



# Variant FCC RF Test Report

**APPLICANT** : Lenovo Mobile Communication Technology Ltd.  
**EQUIPMENT** : Mobile Cellular Phone  
**BRAND NAME** : Lenovo  
**MODEL NAME** : Lenovo K33b36, Lenovo K33b37  
**FCC ID** : YCNK33B36  
**STANDARD** : 47 CFR Part 2, 22(H), 24(E), 27(L), 27(M)  
**CLASSIFICATION** : PCS Licensed Transmitter Held to Ear (PCE)

This is a variant report which is only valid together with the original test report. The product was received on Oct. 24, 2016 and completely tested on Dec. 27, 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 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.

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**



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### REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG662816-04B	Rev. 01	This is a variant report for Lenovo K33b36, Lenovo K33b37. The product equality declaration could be referred to Appendix D. All the test cases were performed in original report which can be referred to Sporton Report Number FG662816B. Based on the original test report, only LTE Band 7 the worse cases of Radiated Spurious Emission and EIRP were verified for differences.	Dec. 30, 2016



### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
0	§2.1046	Conducted Output Power	Reporting Only	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§27.53(m)(4)	Conducted Band Edge Measurement (Band 7)	§27.53(m)(4)	PASS	-
3.8	§2.1051 §27.53(m)(4)	Conducted Spurious Emission (Band 7)	$< 55+10\log_{10}(P[\text{Watts}])$	PASS	-
4.4	§27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 7)	EIRP < 2Watt	PASS	-
4.5	§2.1053 §27.53(m)(4)	Radiated Spurious Emission (Band 7)	$< 55+10\log_{10}(P[\text{Watts}])$	PASS	Under limit 32.69 dB at 10107.000 MHz



# 1 General Description

## 1.1 Applicant

**Lenovo Mobile Communication Technology Ltd.**

No.999, Qishan North 2nd Road, Information & Optoelectronics Park, Torch Hi-tech Industry Development Zone, Xiamen, P.R.China

## 1.2 Manufacturer

**Motorola Mobility LLC**

222 W. Merchandise Mart Plaza, Chicago IL 60654 USA

## 1.3 Product Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Mobile Cellular Phone
<b>Brand Name</b>	Lenovo
<b>Model Name</b>	Lenovo K33b36, Lenovo K33b37
<b>FCC ID</b>	YCNK33B36
<b>EUT supports Radios application</b>	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+ (16QAM uplink is not supported)/LTE WLAN 2.4GHz 802.11b/g/n HT20 Bluetooth v3.0+EDR/Bluetooth v4.0 LE Bluetooth v4.2 LE
<b>IMEI Code</b>	Radiation: 861577030041250/861577030041268 ERP/EIRP: 861577030041250/861577030041268
<b>HW Version</b>	82937_1_13
<b>SW Version</b>	K33_S009_1607022329_ROW
<b>EUT Stage</b>	Identical Prototype

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. After pre-scan two SIM cards power, we found test result of the SIM1 was the worse, so we chose dual SIM1 card to perform all tests.
3. There are two types of EUT sample 1 and sample 2, the differences between two samples are only for SIM slot, sample 1 is dual SIM slot, sample 2 is single SIM slot. According to the difference, we evaluate is not affect RF performance, so only choose sample 1 to perform RF test.



## 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx Frequency</b>	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz
<b>Rx Frequency</b>	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 7 : 2622.5MHz ~ 2687.5 MHz
<b>Bandwidth</b>	LTE Band 7 : 5MHz/ 10MHz / 15MHz / 20MHz
<b>Maximum Output Power to Antenna</b>	LTE Band 7 : 22.79 dBm
<b>Type of Modulation</b>	QPSK / 16QAM

## 1.5 Specification of Accessory

Specification of Accessory			
<b>AC Adapter 1</b>	<b>Brand Name</b>	Lenovo (Acbel)	<b>Model Name</b> C-P35
	<b>Power Rating</b>	I/P: 100-240 Vac, 300mA, O/P: 5.2Vdc, 2000mA	
<b>AC Adapter 2</b>	<b>Brand Name</b>	Lenovo (Huntkey)	<b>Model Name</b> C-P35
	<b>Power Rating</b>	I/P: 100-240Vac, 500mA, O/P: 5.2Vdc, 2000mA	
<b>Battery</b>	<b>Brand Name</b>	Lenovo (scud)	<b>Model Name</b> BL267
	<b>Power Rating</b>	4.4Vdc, 3000mAh	
<b>Earphone</b>	<b>Brand Name</b>	Lenovo (cosonic)	<b>Model Name</b> LS-118M-9
	<b>Signal Line Type</b>	1.2m non-shielded without core	
<b>USB Cable 1</b>	<b>Brand Name</b>	Lenovo(saibao)	<b>Model Name</b> SWT-A053A
	<b>Signal Line Type</b>	1.0m shielded without core	
<b>USB Cable 2</b>	<b>Brand Name</b>	Lenovo(starw)	<b>Model Name</b> XJ-007070
	<b>Signal Line Type</b>	1.0m shielded without core	
<b>LCD Panel</b>	<b>Brand Name</b>	tianma	<b>Model Name</b> Black : TL050VVMP04-00 Golden : TL050VVMP06-00
<b>Camera</b>	<b>Brand Name</b>	Q Technology	<b>Model Name</b> Front : FX219BQS Post : FX258BDS
<b>CTP Module</b>	<b>Brand Name</b>	O-FILM	<b>Model Name</b> black : MCF-050-2585 Golden : MCF-050-2585-02 white : MCF-050-2585-01

## 1.6 Modification of EUT

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



### 1.7 Maximum EIRP Power, Frequency Tolerance, and Emission Designator

LTE Band 7		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
5	2502.5 ~ 2567.5	-	-	-	-	-	-
10	2505.0 ~ 2565.0	-	-	-	-	-	-
15	2507.5 ~ 2562.5	-	-	0.2710	-	-	0.2178
20	2510.0 ~ 2560.0	-	-	-	-	-	-



### 1.8 Testing Location

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.	
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Registration No.</b>
	03CH03-KS	306251

### 1.9 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), 27(L), 27(M)
- ♦ 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

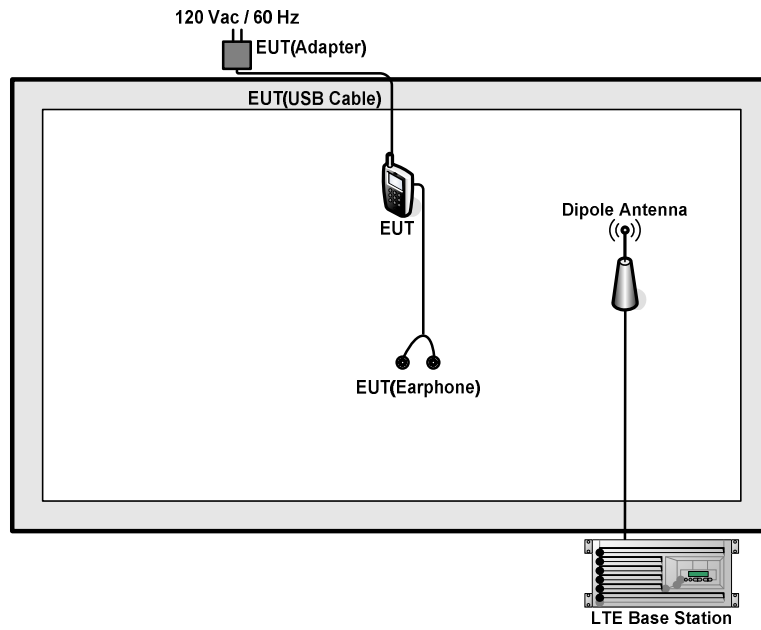
### 2.1 Test Mode

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

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

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	7	-	-	√	√	√	√	√	√	√	√	√	√	√	√
E.I.R.P.	7	-	-			√		√	√	√	√	√	√	√	√
Radiated Spurious Emission	7	-	-				√	√		√				√	
Note	<ol style="list-style-type: none"> <li>The mark "√" means that this configuration is chosen for testing</li> <li>The mark "-" means that this bandwidth is not supported.</li> <li>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.</li> </ol>														

## 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



## 2.4 Frequency List of Low/Middle/High Channels

LTE Band 7 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20850	21100	21350
	Frequency	2510	2535	2560
15	Channel	20825	21100	21375
	Frequency	2507.5	2535	2562.5
10	Channel	20800	21100	21400
	Frequency	2505	2535	2565
5	Channel	20775	21100	21425
	Frequency	2502.5	2535	2567.5

### 3 Conducted Test Items

#### 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 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.

### **3.4.2 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.

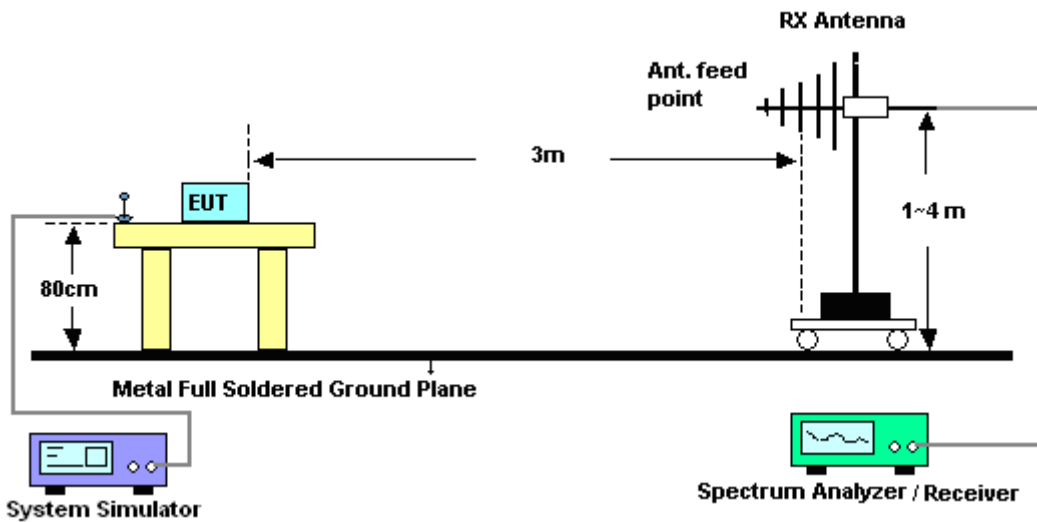
## 4 Radiated Test Items

### 4.1 Measuring Instruments

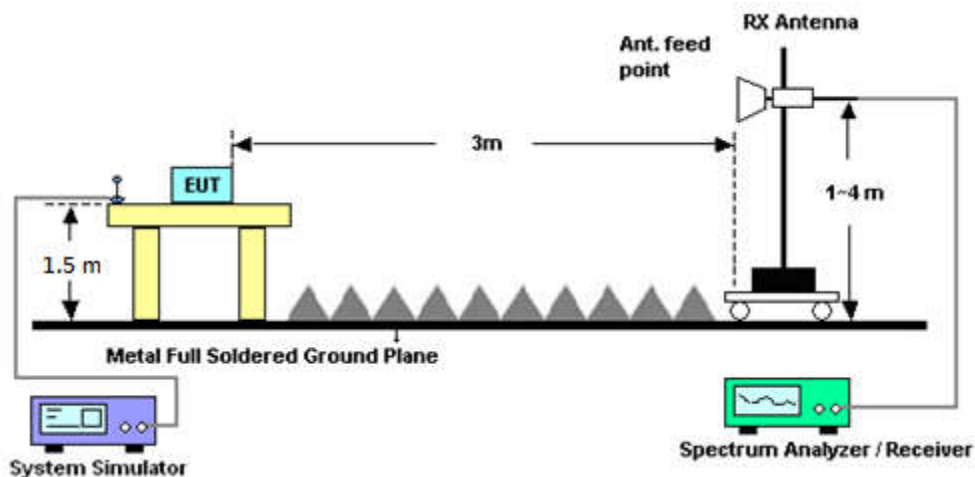
See list of measuring instruments of this test report.

### 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

### 4.4.1 Description of the EIRP Measurement

Equivalent isotropic radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-D-2010, 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 EIRP of 2 watts with LTE band 7.

### 4.4.2 Test Procedures

1. The EUT was placed on a non-conductive rotating platform (0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz) 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.
1. 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.
2. 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.



	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





## 4.5 Radiated Spurious Emission

### 4.5.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-D-2010. 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.

For Band 7

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  $55 + 10 \log (P)$  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 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna 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 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10.  $EIRP (dBm) = S.G. Power - Tx Cable Loss + Tx Antenna Gain$
11.  $ERP (dBm) = EIRP - 2.15$
12. 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)  
 $= P(W) - [43 + 10\log(P)] (dB)$   
 $= [30 + 10\log(P)] (dBm) - [43 + 10\log(P)] (dB)$   
 $= -13dBm.$
13. For Band 7:  
The limit line is derived from  $55 + 10\log(P)$ dB below the transmitter power P(Watts)  
 $EIRP (dBm) = S.G. Power - Tx Cable Loss + Tx Antenna Gain$   
 $ERP (dBm) = EIRP - 2.15$



## 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 22, 2016	Dec. 27, 2016	Apr. 21, 2017	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz~2GHz	Apr. 16, 2016	Dec. 27, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 16, 2016	Dec. 27, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Mar. 03, 2016	Dec. 27, 2016	Mar. 02, 2017	Radiation (03CH03-KS)
Amplifier	SONOMA	310N	187289	9kHz~1GHz	Aug. 09, 2016	Dec. 27, 2016	Aug. 08, 2017	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 13, 2016	Dec. 27, 2016	Oct. 12, 2017	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18GHz~40GHz	Jan. 20, 2016	Dec. 27, 2016	Jan. 19, 2017	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Dec. 27, 2016	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Dec. 27, 2016	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Dec. 27, 2016	NCR	Radiation (03CH03-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% ( $U = 2Uc(y)$ )	2.8dB
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.2dB
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# Appendix A. Test Results of Conducted Test

## Conducted Output Power(Average power)

LTE Band 7 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	1	0	QPSK	22.07	22.10	21.96
20	1	49		22.65	22.40	22.63
20	1	99		22.39	21.90	22.31
20	50	0		21.38	21.34	21.33
20	50	24		21.32	21.33	21.30
20	50	50		21.30	21.25	21.26
20	100	0		21.36	21.35	21.33
20	1	0	16-QAM	21.10	21.20	21.08
20	1	49		21.12	21.16	21.02
20	1	99		21.11	20.97	20.89
20	50	0		20.52	20.46	20.49
20	50	24		20.45	20.34	20.31
20	50	50		20.42	20.29	20.36
20	100	0		20.38	20.38	20.34
15	1	0	QPSK	22.16	22.08	22.15
15	1	37		22.42	22.46	22.38
15	1	74		22.07	22.13	22.19
15	36	0		21.31	21.36	21.35
15	36	20		21.32	21.36	21.30
15	36	39		21.32	21.31	21.29
15	75	0		21.31	21.33	21.27
15	1	0	16-QAM	21.16	21.17	21.05
15	1	37		21.13	21.05	21.03
15	1	74		20.96	21.01	20.98
15	36	0		20.36	20.35	20.31
15	36	20		20.36	20.35	20.33
15	36	39		20.36	20.27	20.30
15	75	0		20.49	20.29	20.29



LTE Band 7 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	22.05	22.03	22.01
10	1	25		22.79	22.34	22.33
10	1	49		22.02	21.99	21.99
10	25	0		21.31	21.33	21.24
10	25	12		21.26	21.32	21.28
10	25	25		21.26	21.32	21.24
10	50	0		21.25	21.32	21.27
10	1	0		16-QAM	21.08	21.10
10	1	25	21.02		21.07	21.00
10	1	49	21.02		20.93	20.90
10	25	0	20.40		20.55	20.25
10	25	12	20.41		20.55	20.60
10	25	25	20.32		20.45	20.25
10	50	0	20.48		20.50	20.34
5	1	0	QPSK		22.02	21.98
5	1	12		22.23	22.32	22.19
5	1	24		22.00	21.98	21.86
5	12	0		21.19	21.25	21.18
5	12	7		21.19	21.24	21.14
5	12	13		21.21	21.25	21.13
5	25	0		21.24	21.29	21.13
5	1	0		16-QAM	20.94	21.00
5	1	12	21.29		21.00	20.98
5	1	24	20.89		21.01	20.88
5	12	0	20.31		20.19	20.19
5	12	7	20.48		20.53	20.26
5	12	13	20.44		20.47	20.16
5	25	0	20.38		20.29	20.15



## Appendix B. Test Results of Radiated Test

### EIRP

LTE Band 7 / 15MHz (Average)							
Channel	Modulation	RB		Horizontal		Vertical	
		Size	Offset	EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	QPSK	1	37	22.75	0.1884	24.08	0.2559
Middle		1	37	22.76	0.1888	24.13	0.2588
Highest		1	0	22.79	0.1901	24.33	0.2710
Lowest	16QAM	1	0	21.94	0.1563	22.96	0.1977
Middle		1	0	21.84	0.1528	23.26	0.2118
Highest		1	0	22.27	0.1687	23.38	0.2178
Limit	EIRP < 2W			Result		PASS	



## Radiated Spurious Emission

LTE Band 7 / 20MHz / QPSK / RB Size 1 Offset 0									
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	5052	-64.78	-25	-39.78	-74.00	-71.34	2.41	8.97	H
	7578.27	-61.39	-25	-36.39	-75.09	-70.39	2.86	11.86	H
	10107	-59.21	-25	-34.21	-77.56	-68.11	3.21	12.11	H
	5052	-66.79	-25	-41.79	-75.5	-73.35	2.41	8.97	V
	7580	-60.76	-25	-35.76	-75.39	-69.76	2.86	11.86	V
	10107	-57.69	-25	-32.69	-77.09	-66.59	3.21	12.11	V

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