326 W
802.11ac VHT20: 11.43 dBm / 0.0139 W
802.11ac VHT40: 11.93 dBm / 0.0156 W
802.11ac VHT80: 11.65 dBm / 0.0146 W</td></tr>
<tr><td>Type of Modulation</td><td>802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)</td></tr>
<tr><td>Antenna Type / Gain</td><td><5745 MHz ~ 5825 MHz>
<Ant. 1> : PIFA Antenna with gain -0.95 dBi
<Ant. 2> : PIFA Antenna with gain 6.27 dBi</td></tr>
<tr><td>Antenna Function Description</td><td>
<table>
<tr><th></th><th>Ant. 1</th><th>Ant. 2</th></tr>
<tr><td>802.11 a/n/ac SISO</td><td>-</td><td>V</td></tr>
<tr><td>802.11 n/ac MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

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 802.11n 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.
- FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01
- 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)
5745-5825 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155#	5775	165	5825

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)

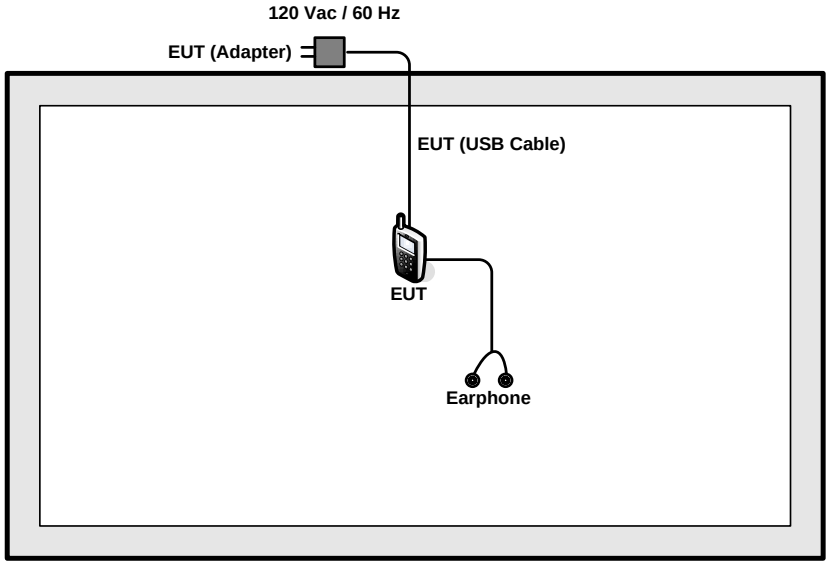
Modulation	Data Rate
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

Ch. #		Band IV：5745-5825 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

Ch. #		Band IV：5745-5825 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

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	Lenovo	SH100	N/A	Unshielded, 1.2 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. 1dB.

Offset(dB) = RF cable loss(dB).
=7.1 (dB)

3 Test Result

3.1 Maximum Conducted Output Power Measurement

3.1.1 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.

3.1.2 Measuring Instruments

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

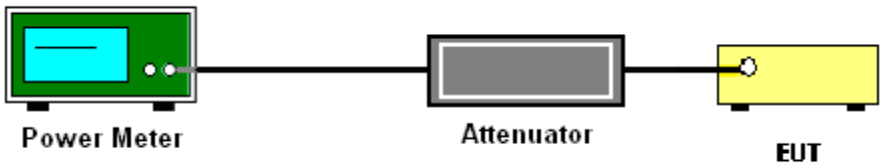
3.1.3 Test Procedures

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

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



3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.2 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.

3.2.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(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)
- 27	68.3

(3) KDB789033 D02 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

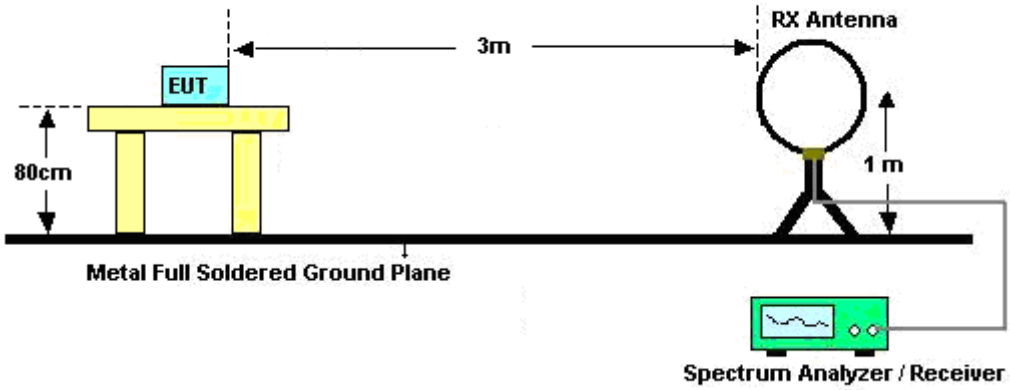
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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.

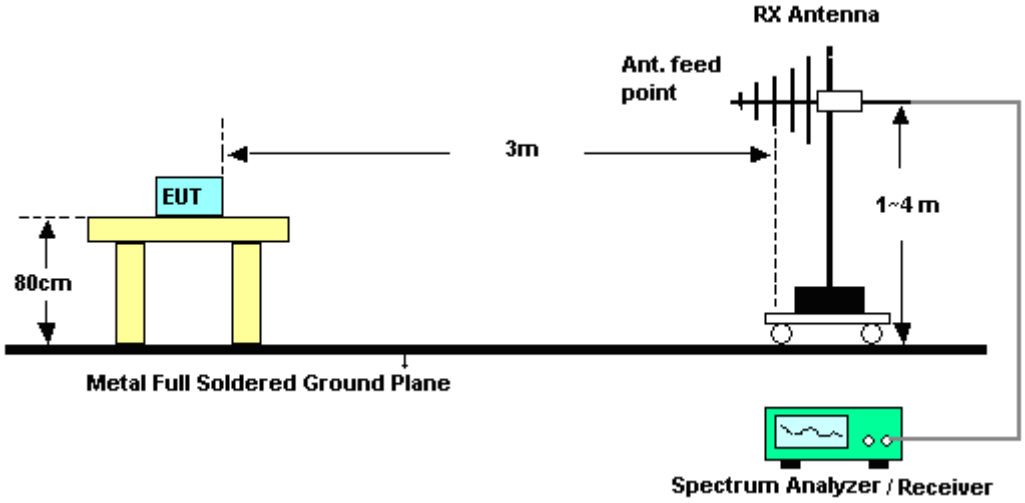
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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

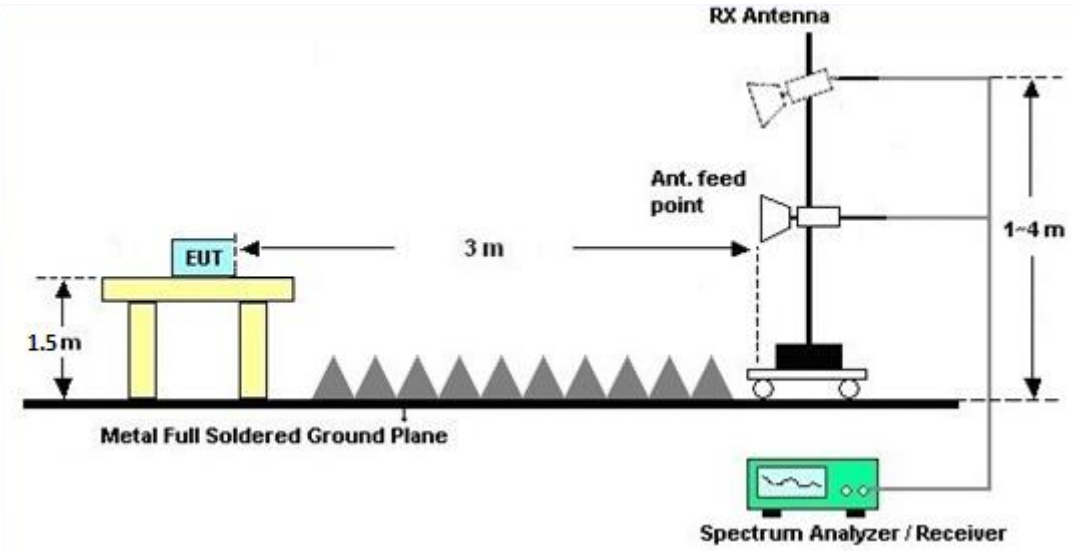
For radiated emissions below 30MHz



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 per 15.31(o) 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

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.

3.4.2 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

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 $N_{ANT} \leq 4$.

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 IV	-0.95	6.27	6.27	6.40	0.27	0.40

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	FSV40	101040	10Hz~40GHz	Aug. 08, 2017	Nov. 10, 2017	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Senor	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-00101800-30-10P-R	1989346	1GHz~18GHz	Jul. 27, 2017	Nov. 20, 2017	Jul. 26, 2018	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	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**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

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

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1dB**

Appendix A. Conducted Test Results

Report Number : FR760101-02E

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

Report Number : FR760101-02E

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 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	149	5745		0.21		10.97			29.73		6.27		Pass
11a	6Mbps	1	157	5785		0.21		10.14			29.73		6.27		Pass
11a	6Mbps	1	165	5825		0.21		11.47			29.73		6.27		Pass
HT20	MCS0	1	149	5745		0.21		12.34			29.73		6.27		Pass
HT20	MCS0	1	157	5785		0.21		12.45			29.73		6.27		Pass
HT20	MCS0	1	165	5825		0.21		11.66			29.73		6.27		Pass
HT40	MCS0	1	151	5755		0.44		12.46			29.73		6.27		Pass
HT40	MCS0	1	159	5795		0.44		12.05			29.73		6.27		Pass
VHT20	MCS0	1	149	5745		0.22		8.94			29.73		6.27		Pass
VHT20	MCS0	1	157	5785		0.22		9.21			29.73		6.27		Pass
VHT20	MCS0	1	165	5825		0.22		8.14			29.73		6.27		Pass
VHT40	MCS0	1	151	5755		0.44		9.46			29.73		6.27		Pass
VHT40	MCS0	1	159	5795		0.44		8.56			29.73		6.27		Pass
VHT80	MCS0	1	155	5775		0.84		9.69			29.73		6.27		Pass
HT20	MCS0	2	149	5745	0.21	0.21	12.34	11.26	14.84	29.73		6.27			Pass
HT20	MCS0	2	157	5785	0.21	0.21	12.45	10.27	14.50	29.73		6.27			Pass
HT20	MCS0	2	165	5825	0.21	0.21	11.66	11.68	14.68	29.73		6.27			Pass
HT40	MCS0	2	151	5755	0.44	0.44	12.46	11.67	15.09	29.73		6.27			Pass
HT40	MCS0	2	159	5795	0.44	0.44	12.05	12.19	15.13	29.73		6.27			Pass
VHT20	MCS0	2	149	5745	0.22	0.22	8.94	7.83	11.43	29.73		6.27			Pass
VHT20	MCS0	2	157	5785	0.22	0.22	9.21	6.90	11.22	29.73		6.27			Pass
VHT20	MCS0	2	165	5825	0.22	0.22	8.14	8.28	11.22	29.73		6.27			Pass
VHT40	MCS0	2	151	5755	0.44	0.44	9.46	8.30	11.93	29.73		6.27			Pass
VHT40	MCS0	2	159	5795	0.44	0.44	8.56	8.75	11.67	29.73		6.27			Pass
VHT80	MCS0	2	155	5775	0.84	0.84	9.69	7.26	11.65	29.73		6.27			Pass

Appendix B. Radiated Spurious Emission

Band 4 - 5725~5850MHz

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 149 5745MHz		5604.6	50.11	-18.09	68.2	40.71	32.31	6.27	29.18	182	310	P	H
		5667.8	50.22	-31.19	81.41	40.75	32.44	6.23	29.2	182	310	P	H
		5719.6	49.78	-60.91	110.69	40.23	32.55	6.22	29.22	182	310	P	H
		5723.2	47.74	-70.36	118.1	38.19	32.55	6.22	29.22	182	310	P	H
	*	5745	94.65	-	-	85.09	32.58	6.2	29.22	182	310	P	H
	*	5745	88.41	-	-	78.85	32.58	6.2	29.22	182	310	A	H
		5614.2	50.36	-17.84	68.2	40.96	32.31	6.27	29.18	161	349	P	V
		5655.4	48.5	-23.71	72.21	39.04	32.41	6.25	29.2	161	349	P	V
		5709.2	49.74	-58.04	107.78	40.23	32.51	6.22	29.22	161	349	P	V
		5722.4	47.98	-68.29	116.27	38.43	32.55	6.22	29.22	161	349	P	V
	*	5745	92.97	-	-	83.41	32.58	6.2	29.22	161	349	P	V
	*	5745	86.53	-	-	76.97	32.58	6.2	29.22	161	349	A	V

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 157 5785MHz		5617.8	48.66	-19.54	68.2	39.23	32.34	6.27	29.18	179	313	P	H
		5668.6	49.54	-32.46	82	40.07	32.44	6.23	29.2	179	313	P	H
		5715.2	49.65	-59.81	109.46	40.14	32.51	6.22	29.22	179	313	P	H
		5722.4	48.27	-68	116.27	38.72	32.55	6.22	29.22	179	313	P	H
	*	5785	93.94	-	-	84.35	32.65	6.18	29.24	179	313	P	H
	*	5785	87.48	-	-	77.89	32.65	6.18	29.24	179	313	A	H
		5850.6	49.58	-71.25	120.83	39.75	32.79	6.29	29.25	179	313	P	H
		5857.8	49.26	-60.75	110.01	39.3	32.82	6.4	29.26	179	313	P	H
		5892	49.15	-43.43	92.58	39.13	32.89	6.4	29.27	179	313	P	H
		5939.6	50.34	-17.86	68.2	39.99	33	6.63	29.28	179	313	P	H
		5608.2	48.92	-19.28	68.2	39.52	32.31	6.27	29.18	161	349	P	V
		5653.4	49.16	-21.57	70.73	39.69	32.41	6.25	29.19	161	349	P	V
		5701.8	49.1	-56.6	105.7	39.58	32.51	6.22	29.21	161	349	P	V
		5721.8	47.8	-67.1	114.9	38.25	32.55	6.22	29.22	161	349	P	V
	*	5785	90.36	-	-	80.77	32.65	6.18	29.24	161	349	P	V
	*	5785	84.23	-	-	74.64	32.65	6.18	29.24	161	349	A	V
		5854.8	49.61	-61.65	111.26	39.75	32.82	6.29	29.25	161	349	P	V
		5859.4	49.76	-59.81	109.57	39.8	32.82	6.4	29.26	161	349	P	V
		5899	50.07	-37.33	87.4	39.93	32.89	6.52	29.27	161	349	P	V
		5927.8	50.18	-18.02	68.2	39.98	32.96	6.52	29.28	161	349	P	V

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 165 5825MHz	*	5825	96.41	-	-	86.61	32.76	6.29	29.25	174	313	P	H
	*	5825	88.9	-	-	79.1	32.76	6.29	29.25	174	313	A	H
		5853.6	48.87	-65.12	113.99	39.01	32.82	6.29	29.25	174	313	P	H
		5861.4	49.4	-59.61	109.01	39.44	32.82	6.4	29.26	174	313	P	H
		5883.2	50	-49.11	99.11	40	32.86	6.4	29.26	174	313	P	H
		5931.2	51.08	-17.12	68.2	40.88	32.96	6.52	29.28	174	313	P	H
	*	5825	92.61	-	-	82.81	32.76	6.29	29.25	158	352	P	V
	*	5825	86.39	-	-	76.59	32.76	6.29	29.25	158	352	A	V
		5850.6	49.28	-71.55	120.83	39.45	32.79	6.29	29.25	158	352	P	V
		5870.6	48.63	-57.8	106.43	38.63	32.86	6.4	29.26	158	352	P	V
		5895.2	50.18	-40.03	90.21	40.04	32.89	6.52	29.27	158	352	P	V
		5942.2	49.41	-18.79	68.2	39.06	33	6.63	29.28	158	352	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

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 149 5745MHz		11490	49.54	-24.46	74	56.18	39.22	9.5	55.36	160	360	P	H
		17235	50.23	-17.97	68.2	50.34	41.49	14.89	56.49	170	360	P	H
		11490	49.76	-24.24	74	56.4	39.22	9.5	55.36	160	360	P	V
		17235	50.44	-17.76	68.2	50.55	41.49	14.89	56.49	170	360	P	V
802.11a CH 157 5785MHz		11570	50.16	-23.84	74	56.74	39.14	9.52	55.24	175	198	P	H
		17355	50.93	-17.27	68.2	50.15	42.24	15.12	56.58	189	185	P	H
		11570	50.97	-23.03	74	57.55	39.14	9.52	55.24	175	198	P	V
		17355	50.18	-18.02	68.2	49.4	42.24	15.12	56.58	189	185	P	V
802.11a CH 165 5825MHz		11650	49.88	-24.12	74	56.38	39.09	9.54	55.13	156	347	P	H
		17475	50.12	-18.08	68.2	48.45	42.99	15.36	56.68	150	360	P	H
		11650	49.66	-24.34	74	56.16	39.09	9.54	55.13	156	347	P	V
		17475	50.55	-17.65	68.2	48.88	42.99	15.36	56.68	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

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)
		5638.8	49.92	-18.28	68.2	40.48	32.38	6.25	29.19	173	312	P	H
		5696.6	49.48	-53.21	102.69	39.98	32.48	6.23	29.21	173	312	P	H
		5706.6	49.33	-57.72	107.05	39.82	32.51	6.22	29.22	173	312	P	H
		5722.2	49.56	-66.26	115.82	40.01	32.55	6.22	29.22	173	312	P	H
	*	5755	92.43	-	-	82.83	32.62	6.2	29.22	173	312	P	H
	*	5755	85.17	-	-	75.57	32.62	6.2	29.22	173	312	A	H
		5850.4	48.18	-73.11	121.29	38.35	32.79	6.29	29.25	173	312	P	H
		5873	49.59	-56.17	105.76	39.59	32.86	6.4	29.26	173	312	P	H
802.11n		5907.6	49.35	-31.69	81.04	39.17	32.93	6.52	29.27	173	312	P	H
HT40		5938.2	49.27	-18.93	68.2	38.96	32.96	6.63	29.28	173	312	P	H
CH 151		5634.4	49.24	-18.96	68.2	39.8	32.38	6.25	29.19	157	348	P	V
5755MHz		5657.4	49.56	-24.14	73.7	40.1	32.41	6.25	29.2	157	348	P	V
		5710	52.66	-55.34	108	43.15	32.51	6.22	29.22	157	348	P	V
		5724.6	48.45	-72.84	121.29	38.9	32.55	6.22	29.22	157	348	P	V
	*	5755	90.19	-	-	80.59	32.62	6.2	29.22	157	348	P	V
	*	5755	83.37	-	-	73.77	32.62	6.2	29.22	157	348	A	V
		5852.8	49.07	-66.75	115.82	39.24	32.79	6.29	29.25	157	348	P	V
		5869	49.67	-57.21	106.88	39.71	32.82	6.4	29.26	157	348	P	V
		5919.8	50.04	-21.99	72.03	39.87	32.93	6.52	29.28	157	348	P	V
		5942.8	50.29	-17.91	68.2	39.94	33	6.63	29.28	157	348	P	V

Band 4 5725~5850MHz

WIFI 802.11n HT40 (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)
802.11n		11510	48.91	-25.09	74	55.55	39.2	9.5	55.34	160	360	P	H
HT40		17265	50.94	-17.26	68.2	50.78	41.71	14.97	56.52	170	360	P	H
CH 151		11510	49.88	-24.12	74	56.52	39.2	9.5	55.34	160	360	P	V
5755MHz		17265	50.07	-18.13	68.2	49.91	41.71	14.97	56.52	170	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

5GHz WIFI 802.11a (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.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11a 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
		230.79	21.09	-24.91	46	34.18	16.51	1.67	31.27	-	-	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
		947.62	32.04	-13.96	46	30.03	29.87	3.47	31.33	100	325	P	H
		30.97	22.95	-17.05	40	30.22	24.43	0.27	31.97	-	-	P	V
		105.66	19.29	-24.21	43.5	33.28	16.64	1.08	31.71	-	-	P	V
		359.8	22.06	-23.94	46	30.26	20.9	2.11	31.21	-	-	P	V
		685.72	27.79	-18.21	46	29.57	26.57	2.9	31.25	-	-	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 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)

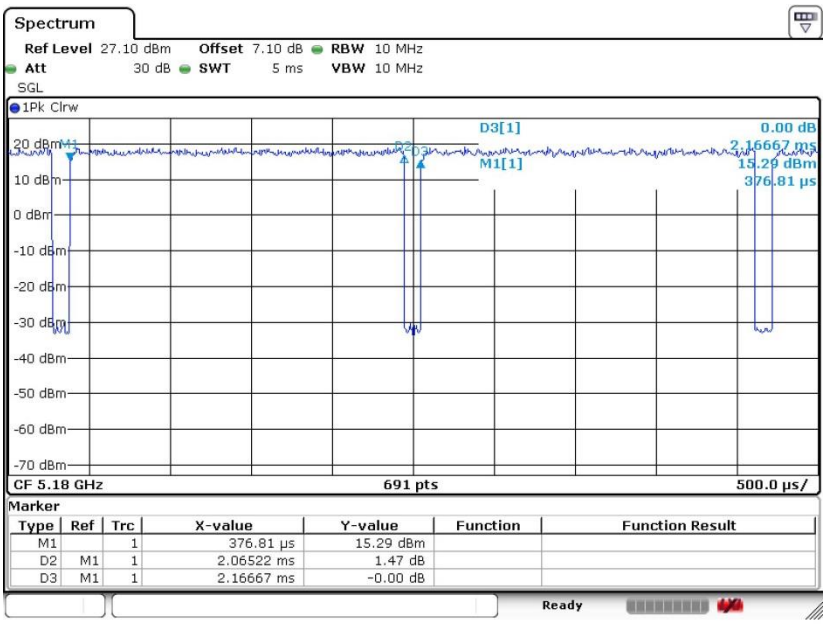
= -10.46(dB)

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

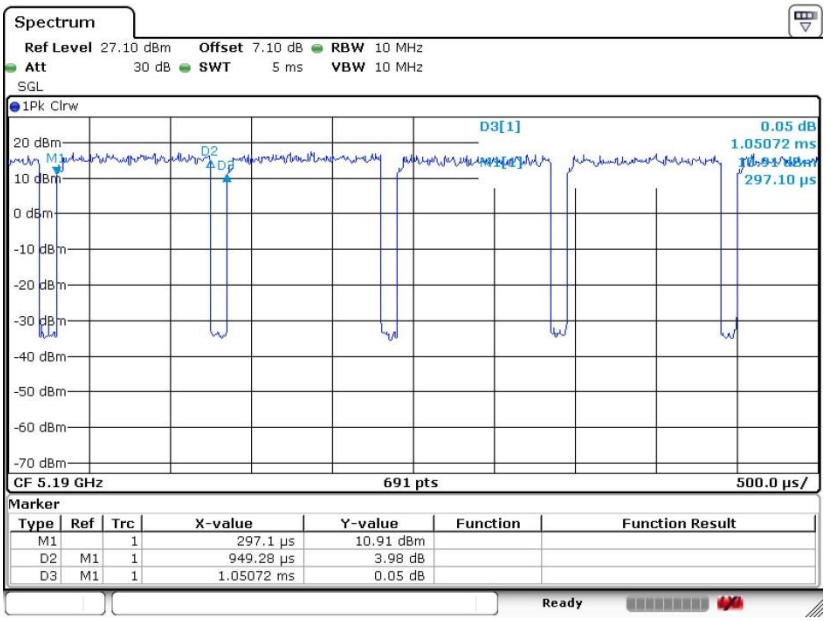
Appendix C. Duty Cycle Plots

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,

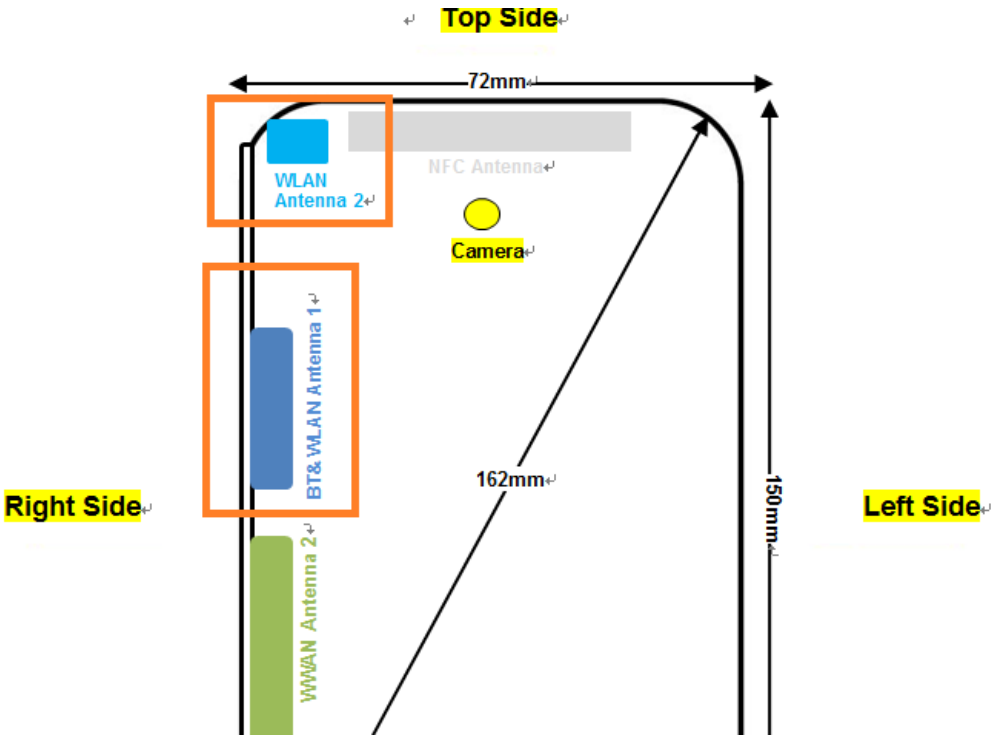
[Z999]

[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

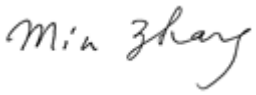
MECHANICAL MODIFICATIONS:

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



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