

Variant FCC RF Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : WCDMA/CDMA/LTE Multi-Mode Digital
Mobile Phone
BRAND NAME : ZTE
MODEL NAME : ZTE A2017U
FCC ID : SRQ-ZTEA2017U
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

This is a variant report which is only valid together with the original test report. The product was received on Jun. 14, 2016 and testing was completed on Jun. 27, 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.



Prepared by: James Huang / Manager



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.

No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test	5
1.4 Product Specification of Equipment Under Test	6
1.5 Modification of EUT	7
1.6 Testing Location	7
1.7 Applicable Standards	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Carrier Frequency Channel	8
2.2 Pre-Scanned RF Power	9
2.3 Test Mode	11
2.4 Connection Diagram of Test System	12
2.5 Support Unit used in test configuration and system	13
2.6 EUT Operation Test Setup	13
2.7 Measurement Results Explanation Example	13
3 TEST RESULT	14
3.1 Output Power Measurement	14
3.2 Radiated Band Edges and Spurious Emission Measurement	15
3.3 Antenna Requirements	19
4 LIST OF MEASURING EQUIPMENT	20
5 UNCERTAINTY OF EVALUATION	21
APPENDIX A. CONDUCTED TEST RESULTS	
APPENDIX B. RADIATED TEST RESULTS	
APPENDIX C. DUTY CYCLE PLOTS	
APPENDIX D. SETUP PHOTOGRAPHS	
APPENDIX E. PRODUCT EQUALITY DECLARATION	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR631604-01C	Rev. 01	This is a variant report for ZTE A2017U. The product equality declaration could be referred to Appendix E. Based on the similarity between two models, only Conducted Power and Radiated Emission from original test report (Sporton Report Number FR631604C) were verified for the differences.	Sep. 01, 2016



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.07 dB at 54.250 MHz
3.3	15.203 & 15.247(b)	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 Product Feature of Equipment Under Test

Product Feature	
Equipment	WCDMA/CDMA/LTE Multi-Mode Digital Mobile Phone
Brand Name	ZTE
Model Name	ZTE A2017U
FCC ID	SRQ-ZTEA2017U
EUT supports Radios application	CDMA/EV-DO/ GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ 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 v4.0 LE/Bluetooth v4.2 LE
IMEI Code	Conducted: 990006780003819 Radiation: NA
HW Version	wwdB
SW Version	A2017UV1.0.0B07
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification			
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz		
Maximum (Peak) Output Power to antenna	<Ant 1> 802.11b : 16.89 dBm (0.0489 W) 802.11g : 19.39 dBm (0.0869 W) 802.11n HT20 : 16.33 dBm (0.0430 W) 802.11n HT40 : 16.94 dBm (0.0494 W) <Ant 2> 802.11b : 16.58 dBm (0.0455 W) 802.11g : 19.06 dBm (0.0805 W) 802.11n HT20 : 16.38 dBm (0.0435 W) 802.11n HT40 : 16.88 dBm (0.0488 W) <Ant 1 + 2> 802.11b : 16.91 dBm (0.0491 W) 802.11g : 19.42 dBm (0.0875 W) 802.11n HT20 : 16.81 dBm (0.0480 W) 802.11n HT40 : 17.27 dBm (0.0533 W)		
Antenna Type	<Ant 1> 802.11b/g/n : PIFA Antenna with gain -0.50 dBi < Ant 2> 802.11b/g/n : PIFA Antenna with gain -0.50 dBi		
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)		
Antenna Function for Transmitter		Chain Port 1	Chain Port 2
	802.11 b	V	V
	802.11 g	V	V
	802.11 n SISO	V	V
	802.11 n 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.		FCC Registration No.
	TH01-KS	03CH03-KS	306251

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 C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
- ♦ 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.

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 Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-



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 shown in the following tables.

2.4GHz 802.11b RF Output Power (dBm)							
Power vs. Channel				Power vs. Data Rate			
Channel	Frequency (MHz)	Ant	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps
CH 01	2412	1	14.98	CH 11	16.86	16.81	16.88
CH 06	2437	1	16.76				
CH 11	2462	1	16.89				
CH 01	2412	2	15.84	CH 11	16.36	16.42	16.45
CH 06	2437	2	16.53				
CH 11	2462	2	16.58				
CH 01	2412	1+2(1)	11.85	CH 11	14.24	14.00	14.14
CH 06	2437	1+2(1)	13.48				
CH 11	2462	1+2(1)	14.28				
CH 01	2412	1+2(2)	13.03	CH 11	13.19	13.21	13.29
CH 06	2437	1+2(2)	13.11				
CH 11	2462	1+2(2)	13.48				
CH 01	2412	1+2	15.49	CH 11	16.76	16.63	16.75
CH 06	2437	1+2	16.31				
CH 11	2462	1+2	16.91				

2.4GHz 802.11g RF Output Power (dBm)											
Power vs. Channel				Power vs. MCS Index							
Channel	Frequency (MHz)	Ant	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	1	17.77	CH 11	19.29	19.38	19.36	19.32	19.24	19.17	19.05
CH 06	2437	1	19.23								
CH 11	2462	1	19.39								
CH 01	2412	2	18.46	CH 11	19.01	18.99	19.04	18.95	19.01	18.88	18.76
CH 06	2437	2	19.04								
CH 11	2462	2	19.06								
CH 01	2412	1+2(1)	15.21	CH 11	16.85	16.74	16.82	16.42	16.21	15.85	16.36
CH 06	2437	1+2(1)	16.83								
CH 11	2462	1+2(1)	16.88								
CH 01	2412	1+2(2)	15.86	CH 11	15.80	15.85	15.81	15.82	15.69	15.51	15.74
CH 06	2437	1+2(2)	15.87								
CH 11	2462	1+2(2)	15.89								
CH 01	2412	1+2	18.56	CH 11	19.37	19.33	19.35	19.14	18.97	18.69	19.07
CH 06	2437	1+2	19.39								
CH 11	2462	1+2	19.42								



2.4GHz 802.11n HT20 RF Output Power (dBm)											
Power vs. Channel				Power vs. MCS Index							
Channel	Frequency (MHz)	Ant	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	1	14.52	CH 11	16.28	16.30	16.28	16.31	16.23	16.25	15.64
CH 06	2437	1	15.84								
CH 11	2462	1	16.33								
CH 01	2412	2	15.61	CH 11	16.31	16.37	16.18	16.27	16.32	16.34	15.43
CH 06	2437	2	16.07								
CH 11	2462	2	16.38								
CH 01	2412	1+2(1)	12.65	CH 11	14.21	14.12	14.14	13.98	13.45	14.23	13.64
CH 06	2437	1+2(1)	13.81								
CH 11	2462	1+2(1)	14.25								
CH 01	2412	1+2(2)	12.72	CH 11	13.27	13.26	13.20	13.22	11.62	13.06	11.65
CH 06	2437	1+2(2)	13.18								
CH 11	2462	1+2(2)	13.30								
CH 01	2412	1+2	15.70	CH 11	16.78	16.72	16.71	16.63	15.64	16.69	15.77
CH 06	2437	1+2	16.52								
CH 11	2462	1+2	16.81								

2.4GHz 802.11n HT40 RF Output Power (dBm)											
Power vs. Channel				Power vs. MCS Index							
Channel	Frequency (MHz)	Ant	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	1	15.02	CH 09	16.88	16.82	16.85	16.87	16.93	16.71	16.34
CH 06	2437	1	15.75								
CH 09	2452	1	16.94								
CH 03	2422	2	16.07	CH 09	16.83	16.71	16.87	16.53	16.37	16.11	15.37
CH 06	2437	2	16.01								
CH 09	2452	2	16.88								
CH 03	2422	1+2(1)	12.78	CH 09	14.51	13.95	14.62	14.39	14.03	13.32	13.16
CH 06	2437	1+2(1)	13.16								
CH 09	2452	1+2(1)	14.67								
CH 03	2422	1+2(2)	13.55	CH 09	13.58	13.63	13.78	13.47	12.32	11.78	11.37
CH 06	2437	1+2(2)	13.14								
CH 09	2452	1+2(2)	13.80								
CH 03	2422	1+2	16.19	CH 09	17.08	16.80	17.23	16.96	16.27	15.63	15.37
CH 06	2437	1+2	16.16								
CH 09	2452	1+2	17.27								

Note: MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.



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.

Single Antenna

<2.4GHz>

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

MIMO Antenna

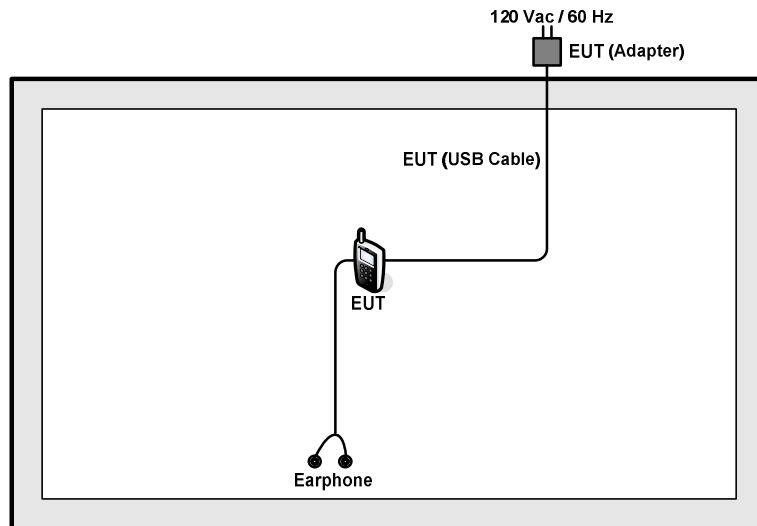
<2.4GHz>

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

2.4 Connection Diagram of Test System

<WLAN Tx Mode>

For 802.11b, 802.11n40



For 802.11g, 802.11n20



2.5 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

2.6 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

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. 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 5.5 dB.

Offset(dB) = RF cable loss(dB).
= 5.5 (dB)

3 Test Result

3.1 Output Power Measurement

3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

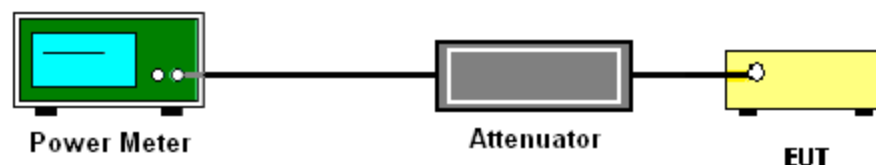
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.1.4 Test Setup



3.1.5 Test Result of Peak Output Power

Please refer to Appendix A of this test report.

3.1.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A

3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

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

3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

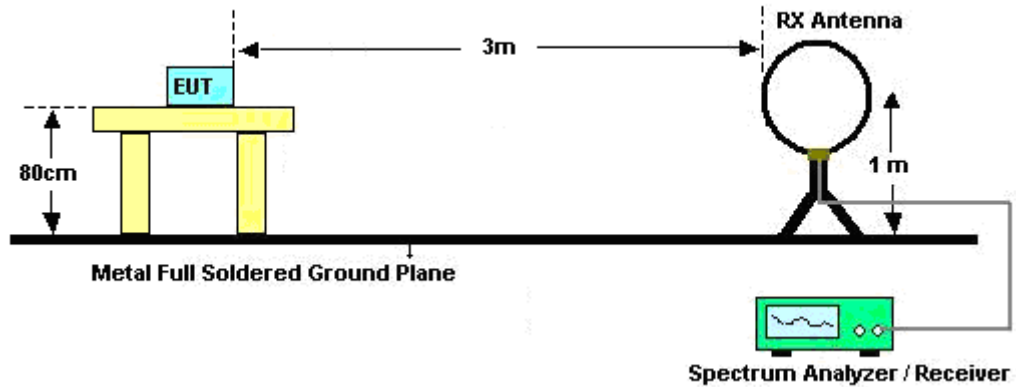
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. 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.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

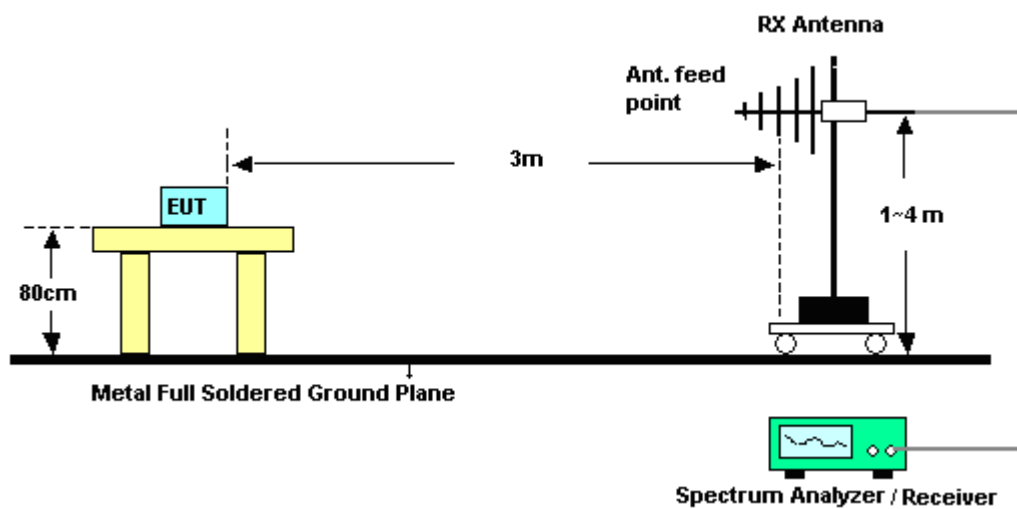
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.2.4 Test Setup

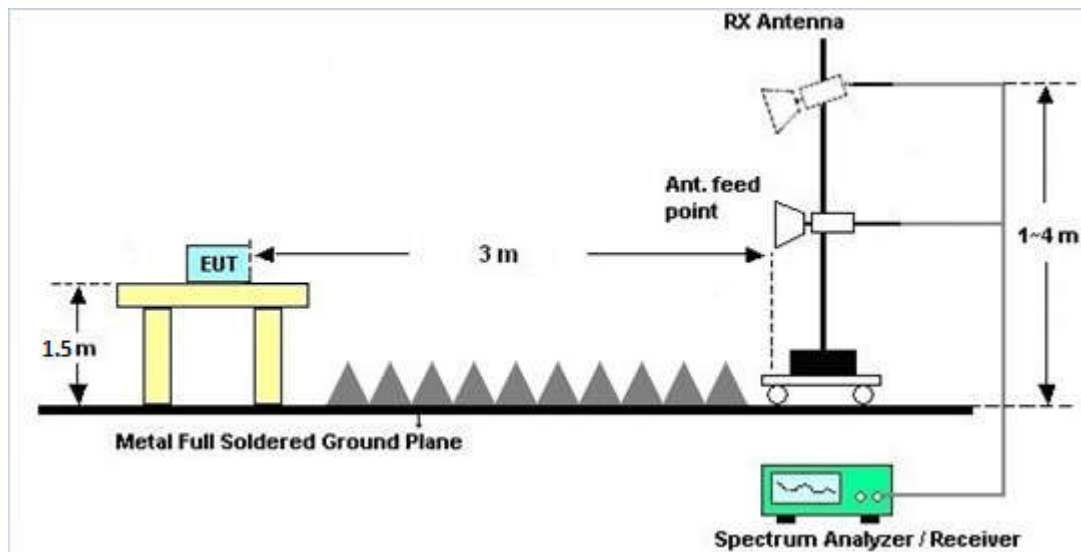
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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 of this test report.

3.2.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B.

3.3 Antenna Requirements

3.3.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the Antenna exceeds 6 dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.3.3 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.

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.

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant. 1	Ant. 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	-0.50	-0.50	-0.50	2.51	0.00	0.00

$Power\ Limit\ Reduction = DG(Power) - 6dBi, (min = 0)$

$PSD\ Limit\ Reduction = DG(PSD) - 6dBi, (min = 0)$



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	Sep. 10, 2015	Jun. 17, 2016	Sep. 09, 2016	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 20, 2016	Jun. 17, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Jun. 17, 2016	Jan. 19, 2017	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Jun. 17, 2016~ Jun. 27, 2016	Sep. 09, 2016	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 22, 2016	Jun. 17, 2016~ Jun. 27, 2016	Apr. 21, 2017	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 07, 2015	Jun. 17, 2016~ Jun. 27, 2016	Nov. 06, 2016	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz~2GHz	Apr. 16, 2016	Jun. 17, 2016~ Jun. 27, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 16, 2016	Jun. 17, 2016~ Jun. 27, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz~40GHz	Oct. 10, 2015	Jun. 17, 2016~ Jun. 27, 2016	Oct. 09, 2016	Radiation (03CH03-KS)
Amplifier	Burgeon	BPA-530	102212	0.01MHz~3000MHz	Aug. 10, 2015	Jun. 17, 2016~ Jun. 27, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 24, 2015	Jun. 17, 2016~ Jun. 27, 2016	Oct. 23, 2016	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jun. 17, 2016~ Jun. 27, 2016	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 17, 2016~ Jun. 27, 2016	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 17, 2016~ Jun. 27, 2016	NCR	Radiation (03CH03-KS)

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% ($U = 2Uc(y)$)	4.5dB
---	-------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.5dB
---	-------

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.6dB
---	-------



Appendix A. Conducted Test Results

Test Engineer:	Ivan Zhang	Temperature:	24~25	°C
Test Date:	2016/6/17	Relative Humidity:	54~55	%

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	14.98	15.84		30.00	30.00	-0.50	-0.50	14.48	15.34	36.00	36.00	Pass
11b	1Mbps	1	6	2437	16.76	16.53		30.00	30.00	-0.50	-0.50	16.26	16.03	36.00	36.00	Pass
11b	1Mbps	1	11	2462	16.89	16.58		30.00	30.00	-0.50	-0.50	16.39	16.08	36.00	36.00	Pass
11g	6Mbps	1	1	2412	17.77	18.46		30.00	30.00	-0.50	-0.50	17.27	17.96	36.00	36.00	Pass
11g	6Mbps	1	6	2437	19.23	19.04		30.00	30.00	-0.50	-0.50	18.73	18.54	36.00	36.00	Pass
11g	6Mbps	1	11	2462	19.39	19.06		30.00	30.00	-0.50	-0.50	18.89	18.56	36.00	36.00	Pass
HT20	MCS0	1	1	2412	14.52	15.61		30.00	30.00	-0.50	-0.50	14.02	15.11	36.00	36.00	Pass
HT20	MCS0	1	6	2437	15.84	16.07		30.00	30.00	-0.50	-0.50	15.34	15.57	36.00	36.00	Pass
HT20	MCS0	1	11	2462	16.33	16.38		30.00	30.00	-0.50	-0.50	15.83	15.88	36.00	36.00	Pass
HT40	MCS0	1	3	2422	15.02	16.07		30.00	30.00	-0.50	-0.50	14.52	15.57	36.00	36.00	Pass
HT40	MCS0	1	6	2437	15.75	16.01		30.00	30.00	-0.50	-0.50	15.25	15.51	36.00	36.00	Pass
HT40	MCS0	1	9	2452	16.94	16.88		30.00	30.00	-0.50	-0.50	16.44	16.38	36.00	36.00	Pass
11b	1Mbps	2	1	2412	11.85	13.03	15.49	30.00		-0.50		14.99		36.00		Pass
11b	1Mbps	2	6	2437	13.48	13.11	16.31	30.00		-0.50		15.81		36.00		Pass
11b	1Mbps	2	11	2462	14.28	13.48	16.91	30.00		-0.50		16.41		36.00		Pass
11g	6Mbps	2	1	2412	15.21	15.86	18.56	30.00		-0.50		18.06		36.00		Pass
11g	6Mbps	2	6	2437	16.83	15.87	19.39	30.00		-0.50		18.89		36.00		Pass
11g	6Mbps	2	11	2462	16.88	15.89	19.42	30.00		-0.50		18.92		36.00		Pass
HT20	MCS0	2	1	2412	12.65	12.72	15.70	30.00		-0.50		15.20		36.00		Pass
HT20	MCS0	2	6	2437	13.81	13.18	16.52	30.00		-0.50		16.02		36.00		Pass
HT20	MCS0	2	11	2462	14.25	13.30	16.81	30.00		-0.50		16.31		36.00		Pass
HT40	MCS0	2	3	2422	12.78	13.55	16.19	30.00		-0.50		15.69		36.00		Pass
HT40	MCS0	2	6	2437	13.16	13.14	16.16	30.00		-0.50		15.66		36.00		Pass
HT40	MCS0	2	9	2452	14.67	13.80	17.27	30.00		-0.50		16.77		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	0.05	0.05	12.51	13.36	
11b	1Mbps	1	6	2437	0.05	0.05	14.20	14.08	
11b	1Mbps	1	11	2462	0.05	0.05	14.46	14.10	
11g	6Mbps	1	1	2412	0.21	0.23	11.21	12.14	
11g	6Mbps	1	6	2437	0.21	0.23	12.84	12.58	
11g	6Mbps	1	11	2462	0.21	0.23	12.92	12.71	
HT20	MCS0	1	1	2412	0.26	0.23	8.11	8.75	
HT20	MCS0	1	6	2437	0.26	0.23	9.41	9.69	
HT20	MCS0	1	11	2462	0.26	0.23	9.66	9.77	
HT40	MCS0	1	3	2422	0.44	0.43	7.96	8.96	
HT40	MCS0	1	6	2437	0.44	0.43	9.04	8.94	
HT40	MCS0	1	9	2452	0.44	0.43	9.48	9.61	
11b	1Mbps	2	1	2412	0.02	0.04	10.30	10.25	13.29
11b	1Mbps	2	6	2437	0.02	0.04	11.99	10.65	14.38
11b	1Mbps	2	11	2462	0.02	0.04	11.96	11.08	14.55
11g	6Mbps	2	1	2412	0.19	0.24	8.71	9.10	11.92
11g	6Mbps	2	6	2437	0.19	0.24	10.40	9.36	12.92
11g	6Mbps	2	11	2462	0.19	0.24	10.29	9.58	12.96
HT20	MCS0	2	1	2412	0.25	0.23	6.07	6.41	9.26
HT20	MCS0	2	6	2437	0.25	0.23	7.48	6.78	10.16
HT20	MCS0	2	11	2462	0.25	0.23	7.51	6.89	10.22
HT40	MCS0	2	3	2422	0.46	0.48	5.55	6.40	9.01
HT40	MCS0	2	6	2437	0.46	0.48	6.74	5.82	9.31
HT40	MCS0	2	9	2452	0.46	0.48	7.49	6.37	9.98

Note: Measured power (dBm) has offset with cable loss.



Appendix B. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 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)
802.11b CH 01 2412MHz		2363.3	51.37	-22.63	74	55.94	26.91	5.54	37.02	133	156	P	H
		2389.69	40.08	-13.92	54	44.51	27	5.59	37.02	133	156	A	H
	*	2413.193	99.6	-	-	103.86	27.13	5.61	37	133	156	P	H
	*	2413.277	96.29	-	-	100.55	27.13	5.61	37	133	156	A	H
		2353.42	51.54	-22.46	74	56.11	26.91	5.54	37.02	179	258	P	V
		2389.95	39.56	-14.44	54	43.99	27	5.59	37.02	179	258	A	V
	*	2413.277	95.2	-	-	99.46	27.13	5.61	37	179	258	P	V
	*	2413.527	91.98	-	-	96.24	27.13	5.61	37	179	258	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 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)
802.11b CH 01 2412MHz		4824	36.64	-37.36	74	58.1	31.51	9.13	62.1	100	360	P	H
		4824	36.86	-37.14	74	58.32	31.51	9.13	62.1	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11g (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)
802.11g CH 11 2462MHz	*	2456.697	101.38	-	-	105.16	27.51	5.67	36.96	327	183	P	H
	*	2456.78	93.97	-	-	97.75	27.51	5.67	36.96	327	183	A	H
		2484.76	51.44	-22.56	74	55.05	27.64	5.69	36.94	327	183	P	H
		2483.62	41.43	-12.57	54	45.04	27.64	5.69	36.94	327	183	A	H
	*	2458.617	99.18	-	-	102.96	27.51	5.67	36.96	300	221	P	V
	*	2458.867	91.8	-	-	95.58	27.51	5.67	36.96	300	221	A	V
		2490.64	51.36	-22.64	74	54.81	27.77	5.71	36.93	300	221	P	V
		2483.98	40.99	-13.01	54	44.6	27.64	5.69	36.94	300	221	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11g (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)
802.11g CH 11 2462MHz		4926	35.96	-38.04	74	56.99	31.67	9.27	61.97	100	360	P	H
		7386	40.44	-33.56	74	53.98	34.29	11.29	59.12	100	360	P	H
		4926	36.62	-37.38	74	57.65	31.67	9.27	61.97	100	360	P	V
		7386	41.98	-32.02	74	55.52	34.29	11.29	59.12	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (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 HT20 CH 11 2462MHz	*	2456.446	97.17	-	-	100.95	27.51	5.67	36.96	290	285	P	H
	*	2455.862	90.05	-	-	93.83	27.51	5.67	36.96	290	285	A	H
		2486.2	51.85	-22.15	74	55.46	27.64	5.69	36.94	290	285	P	H
		2484.04	41.49	-12.51	54	45.1	27.64	5.69	36.94	290	285	A	H
	*	2456.196	98.05	-	-	101.83	27.51	5.67	36.96	400	287	P	V
	*	2456.279	90.3	-	-	94.08	27.51	5.67	36.96	400	287	A	V
		2483.62	51.57	-22.43	74	55.18	27.64	5.69	36.94	400	287	P	V
		2484.34	41.71	-12.29	54	45.32	27.64	5.69	36.94	400	287	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (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 HT20 CH 11 2462MHz		4926	36.13	-37.87	74	57.16	31.67	9.27	61.97	100	360	P	H
		7386	40.38	-33.62	74	53.92	34.29	11.29	59.12	100	360	P	H
		4926	36.69	-37.31	74	57.72	31.67	9.27	61.97	100	360	P	V
		7386	40.92	-33.08	74	54.46	34.29	11.29	59.12	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

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 09 2452MHz		2382.93	51.03	-22.97	74	55.53	26.95	5.57	37.02	280	48	P	H
		2388.52	40.76	-13.24	54	45.19	27	5.59	37.02	280	48	A	H
	*	2454.943	94.75			98.53	27.51	5.67	36.96	280	48	P	H
	*	2459.368	86.8			90.58	27.51	5.67	36.96	280	48	A	H
		2485.42	58.36	-15.64	74	61.97	27.64	5.69	36.94	280	48	P	H
		2486.08	42.94	-11.06	54	46.55	27.64	5.69	36.94	280	48	A	H
		2388.91	53.79	-20.21	74	58.22	27	5.59	37.02	131	244	P	V
		2388.39	40.73	-13.27	54	45.16	27	5.59	37.02	131	244	A	V
	*	2460.705	95.47			99.25	27.51	5.67	36.96	131	244	P	V
	*	2456.196	88.02			91.8	27.51	5.67	36.96	131	244	A	V
		2485.36	59.51	-14.49	74	63.12	27.64	5.69	36.94	131	244	P	V
		2485.48	42.67	-11.33	54	46.28	27.64	5.69	36.94	131	244	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

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 HT40 CH 09 2452MHz		4902	36.4	-37.6	74	57.5	31.64	9.25	61.99	100	360	P	H
		7356	39.23	-34.77	74	52.88	34.19	11.29	59.13	100	360	P	H
		4904	36.48	-37.52	74	57.58	31.64	9.25	61.99	100	360	P	V
		7356	39.25	-34.75	74	52.9	34.19	11.29	59.13	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

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)
2.4GHz 802.11n HT40 LF		55.22	29.19	-10.81	40	53.3	7.6	0.89	32.6	100	214	P	H
		105.66	30.03	-13.47	43.5	47.91	13.18	1.24	32.3	-	-	P	H
		153.19	30.25	-13.25	43.5	47.56	13.62	1.5	32.43	-	-	P	H
		173.56	31.44	-12.06	43.5	49.98	12.34	1.6	32.48	-	-	P	H
		231.76	29.44	-16.56	46	47.77	12.29	1.73	32.35	-	-	P	H
		321.97	31.03	-14.97	46	45.78	15.3	2.21	32.26	-	-	P	H
	!	54.25	34.93	-5.07	40	58.68	7.94	0.89	32.58	100	124	P	V
		103.72	29.05	-14.45	43.5	46.97	13.15	1.23	32.3	-	-	P	V
		154.16	31.4	-12.1	43.5	48.77	13.56	1.5	32.43	-	-	P	V
		180.35	27.66	-15.84	43.5	46.62	11.92	1.63	32.51	-	-	P	V
		306.45	26.97	-19.03	46	42.09	15.02	2.16	32.3	-	-	P	V
		323.91	27.43	-18.57	46	42.13	15.33	2.21	32.24	-	-	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.	
1+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

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)

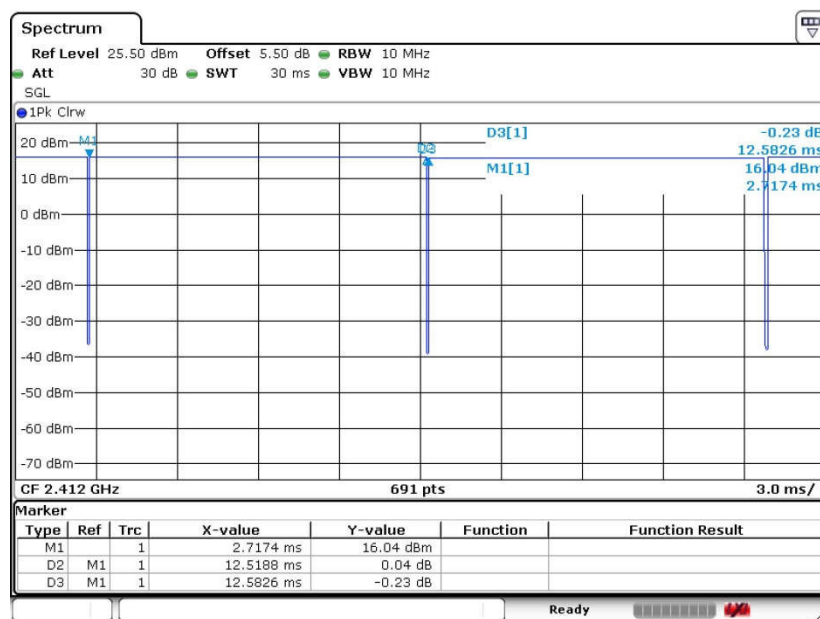
= -10.46(dB)

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

Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b ANT 1+2	99.49	-	-	10Hz
802.11g ANT 1+2	95.78	2.07	0.48	1kHz
2.4GHz 802.11n HT20 ANT 1+2	94.37	1.92	0.52	1kHz
2.4GHz 802.11n HT40 ANT 1+2	89.88	0.95	1.05	3kHz

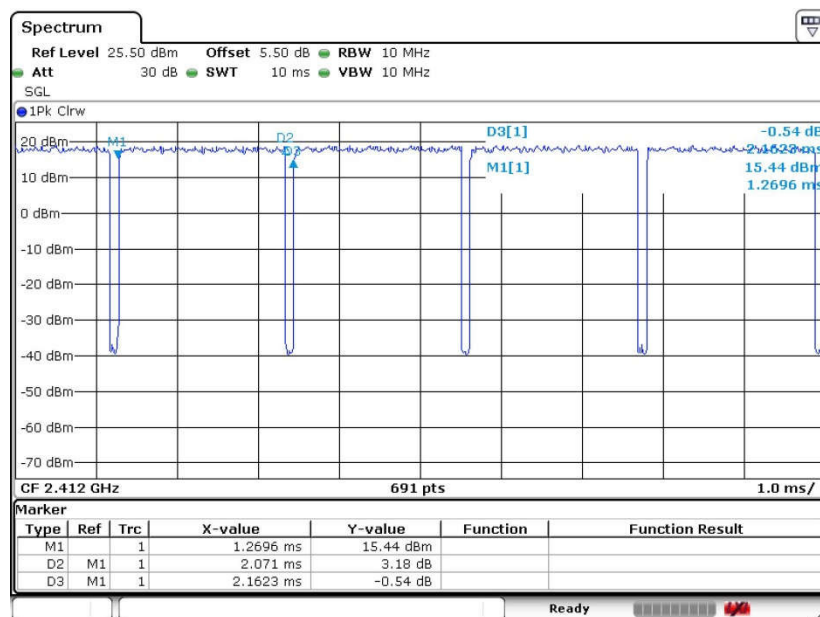
802.11b



Date: 17 JUN 2016 15:49:58



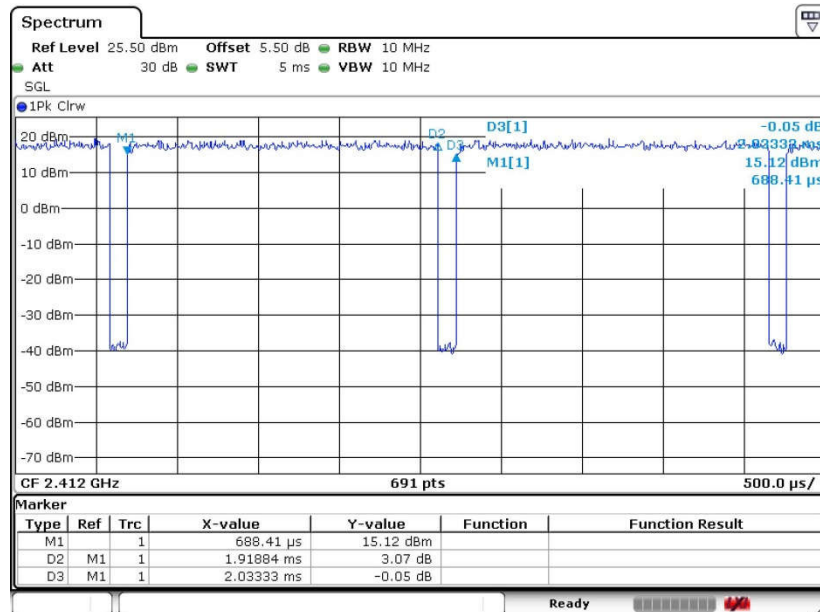
802.11g



Date: 17.JUN.2016 16:51:10



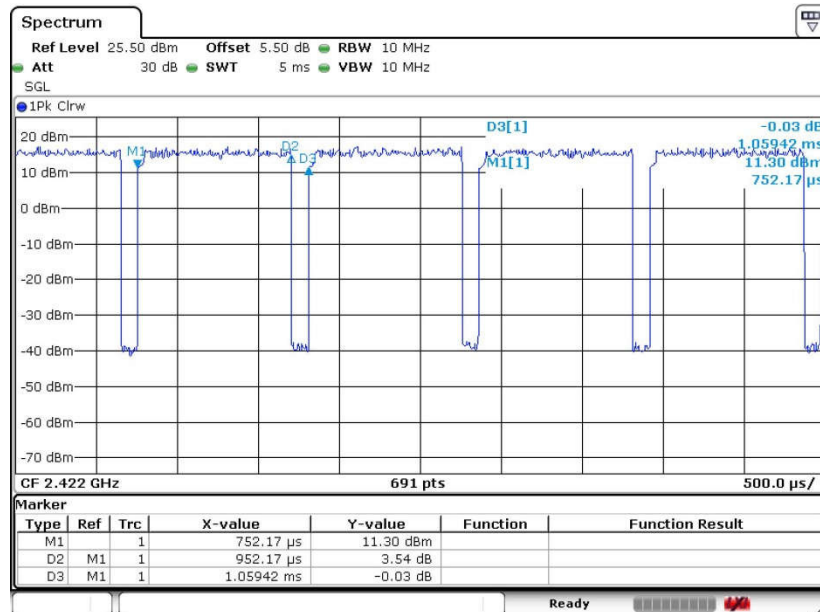
2.4GHz 802.11n HT20



Date: 17.JUN.2016 16:54:04



2.4GHz 802.11n HT40



Date: 17.JUN.2016 16:04:58



Appendix E. Product Equality Declaration

ZTE CORPORATION

Product Change Description

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

[ZTE A2017U]

[ZTE Corporation]

is the variant of the initial certified product,

[ZTE A2017U]

[ZTE Corporation]

[Project Number:16ZTE027]

SOFTWARE MODIFICATIONS:

Protocol Stack changes: NO

MMS/STK changes: NO

JAVA changes: NO

Other changes detailed: NO

HARDWARE MODIFICATION:

Band changes: NO

Power Amplifier changes: NO

Antenna changes: GPS/WiFi/Bluetooth 3in1 antenna is now updated.

Aiming at improving GPS performance, we updated this antenna and this result to 1dB efficiency better than previous one. Meanwhile, WiFi/Bluetooth efficiency was slightly down.

Before



After

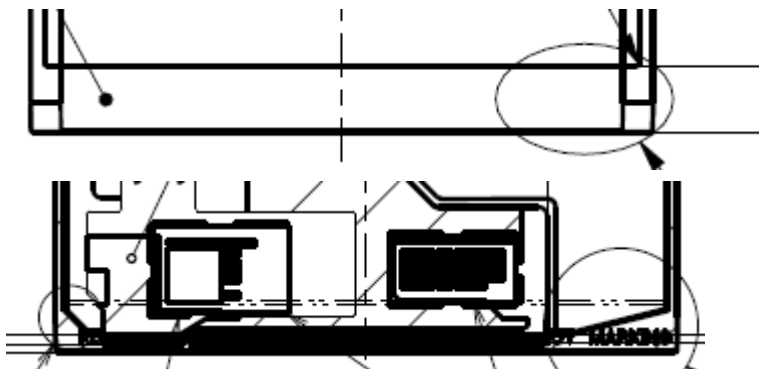


PCB Layout changes: NO

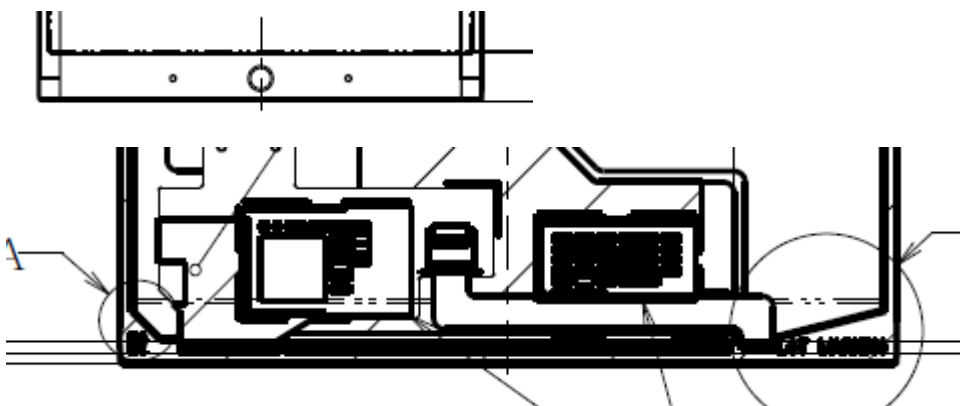
Components on PCB changes: NO

LCD changes: Yes, Added touch key and touch key FPC

Before



After



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

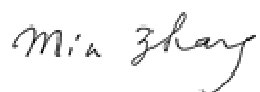
Other changes detailed: NO

ACCESSORY MODIFICATIONS:

Battery changes:NO

AC Adaptor changes:NO

Earphone changes:NO



APPROVED BY: Min zhang

Project Manager: Li xiaofeng

Date:2016-6-6

Company: ZTE Corporation

Address: B109, #889, Bibo Rd, Zhangjiang Hi-Tech Park, Shanghai,China

Tel:+86-21-68896840

Fax: +86-21-68896835