



Variant FCC RF Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : LTE Ufi
BRAND NAME : ZTE
MODEL NAME : Z288L
FCC ID : SRQ-Z288L
STANDARD : 47 CFR Part 2, 27(F)
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 the testing has shown the tested sample to be 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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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	Reporting Only	PASS	-
3.2	§27.50(b)(10)	Effective Radiated Power	ERP < 3 Watt	PASS	-
3.3	§2.1053 §27.53(c)(2)	Radiated Spurious Emission	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	Under limit 40.91 dB at 3120.000 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: 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	LTE Band 13 : 779.5 MHz ~ 784.5 MHz
Rx Frequency	LTE Band 13 : 748.5 MHz ~ 753.5 MHz
Bandwidth	5MHz / 10MHz
Maximum Output Power to Antenna	22.18 dBm
Antenna Type	PIFA Antenna
Type of Modulation	QPSK / 16QAM



1.5 Modification of EUT

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

1.6 Maximum ERP Power

FCC Rule	System	Type of Modulation	BW	Maximum ERP (W)
Part 27	LTE Band 13	QPSK	5MHz	0.0820
Part 27	LTE Band 13	16QAM	5MHz	0.0667
Part 27	LTE Band 13	QPSK	10MHz	0.0865
Part 27	LTE Band 13	16QAM	10MHz	0.0675

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:

- ♦ 47 CFR Part 2, 27(F)
- ♦ 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.



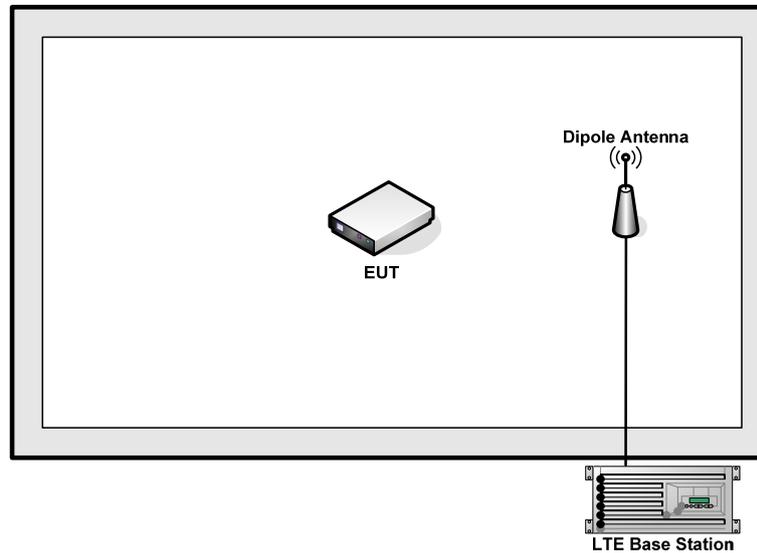
2 Test Configuration of Equipment Under Test

2.1 Test Mode

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

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	13	-	-	v	v	-	-	v	v	v	v	v	v	v	v
E.R.P.	13	-	-	v	v	-	-	v	v	v			v	v	v
Radiated Spurious Emission	13	-	-	v	v	-	-	v		v				v	
Note	<ol style="list-style-type: none"> The mark "v " means that this configuration is chosen for testing The mark "- "means that this bandwidth is not supported. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 														

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820C	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 force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

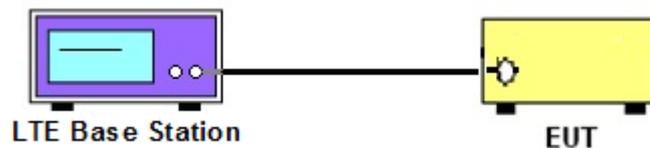
3.1.2 Measuring Instruments

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 the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

3.1.4 Test Setup





3.1.5 Test Result of Conducted Output Power

<LTE Band 13 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power (dBm) Low Ch. / Freq.	Power (dBm) Middle Ch. / Freq.	Power (dBm) High Ch. / Freq.
Channel					23230	
Frequency (MHz)					782	
10	QPSK	1	0		22.18	
10	QPSK	1	24		22.07	
10	QPSK	1	49		21.96	
10	QPSK	25	0		21.14	
10	QPSK	25	12		21.10	
10	QPSK	25	24		21.03	
10	QPSK	50	0		21.18	
10	16QAM	1	0		21.37	
10	16QAM	1	24		21.32	
10	16QAM	1	49		21.28	
10	16QAM	25	0		20.08	
10	16QAM	25	12		20.00	
10	16QAM	25	24		20.02	
10	16QAM	50	0		20.10	
Channel				23205	23230	23255
Frequency (MHz)				779.5	782	784.5
5	QPSK	1	0	22.10	22.16	22.06
5	QPSK	1	12	21.89	22.03	22.04
5	QPSK	1	24	22.07	22.07	21.90
5	QPSK	12	0	21.27	21.20	21.00
5	QPSK	12	6	21.04	21.14	20.96
5	QPSK	12	11	21.18	21.14	20.91
5	QPSK	25	0	20.93	21.08	20.89
5	16QAM	1	0	21.26	21.24	21.35
5	16QAM	1	12	20.99	20.75	21.25
5	16QAM	1	24	21.19	21.15	20.68
5	16QAM	12	0	20.18	20.23	19.99
5	16QAM	12	6	20.06	20.14	19.95
5	16QAM	12	11	20.09	20.09	19.95
5	16QAM	25	0	19.98	20.06	19.92

Note: Maximum average power for LTE.

3.2 Effective Radiated Power Measurement

3.2.1 Description of the ERP Measurement

Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-C-2004, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. Mobile and portable (hand-held) stations operating are limited to average ERP of 3 watts with LTE band 13.

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 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.
2. 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.
3. 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, $EIRP = LVL + \text{Correction factor}$ and $ERP = EIRP - 2.15$. Take the record of the output power at substitution antenna.



	LTE Average					
LTE BW	1.4M	3M	5M	10M	15M	20M
Span	3MHz	6MHz	10MHz	20MHz	30MHz	40MHz
RBW	30kHz	100kHz	100kHz	300kHz	300kHz	300kHz
VBW	100kHz	300kHz	300kHz	1MHz	1MHz	1MHz
Detector	RMS	RMS	RMS	RMS	RMS	RMS
Trace	Average	Average	Average	Average	Average	Average
Average Type	Power	Power	Power	Power	Power	Power
Sweep Count	100	100	100	100	100	100



3.2.4 Test Result of ERP

LTE Band 13 / 5MHz (Average)							
Channel	Modulation	RB		Horizontal		Vertical	
		Size	Offset	ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	1	0	19.10	0.0813	4.86	0.0031
Middle		1	0	18.37	0.0687	4.11	0.0026
Highest		1	0	19.14	0.0820	4.65	0.0029
Lowest	16QAM	1	0	17.82	0.0605	3.61	0.0023
Middle		1	0	18.24	0.0667	3.79	0.0024
Highest		1	0	18.06	0.0640	3.63	0.0023
Limit	ERP < 3W			Result		PASS	

LTE Band 13 / 10MHz (Average)							
Channel	Modulation	RB		Horizontal		Vertical	
		Size	Offset	ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	1	0	-	-	-	-
Middle		1	0	19.37	0.0865	5.44	0.0035
Highest		1	0	-	-	-	-
Lowest	16QAM	1	0	-	-	-	-
Middle		1	0	18.29	0.0675	4.39	0.0027
Highest		1	0	-	-	-	-
Limit	ERP < 3W			Result		PASS	



3.3 Radiated Spurious Emission Measurement

3.3.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. 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

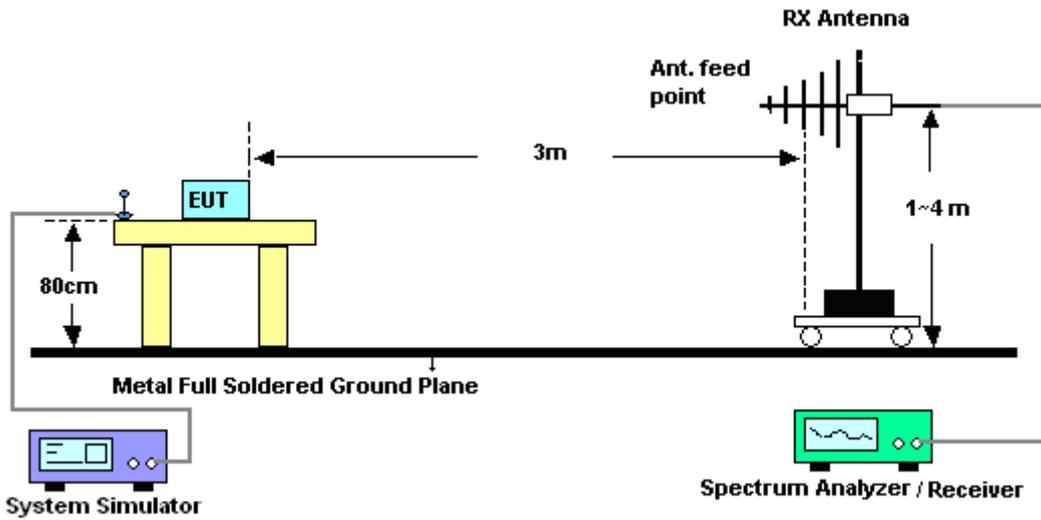
1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 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 the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the 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. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

$$\begin{aligned} & \text{The limit line is derived from } 43 + 10\log(P)\text{dB below the transmitter power } P(\text{Watts}) \\ & = P(\text{W}) - [43 + 10\log(P)] \text{ (dB)} \\ & = [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)} \\ & = -13\text{dBm}. \end{aligned}$$

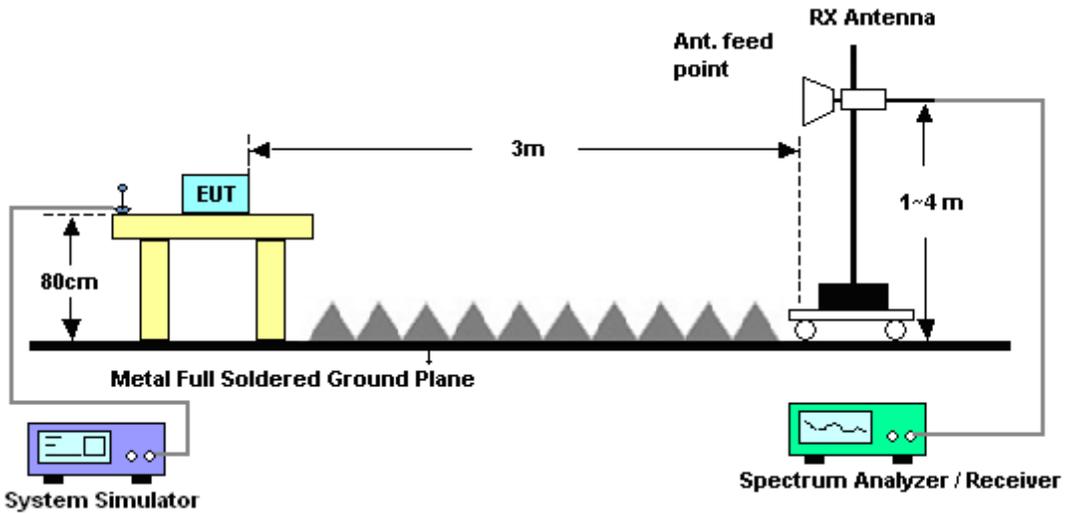
12. $\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$
13. $\text{ERP (dBm)} = \text{EIRP} - 2.15$

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 :	LTE Band 13	Temperature :	21~22°C						
Test Mode :	5MHz QPSK RB Size 1 Offset 0	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
1560	-62.65	-13	-49.65	-59.07	-63.63	1.75	4.88	H	Pass
2340	-56.85	-13	-43.85	-62.86	-58.47	2.16	5.93	H	Pass
3120	-55.65	-13	-42.65	-66.07	-57.68	2.48	6.66	H	Pass

Band :	LTE Band 13	Temperature :	21~22°C						
Test Mode :	5MHz QPSK RB Size 1 Offset 0	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
1560	-60.25	-13	-47.25	-58.72	-61.23	1.75	4.88	V	Pass
2340	-55.73	-13	-42.73	-63.71	-57.35	2.16	5.93	V	Pass
3120	-53.91	-13	-40.91	-65.42	-55.94	2.48	6.66	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;Ma x 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	61601000247 3	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
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Appendix A. Product Equality Declaration

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

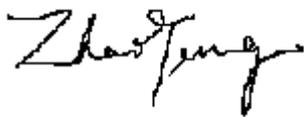
ACCESSORY MODIFICATIONS:

Battery changes: NO

AC Adaptor changes: NO

Earphone changes: NO

APPROVED BY:



Project Manager: Zhaoyang

Date: 2015-6-4

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