Variant FCC RF Test Report

APPLICANT	**:**	**ZTE CORPORATION**
EQUIPMENT	**:**	**LTE Ufi**
BRAND NAME	**:**	**ZTE**
MODEL NAME	**:**	**Z288L**
FCC ID	**:**	**SRQ-Z288L**
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 Jul. 06, 2015 and testing was completed on Jul. 30, 2015. 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-C-2004 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.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China

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APPENDIX A. PRODUCT EQUALITY DECLARATION

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG450601-01A	Rev. 01	This is a variant report for Z288L. The product equality declaration could be referred to Appendix A. All the test cases were performed on the original test report which can be referred to Sporton Report Number FG450601A. Based on the original test report, only the conducted power, ERP/EIRP and the worst cases of radiated spurious emission were verified for the differences.	Aug. 04, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	N/A	PASS	-
3.2	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
3.2	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.3	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 31.46 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	LTE Ufi
Brand Name	ZTE
Model Name	Z288L
FCC ID	SRQ-Z288L
EUT supports Radios application	CDMA/EV-DO/LTE/WLAN 2.4GHz 802.11b/g/n HT20
IMEI Code	Radiation: 990003230310761 ERP/EIRP: 990003230310746
HW Version	Z288LHWV1.1
SW Version	TF_US_Z288LV1.0.0B05
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 subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	CDMA2000 BC0: 824.70 MHz ~ 848.31 MHz CDMA2000 BC1: 1851.25 MHz ~ 1908.75 MHz
Rx Frequency	CDMA2000 BC0: 869.70 MHz ~ 893.31 MHz CDMA2000 BC1: 1931.25 MHz ~ 1988.75 MHz
Maximum Output Power to Antenna	CDMA2000 BC0 : 24.19 dBm CDMA2000 BC1 : 23.80 dBm
Antenna Type	PIFA Antenna
Type of Modulation	CDMA2000 : QPSK CDMA2000 1xEV-DO : QPSK/8PSK

1.5 Modification of EUT

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

1.6 Maximum ERP/EIRP Power

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)
Part 22	CDMA2000 BC0 1xRTT	QPSK	0.1311
Part 24	CDMA2000 BC1 1xRTT	QPSK	0.1828

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 2009 requirement.

1.8 Applicable Standards

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

- FCC 47 CFR Part 2, 22(H), 24(E)
- ANSI / TIA / EIA-603-C-2004
- 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 emissions were investigated as following frequency range:

1. 30 MHz to 10th harmonic for CDMA2000 BC0.
2. 30 MHz to 10th harmonic for CDMA2000 BC1.

All modes and data rates and positions were investigated.

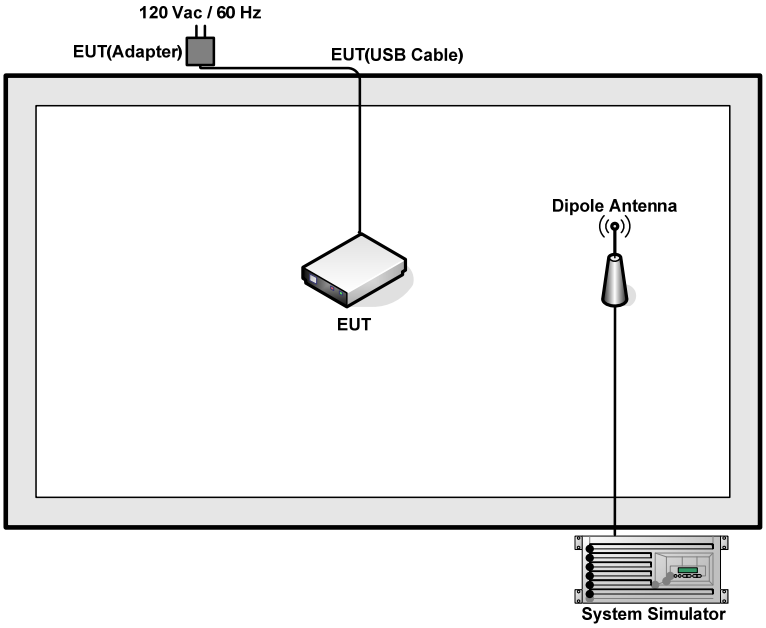
Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
CDMA2000 BC0	■ 1xRTT Link Mode	■ 1xRTT Link Mode
CDMA2000 BC1	■ 1xRTT Link Mode	■ 1xRTT Link Mode

Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)						
Band	**CDMA2000 BC0**			**CDMA2000 BC1**		
Channel	**1013**	**384**	**777**	**25**	**600**	**1175**
Frequency	**824.7**	**836.52**	**848.31**	**1851.25**	**1880**	**1908.75**
1xRTT RC1 SO55	24.07	24.15	24.04	23.67	23.65	23.76
1xRTT RC3 SO55	24.09	**24.19**	24.06	23.72	23.75	**23.80**
1xRTT RC3 SO32(+ F-SCH)	24.05	24.09	23.98	23.67	23.62	23.66
1xRTT RC3 SO32(+SCH)	24.01	24.07	23.92	23.63	23.62	23.65
1xEV-DO RTAP 153.6kbps	24.11	24.14	24.04	23.70	23.73	23.78
1xEV-DO RETAP 4096Bits	24.09	24.16	24.03	23.67	23.70	23.72

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

3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

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.

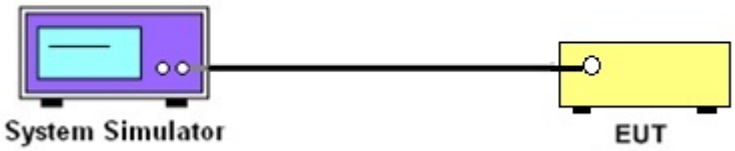
3.1.2 Measuring Instruments

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

3.1.3 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.

3.1.4 Test Setup



3.1.5 Test Result of Conducted Output Power

CDMA2000 BC0			
Test Mode	**CDMA 2000 1xRTT**		
Test Status	**RC3+SO55**		
Channel	**1013 (Low)**	**384 (Mid)**	**777 (High)**
Frequency (MHz)	**824.70**	**836.52**	**848.31**
Conducted Power (dBm)	24.09	24.19	24.06

CDMA2000 BC1			
Test Mode	**CDMA 2000 1xRTT**		
Test Status	**RC3+SO55**		
Channel	**25 (Low)**	**600 (Mid)**	**1175 (High)**
Frequency (MHz)	**1851.25**	**1880.00**	**1908.75**
Conducted Power (dBm)	23.72	23.75	23.80

Note: maximum average power for CDMA2000.

3.2 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

3.2.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, 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 and the EIRP of mobile transmitters are limited to 2 Watts.

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 971168 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-C-2004 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-C. 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 + Correction factor and ERP = EIRP - 2.15. Take the record of the output power at substitution antenna.

	CDMA2000/EV-DO
SPAN	3MHz
RBW	30kHz
VBW	100kHz
Detector	RMS
Trace	Average
Average Type	Power
Sweep Count	100

3.2.4 Test Result of ERP

CDMA2000 BC0 1xRTT_RC3+SO55 Radiated Power ERP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	824.7	21.18	0.1311	6.74	0.0047
Middle	836.52	20.55	0.1135	6.97	0.0050
Highest	848.31	18.06	0.0639	8.17	0.0066
Limit	ERP < 7W	Result		PASS	

3.2.5 Test Result of EIRP

CDMA2000 BC1 1xRTT_RC3+SO55 Radiated Power EIRP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	1851.25	22.52	0.1785	21.78	0.1505
Middle	1880	22.39	0.1734	21.61	0.1449
Highest	1908.75	22.62	0.1828	22.32	0.1708
Limit	EIRP < 2W	Result		PASS	

3.3 Field Strength of Spurious Radiation Measurement

3.3.1 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.

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters 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.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

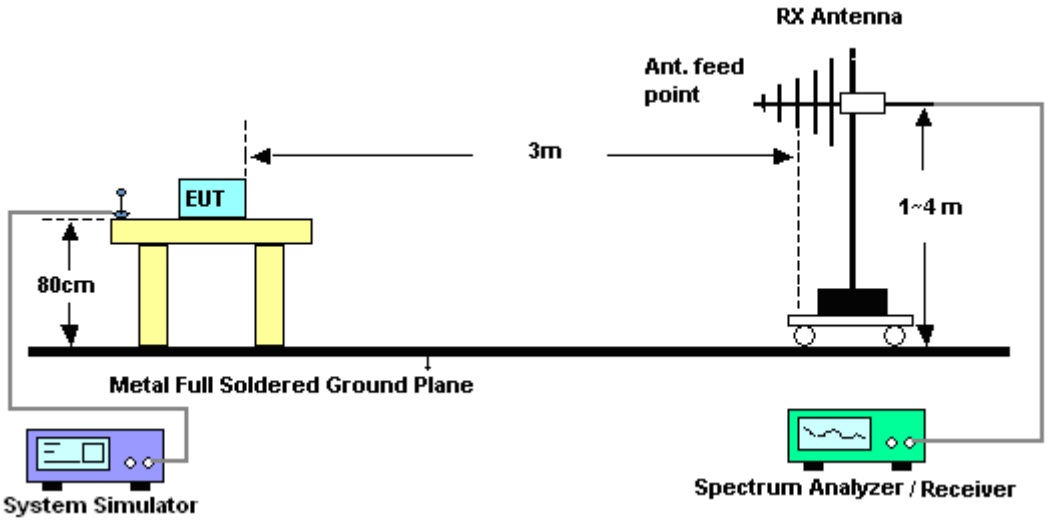
    = P(W) - [43 + 10log(P)] (dB)

    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

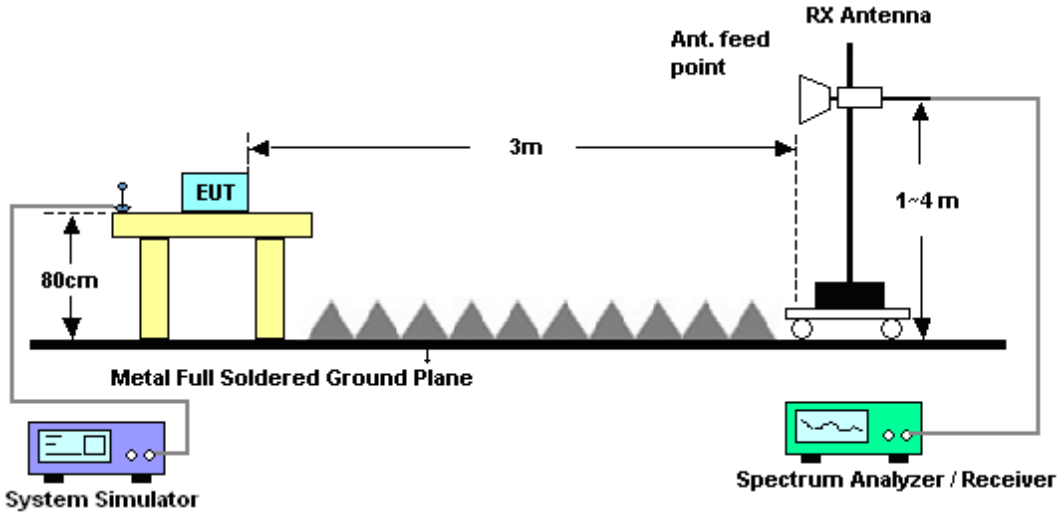
    = -13dBm.

3.3.4 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.3.5 Test Result of Field Strength of Spurious Radiated

Band :	CDMA2000 BC0	Temperature :	21~22°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	41~42%
Test Engineer :	Jack Wang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

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)	Result
1672	-57.17	-13	-44.17	-59.35	-59.06	1.86	5.90	H	Pass
2509	-53.73	-13	-40.73	-62.76	-56.07	2.31	6.80	H	Pass
3345	-53.90	-13	-40.90	-66.53	-56.30	2.85	7.40	H	Pass

Band :	CDMA2000 BC0	Temperature :	21~22°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	41~42%
Test Engineer :	Jack Wang	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

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)	Result
1673	-59.88	-13	-46.88	-58.74	-61.77	1.86	5.90	V	Pass
2512	-51.35	-13	-38.35	-62.32	-53.69	2.31	6.80	V	Pass
3345	-52.75	-13	-39.75	-66.73	-55.15	2.85	7.40	V	Pass

Band :	CDMA2000 BC1	Temperature :	21~22°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	41~42%
Test Engineer :	Jack Wang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

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)	Result
3759	-52.62	-13	-39.62	-66.82	-57.22	3	7.60	H	Pass
5640	-47.82	-13	-34.82	-61.61	-54.08	3.84	10.10	H	Pass
7521	-44.46	-13	-31.46	-64.24	-51.96	4.43	11.93	H	Pass

Band :	CDMA2000 BC1	Temperature :	21~22°C
Test Mode :	1xRTT_RC3+SO55 (QPSK)	Relative Humidity :	41~42%
Test Engineer :	Jack Wang	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

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)	Result
3760	-54.70	-13	-41.70	-67.19	-59.30	3	7.60	V	Pass
5640	-49.56	-13	-36.56	-61.97	-55.82	3.84	10.10	V	Pass
7521	-46.31	-13	-33.31	-64.1	-53.81	4.43	11.93	V	Pass

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV30	101338	9kHz~30GHz	May 04, 2015	Jul. 30, 2015	May 03, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 29, 2014	Jul. 13, 2015	Sep. 28, 2015	Radiation (03CH02-KS)
Spectrum Analyzer	R&S	FSV40	101040	10kHz~40GHz;Max 30dBm	Sep. 25, 2014	Jul. 13, 2015	Sep. 24, 2015	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz~2GHz	Sep. 13, 2014	Jul. 13, 2015	Sep. 12, 2015	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014	Jul. 13, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 08, 2014	Jul. 13, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz~40GHz	Sep. 04, 2014	Jul. 13, 2015	Sep. 03, 2015	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz~1000MHz / 32 dB	May 04, 2015	Jul. 13, 2015	May 03, 2016	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1GHz~26.5GHz Gain 30dB	Oct. 28, 2014	Jul. 13, 2015	Oct. 27, 2015	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jul. 13, 2015	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jul. 13, 2015	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jul. 13, 2015	NCR	Radiation (03CH02-KS)

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))	**5.1 dB**

Appendix A. Product Equality Declaration

ZTE中兴

ZTE CORPORATION

Product Change Description

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

[Z288L]
[ZTE Corporation]

is the variant of the initial certified product,

[Z288L]
[ZTE Corporation]

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: YES Antenna matching changed
PCB Layout changes: YES
Components on PCB changes: YES

Duplexer Changed due to supply：

a. CDMA BC0: from 2520(MURATA:SAYFH836MCC0F0A) to 1814 (MURATA:SAYEY836MCA0F0A)

b. CDMA BC1: from 2520(AVAGO:ACMD-7407-TR1) to 1814(MURATA:SAYEY1G88BA0B0A)

c. LTE B13: from 2520(EPCOS: B39781B7677A710) to 2016（TAIYO:D5PE782M0P3PZ-ZAS）

Filter Changed due to supply：

a. Drx Chain for CDMA BC1：from 1411(MURATA:SAFEB1G96FL0F00) to 1109(MURATA:SAFFB1G96FL0F0A)

Tx Chain for LTE B13: from 1411(EPCOS:B39781B9475M410) to 1109(TBD)

d. Varistors changed due to supply. From yageo (VRS0402KR140161N) to sunlord(SDV1005E140C101NPTF)

Add second Flash vender ESMT

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

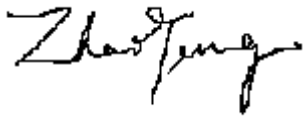
MECHANICAL MODIFICATIONS:

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

APPROVED BY:



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