



Variant FCC RF Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : Wireless Access Terminal
BRAND NAME : ZTE
MODEL NAME : WF721
FCC ID : SRQ-WF721
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter (PCB)

This is a variant report which is only valid together with the original test report. The product was received on Jun. 21, 2016 and testing was completed on Jul. 06, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-D-2010 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

- 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 6
 - 1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator 7
 - 1.7 Testing Location 7
 - 1.8 Applicable Standards 7
- 2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST 8**
 - 2.1 Test Mode..... 8
 - 2.2 Connection Diagram of Test System 9
 - 2.3 Support Unit used in test configuration 9
- 3 CONDUCTED TEST RESULT 10**
 - 3.1 Measuring Instruments 10
 - 3.2 Test Setup 10
 - 3.3 Test Result of Conducted Test 10
 - 3.4 Conducted Output Power 10
- 4 RADIATED TEST ITEMS 11**
 - 4.1 Measuring Instruments 11
 - 4.2 Test Setup 11
 - 4.3 Test Result of Radiated Test 11
 - 4.4 Effective Radiated Power and Effective Isotropic Radiated Power Measurement 12
 - 4.5 Field Strength of Spurious Radiation Measurement 14
- 5 LIST OF MEASURING EQUIPMENT 15**
- 6 UNCERTAINTY OF EVALUATION 16**

APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST

APPENDIX C. TEST SETUP PHOTOGRAPHS

APPENDIX D. PRODUCT EQUALITY DECLARATION



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
4.4	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
4.5	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log ₁₀ (P[Watts])	PASS	Under limit 30.51 dB at 7521.000 MHz



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	Wireless Access Terminal
Brand Name	ZTE
Model Name	WF721
FCC ID	SRQ-WF721
EUT supports Radios application	GPRS/ WCDMA
IMEI Code	Conducted: NA Radiation: 004401783969955 ERP/EIRP: 004401783970190
HW Version	dekA
SW Version	WF721 1.1.21
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	GSM/GPRS: 850: 824.2 MHz ~ 848.8 MHz 1900: 1850.2 MHz ~ 1909.8MHz WCDMA: Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz
Rx Frequency	GSM/GPRS: 850: 869.2 MHz ~ 893.8 MHz 1900: 1930.2 MHz ~ 1989.8 MHz WCDMA: Band V: 871.4 MHz ~ 891.6 MHz Band II: 1932.4 MHz ~ 1987.6 MHz
Maximum Output Power to Antenna	GSM/GPRS: 850: 31.74 dBm 1900: 28.95 dBm WCDMA: Band V: 22.48 dBm Band II: 22.20 dBm
Antenna Type	PCB Antenna
Type of Modulation	GPRS: GMSK WCDMA: QPSK (Uplink)

1.5 Modification of EUT

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

1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)
Part 22	GSM850 GPRS class 8	GMSK	1.4322
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.0989
Part 24	GSM1900 GPRS class 8	GMSK	1.0423
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.2455

1.7 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	03CH02-KS	418269

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

1.8 Applicable Standards

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

- 47 CFR Part 2, 22(H), 24(E)
- ANSI / TIA / EIA-603-D-2010
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

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

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

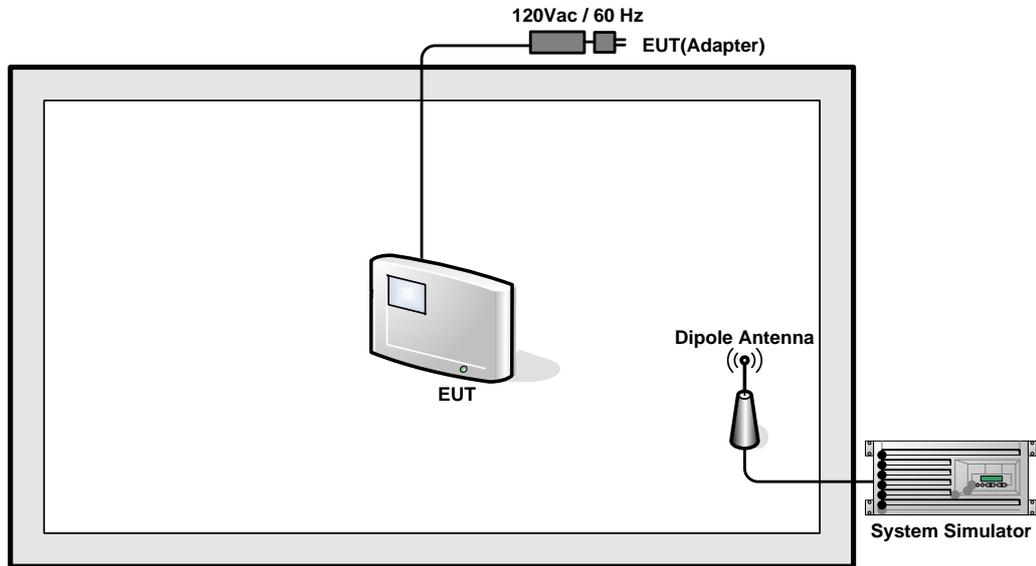
1. 30 MHz to 10th harmonic for GSM850 and WCDMA Band V.
2. 30 MHz to 10th harmonic for GSM1900 and WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GPRS class 8 Link	■ GPRS class 8 Link
GSM 1900	■ GPRS class 8 Link	■ GPRS class 8 Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

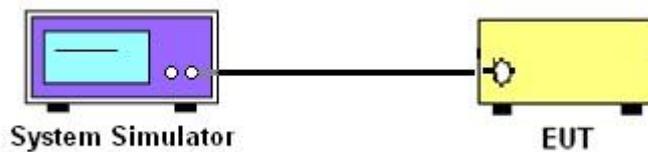
3 Conducted Test Result

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 Conducted Output Power



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power

3.4.1 Description of the Conducted Output Power

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

3.4.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

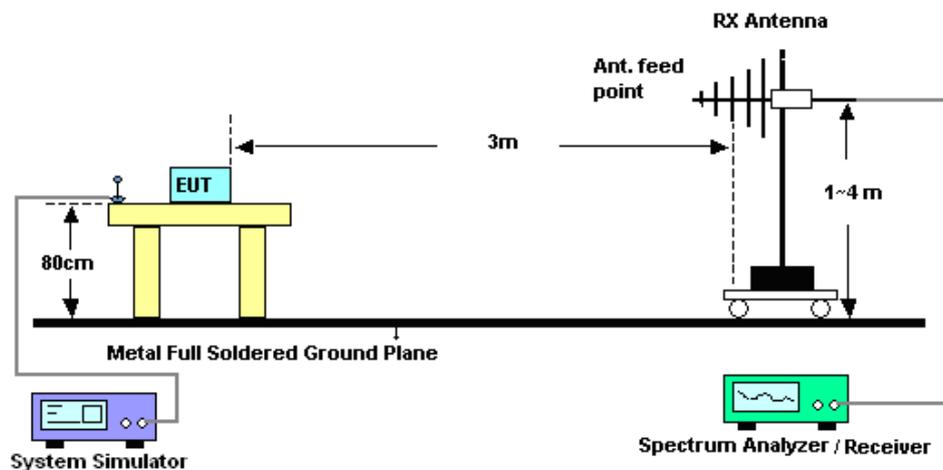
4 Radiated Test Items

4.1 Measuring Instruments

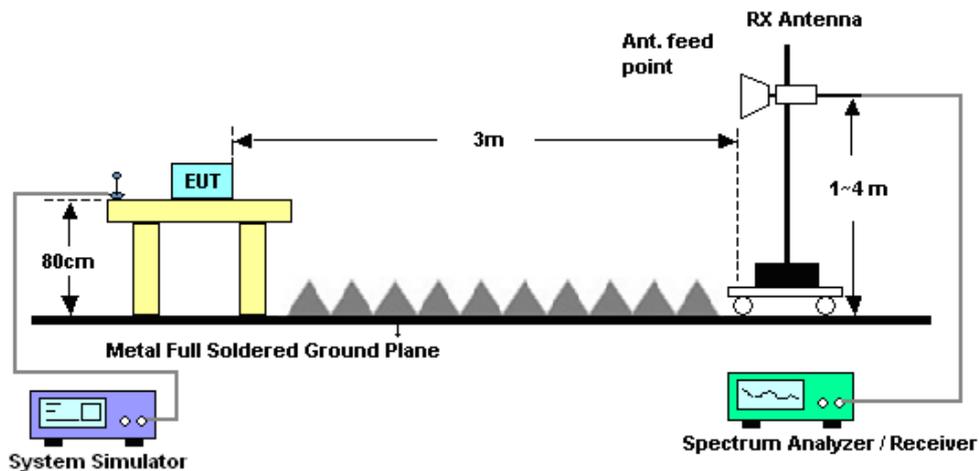
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.



4.4 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

4.4.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-D-2010, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. The ERP of mobile transmitters must not exceed 7 Watts (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band).

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-D-2010 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-D. The EUT was replaced by the substitution antenna at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, $EIRP = LVL + \text{Correction factor}$ and $ERP = EIRP - 2.15$. Take the record of the output power at substitution antenna.



	GSM/GPRS/EDGE	WCDMA/HSPA
SPAN	500kHz	10MHz
RBW	10kHz	100kHz
VBW	30kHz	300kHz
Detector	RMS	RMS
Trace	Average	Average
Average Type	Power	Power
Sweep Count	100	100



4.5 Field Strength of Spurious Radiation Measurement

4.5.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.5.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.

$$\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$$

$$\text{ERP (dBm)} = \text{EIRP} - 2.15$$

The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$

$$= -13\text{dBm.}$$



5 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	Jul. 06, 2016	Sep. 09, 2016	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Jul. 06, 2016	Oct. 23, 2016	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz~44GHz; Max 30dB	Apr. 22, 2016	Jul. 05, 2016	Apr. 21, 2017	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz~2GHz	Sep. 12, 2015	Jul. 05, 2016	Sep. 11, 2016	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 07, 2015	Jul. 05, 2016	Nov. 06, 2016	Radiation (03CH02-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz~40GHz	Oct. 10, 2015	Jul. 05, 2016	Oct. 09, 2016	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz~1000MHz / 32 dB	Apr. 22, 2016	Jul. 05, 2016	Apr. 21, 2017	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1~26.5GHz Gain 30dB	Oct. 24, 2015	Jul. 05, 2016	Oct. 23, 2016	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	61601000247 3	N/A	NCR	Jul. 05, 2016	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jul. 05, 2016	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jul. 05, 2016	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required



6 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 (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% ($U = 2Uc(y)$)	5.1dB
---	-------



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GPRS class 8	31.74	31.19	31.66	28.95	28.86	28.62

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2Kbps	22.44	22.48	22.33	22.20	21.82	22.09



Appendix B. Test Results of Radiated Test

ERP/EIRP

Channel	Mode	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	GSM850 GPRS class 8	28.66	0.7345	29.92	0.9817
Middle		29.65	0.9226	30.79	1.1995
Highest		30.47	1.1143	31.56	1.4322
Lowest	WCDMA Band V RMC 12.2Kbps	19.25	0.0841	19.90	0.0977
Middle		19.27	0.0845	19.95	0.0989
Highest		19.18	0.0828	19.79	0.0953
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900 GPRS class 8	29.91	0.9795	27.43	0.5534
Middle		29.27	0.8453	26.65	0.4624
Highest		30.18	1.0423	26.50	0.4467
Lowest	WCDMA Band II RMC 12.2Kbps	23.90	0.2455	20.59	0.1146
Middle		23.33	0.2153	20.34	0.1081
Highest		23.62	0.2301	20.22	0.1052
Limit	EIRP < 2W	Result		PASS	

**Radiated Spurious Emission**

GSM850 (GPRS class 8)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672	-55.35	-13	-42.35	-57.53	-57.24	1.86	5.90	H
	2509	-54.20	-13	-41.20	-63.23	-56.54	2.31	6.80	H
	3345	-54.15	-13	-41.15	-66.78	-56.55	2.85	7.40	H
	1672	-60.14	-13	-47.14	-59.00	-62.03	1.86	5.90	V
	2509	-52.43	-13	-39.43	-63.40	-54.77	2.31	6.80	V
	3345	-53.26	-13	-40.26	-67.24	-55.66	2.85	7.40	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

GSM1900 (GPRS class 8)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3759	-52.57	-13	-39.57	-66.77	-57.17	3	7.60	H
	5640	-49.73	-13	-36.73	-63.52	-55.99	3.84	10.10	H
	7521	-43.51	-13	-30.51	-63.29	-51.01	4.43	11.93	H
	3759	-53.77	-13	-40.77	-66.26	-58.37	3	7.60	V
	5640	-50.68	-13	-37.68	-63.09	-56.94	3.84	10.10	V
	7521	-46.16	-13	-33.16	-63.95	-53.66	4.43	11.93	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



WCDMA Band V(RMC 12.2Kbps)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672	-56.37	-13	-43.37	-58.55	-58.26	1.86	5.90	H
	2509	-54.54	-13	-41.54	-63.57	-56.88	2.31	6.80	H
	3345	-54.11	-13	-41.11	-66.74	-56.51	2.85	7.40	H
	1672	-59.14	-13	-46.14	-58.00	-61.03	1.86	5.90	V
	2509	-52.16	-13	-39.16	-63.13	-54.50	2.31	6.80	V
	3345	-52.21	-13	-39.21	-66.19	-54.61	2.85	7.40	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA Band II(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3759	-51.52	-13	-38.52	-65.72	-56.12	3	7.60	H
	5640	-48.57	-13	-35.57	-62.36	-54.83	3.84	10.10	H
	7521	-44.07	-13	-31.07	-63.85	-51.57	4.43	11.93	H
	3759	-54.50	-13	-41.50	-66.99	-59.10	3	7.60	V
	5640	-50.09	-13	-37.09	-62.5	-56.35	3.84	10.10	V
	7521	-45.53	-13	-32.53	-63.32	-53.03	4.43	11.93	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



Appendix D. Product Equality Declaration

ZTE CORPORATION

Product Change Description

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

[WF721]

[ZTE Corporation]

is the variant of the initial certified product,

[WF721]

[ZTE Corporation]

SOFTWARE MODIFICATIONS:

Protocol Stack changes: NO

MMS/STK changes: NO

JAVA changes: NO

Other changes detailed:

- NV item change to support the new sp8t since its control logic is different with the Original one.
- Code change to detect the device use the original sp8t or new sp8t.

HARDWARE MODIFICATION:

Band changes: NO

Power Amplifier changes: NO

Antenna changes: NO

PCB Layout changes: NO

Components on PCB changes: We changed the original sp8t RF switch to new one because the original one stopped production by the supplier. And these two sp8t RF switches are pin-pin compatible. Two resistors are changed to enforce the hardware detection function so we can know which sp8t we are using.

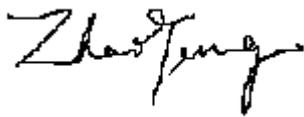
LCD changes: NA
Speaker changes: NA
Camera changes: NA
Vibrator changes: NA
Bluetooth changes: NA
FM changes: NA
Other changes: NO

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: zhaoyang

Project Manager: Zheng dahu

Date:2016-3-24

Company: ZTE Corporation

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

Tel:+86-21-68896840

Fax: +86-21-68896835