



# FCC RF Test Report

**APPLICANT** : Hewlett-Packard Company  
**EQUIPMENT** : Tablet PC  
**BRAND NAME** : HP  
**MODEL NAME** : HSTNN-I22C  
**FCC ID** : B94HNI22CFX468  
**STANDARD** : 47 CFR Part 2, 22(H), 24(E), 27  
**CLASSIFICATION** : PCS Licensed Transmitter (PCB)

The product was received on Aug. 20, 2014 and completely tested on Sep. 30, 2014. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



## **SPORTON INTERNATIONAL INC.**

**No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.**



TABLE OF CONTENTS

REVISION HISTORY..... 3
SUMMARY OF TEST RESULT ..... 4
1 GENERAL DESCRIPTION ..... 6
1.1 Applicant ..... 6
1.2 Manufacturer ..... 6
1.3 Product Feature of Equipment Under Test..... 6
1.4 Product Specification subjective to this standard ..... 7
1.5 Modification of EUT ..... 7
1.6 Emission Designator ..... 8
1.7 Testing Location ..... 10
1.8 Applicable Standards..... 10
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST ..... 11
2.1 Test Mode ..... 11
2.2 Connection Diagram of Test System ..... 13
2.3 Support Unit used in test configuration and system ..... 14
2.4 Measurement Results Explanation Example..... 14
3 CONDUCTED TEST ITEMS ..... 15
3.1 Measuring Instruments ..... 15
3.2 Test Setup ..... 15
3.3 Test Result of Conducted Test ..... 16
3.4 Conducted Output Power and ERP/EIRP ..... 16
3.5 Peak-to-Average Ratio ..... 17
3.6 Occupied Bandwidth..... 18
3.7 Conducted Band Edge ..... 19
3.8 Conducted Spurious Emission ..... 21
3.9 Frequency Stability ..... 22
4 RADIATED TEST ITEMS ..... 23
4.1 Measuring Instruments ..... 23
4.2 Test Setup ..... 23
4.3 Test Result of Radiated Test ..... 23
4.4 Radiated Spurious Emission ..... 24
5 LIST OF MEASURING EQUIPMENT ..... 25
6 UNCERTAINTY OF EVALUATION ..... 26
APPENDIX A. TEST RESULTS OF CONDUCTED TEST
APPENDIX B. TEST RESULTS OF RADIATED TEST
APPENDIX C. SETUP PHOTOGRAPHS





**SUMMARY OF TEST RESULT**

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.4	§2.1046	RSS-Gen(4.8) RSS-130(4.4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Conducted Output Power	Reporting Only	PASS	-
3.4	§22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power (Band 5)	ERP < 7 Watt	PASS	-
	§27.50(b)(10) §27.50(c)(10)	N/A	Effective Radiated Power (Band 13) (Band 17)	ERP < 3 Watt		
	N/A	RSS-130(4.4)	Equivalent Isotropic Radiated Power (Band 13) (Band 17)	EIRP < 5 Watt		
	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power (Band 2)(Band 25)	EIRP < 2Watt		
	§27.50(d)(4)	RSS-139 (6.4) SRSP-513(5.1.2)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt		
3.5	§24.232(d)	RSS-130(4.4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049 §22.917(b) §24.238(b) §27.53(h)(3)	RSS-GEN(4.6.1) RSS-132 (3.1) RSS-133 (3.1) RSS-139 (3.1)	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(c)(4) §27.53(f) §27.53(g)	RSS-GEN(4.9) RSS-132 (5.5) RSS-133 (6.5.1) RSS-130(4.6) RSS-139 (6.5)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 13) (Band 17) (Band 25)	< 43+10log10(P[Watts])	PASS	-



Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.8	§2.1053 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(f) §27.53(g)	RSS-GEN(4.9) RSS-132 (5.5) RSS-133 (6.5.1) RSS-130(4.6) RSS-139 (6.5)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 13) (Band 17) (Band 25)	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.9	§2.1055 §22.355 §24.235 §27.54	RSS-GEN(4.7) RSS-132(5.3) RSS-133(6.3) RSS-130(4.3) RSS-139 (6.3)	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22 within authorized band	PASS	-
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(f) §27.53(g) §27.53(h)	RSS-GEN(4.9) RSS-132 (5.5) RSS-133 (6.5.1) RSS-130(4.6) RSS-139 (6.5)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 13) (Band 17) (Band 25)	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 11.95 dB at 1560.000 MHz
4.5	§22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power (Band 5)	ERP < 7 Watt	PASS	-
	§27.50(b)(10) §27.50(c)(10)	N/A	Effective Radiated Power (Band 13) (Band 17)	ERP < 3 Watt		
	N/A	RSS-130(4.4)	Equivalent Isotropic Radiated Power (Band 13) (Band 17)	EIRP < 5 Watt		
	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power (Band 2)(Band 25)	EIRP < 2Watt		
	§27.50(d)(4)	RSS-139 (6.4) SRSP-513(5.1.2)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt		



# 1 General Description

## 1.1 Applicant

**Hewlett-Packard Company**

11445 Compaq Center Drive W Houston, TX 77070 , USA

## 1.2 Manufacturer

**Inventec Corporation**

Inventec Building, No. 66 Hou-Kang Street Shilin District, Taipei 11170, Taiwan

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Tablet PC
Brand Name	HP
Model Name	HSTNN-I22C
FCC ID	B94HNI22CFX468
Integrated the WWAN Module	Brand Name: Foxconn Model Name: T77H468 FCC ID: B94HNI22CFX468
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE
EUT Stage	Identical Prototype



### 1.4 Product Specification subjective to this standard

Product Specification subjective to this standard	
<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 13 : 779.5 MHz ~ 784.5 MHz LTE Band 17 : 706.5 MHz ~ 713.5 MHz LTE Band 25 : 1850.7 MHz ~ 1914.3 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 13 : 748.5 MHz ~ 753.5 MHz LTE Band 17 : 736.5 MHz ~ 743.5 MHz LTE Band 25 : 1930.7 MHz ~ 1994.3 MHz
<b>Bandwidth</b>	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 13 : 5MHz / 10MHz LTE Band 17 : 5MHz / 10MHz LTE Band 25 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz
<b>Maximum Output Power to Antenna</b>	LTE Band 2 : 23.04 dBm LTE Band 4 : 23.18 dBm LTE Band 5 : 23.27 dBm LTE Band 13 : 22.66 dBm LTE Band 17 : 22.89 dBm LTE Band 25 : 22.89 dBm
<b>Antenna Gain</b>	LTE Band 2 : -3.08 dBi LTE Band 4 : -4.76 dBi LTE Band 5 : -6.08 dBi LTE Band 13 : -7.04 dBi LTE Band 17 : -7.72 dBi LTE Band 25 : -3.08 dBi
<b>Type of Modulation</b>	QPSK / 16QAM

### 1.5 Modification of EUT

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



### 1.6 Emission Designator

LTE Band 2		QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
1.4	1M10G7D	-	0.09	1M10W7D	-	0.08	
3	2M73G7D	-	0.09	2M73W7D	-	0.08	
5	4M50G7D	-	0.10	4M49W7D	-	0.08	
10	9M08G7D	0.0164	0.10	9M06W7D	-	0.08	
15	13M5G7D	-	0.09	13M5W7D	-	0.07	
20	18M5G7D	-	0.10	18M6W7D	-	0.07	
LTE Band 25		QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
1.4	1M10G7D	-	0.10	1M10W7D	-	0.08	
3	2M74G7D	-	0.09	2M74W7D	-	0.08	
5	4M51G7D	-	0.09	4M51W7D	-	0.07	
10	9M10G7D	0.0012	0.10	9M08W7D	-	0.08	
15	13M5G7D	-	0.09	13M5W7D	-	0.07	
20	18M5G7D	-	0.10	18M6W7D	-	0.08	
LTE Band 4		QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
1.4	1M10G7D	-	0.07	1M11W7D	-	0.06	
3	2M72G7D	-	0.07	2M74W7D	-	0.05	
5	4M50G7D	-	0.07	4M49W7D	-	0.05	
10	9M10G7D	0.0032	0.07	9M08W7D	-	0.06	
15	13M5G7D	-	0.07	13M5W7D	-	0.05	
20	18M6G7D	-	0.07	18M6W7D	-	0.05	



LTE Band 5		QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
1.4	1M10G7D	-	0.03	1M10W7D	-	0.03	
3	2M73G7D	-	0.03	2M73W7D	-	0.03	
5	4M50G7D	-	0.03	4M50W7D	-	0.03	
10	9M06G7D	0.0020	0.03	9M04W7D	-	0.03	
LTE Band 13		QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
5	4M52G7D	-	0.02	4M51W7D	-	0.02	
10	9M08G7D	0.0063	0.02	9M06W7D	-	0.02	
LTE Band 17		QPSK			16QAM		
BW(MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)	
5	4M51G7D	-	0.02	4M51W7D	-	0.01	
10	9M06G7D	0.0055	0.02	9M00W7D	-	0.02	



### 1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

<b>Test Site</b>	SPORTON INTERNATIONAL INC.	
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	
	TH02-HY	03CH07-HY

### 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), 27
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.



## 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 v02r01 with maximum output power.

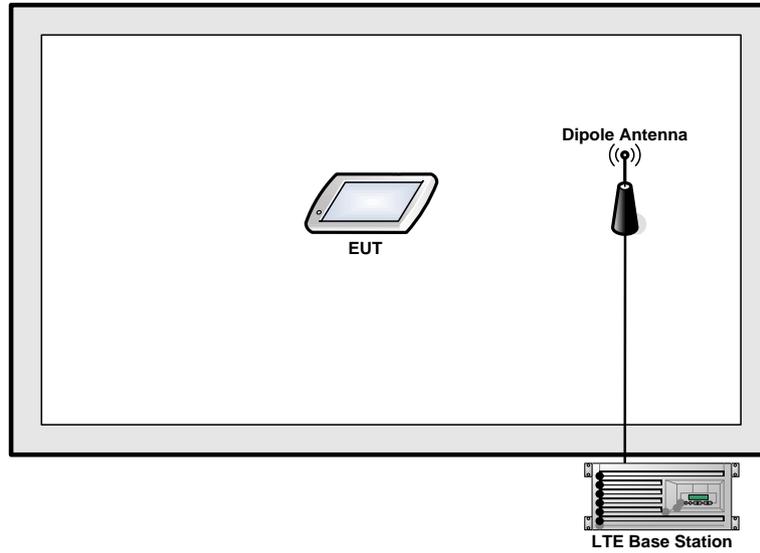
Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	5	Y	Y	Y	Y	-	-	Y	Y	Y	Y	Y	Y	Y	Y
	13	-	-	Y	Y	-	-	Y	Y	Y	Y	Y	Y	Y	Y
	17	-	-	Y	Y	-	-	Y	Y	Y	Y	Y	Y	Y	Y
	25	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Peak-to-Average Ratio	2						Y		Y	Y		Y	Y	Y	Y
	4						Y		Y	Y		Y	Y	Y	Y
	5				Y	-	-		Y	Y		Y	Y	Y	Y
	13	-	-		Y	-	-		Y	Y		Y	Y	Y	Y
	17	-	-		Y	-	-		Y	Y		Y	Y	Y	Y
	25						Y		Y	Y		Y	Y	Y	Y
26dB and 99% Bandwidth	2	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y
	4	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y
	5	Y	Y	Y	Y	-	-	Y	Y			Y	Y	Y	Y
	13	-	-	Y	Y	-	-	Y	Y			Y	Y	Y	Y
	17	-	-	Y	Y	-	-	Y	Y			Y	Y	Y	Y
	25	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y
Conducted Band Edge	2	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y		Y
	4	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y		Y
	5	Y	Y	Y	Y	-	-	Y	Y	Y		Y	Y		Y
	13	-	-	Y	Y	-	-	Y	Y	Y		Y	Y		Y
	17	-	-	Y	Y	-	-	Y	Y	Y		Y	Y		Y
	25	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y		Y



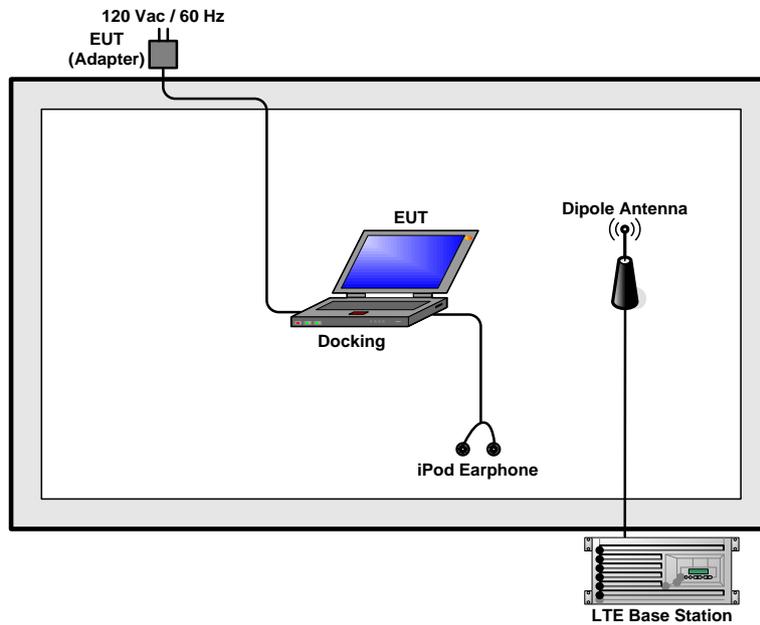
Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Conducted Spurious Emission	2	v	v	v	v	v	v	v	v	v			v	v	v
	4	v	v	v	v	v	v	v	v	v			v	v	v
	5	v	v	v	v	-	-	v	v	v			v	v	v
	13	-	-	v	v	-	-	v	v	v			v	v	v
	17	-	-	v	v	-	-	v	v	v			v	v	v
	25	v	v	v	v	v	v	v	v	v			v	v	v
Frequency Stability	2				v			v				v		v	
	4				v			v				v		v	
	5				v	-	-	v				v		v	
	13	-	-		v	-	-	v				v		v	
	17	-	-		v	-	-	v				v		v	
	25				v			v				v		v	
E.R.P./E.I.R.P.	2	v	v	v	v	v	v	v	v	v			v	v	v
	4	v	v	v	v	v	v	v	v	v			v	v	v
	5	v	v	v	v	-	-	v	v	v			v	v	v
	13	-	-	v	v	-	-	v	v	v			v	v	v
	17	-	-	v	v	-	-	v	v	v			v	v	v
	25	v	v	v	v	v	v	v	v	v			v	v	v
Radiated Spurious Emission	2	v	v	v	v	v	v	v		v				v	
	4	v	v	v	v	v	v	v		v				v	
	5	v	v	v	v	-	-	v		v				v	
	13	-	-	v	v	-	-	v		v				v	
	17	-	-	v	v	-	-	v		v				v	
	25	v	v	v	v	v	v	v		v				v	
Note	<p>1. The mark "v" means that this configuration is chosen for testing</p> <p>2. The mark "-" means that this bandwidth is not supported.</p> <p>3. For E.R.P./E.I.R.P. measurement, the widest bandwidth of each band is chosen for testing due to highest conducted power. Besides, the lowest bandwidth of each band is also measured for reporting only.</p> <p>4. 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.</p>														

## 2.2 Connection Diagram of Test System

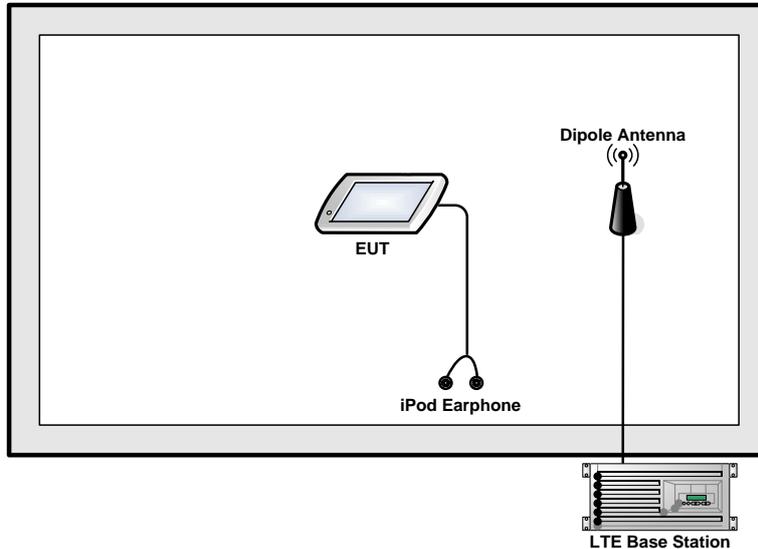
<EUT Standalone Mode For LTE Band 5>



<EUT with Docking, Earphone, and Adapter Mode For LTE Band 2, Band 17, and Band 25>



<EUT with Earphone Mode For LTE Band 4 and Band 13>



### 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.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

### 2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

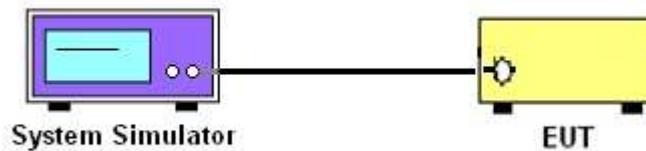
### 3 Conducted Test Items

#### 3.1 Measuring Instruments

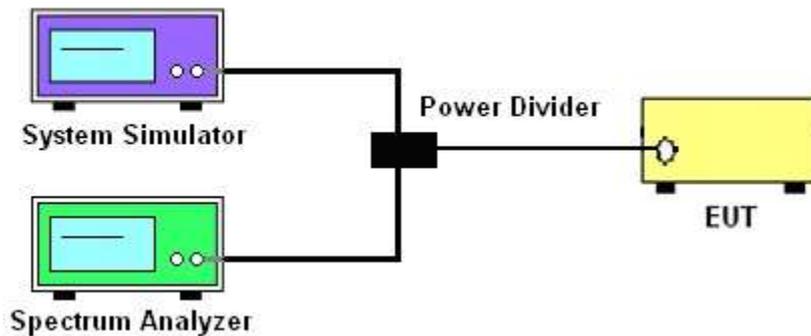
See list of measuring instruments of this test report.

#### 3.2 Test Setup

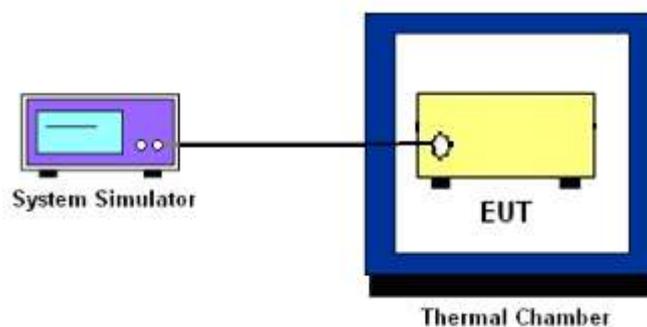
##### 3.2.1 Conducted Output Power



##### 3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge, and Conducted Spurious Emission



##### 3.2.3 Frequency Stability





### 3.3 Test Result of Conducted Test

Please refer to Appendix A.

### 3.4 Conducted Output Power and ERP/EIRP

#### 3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP 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.

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 13 and Band 17. (FCC Only)

The EIRP of mobile transmitters must not exceed 5 Watts for LTE Band 13 and Band 17. (IC Only)

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2 and Band 25.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$ ,  $ERP = EIRP - 2.15$ , where

$P_T$  = transmitter output power in dBm

$G_T$  = gain of the transmitting antenna in dBi

$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna in dB

#### 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.



## **3.5 Peak-to-Average Ratio**

### **3.5.1 Description of the PAR Measurement**

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### **3.5.2 Test Procedures**

1. The testing follows FCC KDB 971168 v02r01 Section 5.7.1.
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.



## **3.6 Occupied Bandwidth**

### **3.6.1 Description of Occupied Bandwidth Measurement**

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

### **3.6.2 Test Procedures**

1. The testing follows FCC KDB 971168 v02r01 Section 4.2.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.



### **3.7 Conducted Band Edge**

#### **3.7.1 Description of Conducted Band Edge Measurement**

22.917(a) for Band 5

For operations in the 824 – 849 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power P(Watts) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

24.238 (a) for Band 2, 25

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (c) for Band 13

For operations in the 776-788 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed. In addition, the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least  $65 + 10 \log_{10} p(\text{watts})$ , dB, for mobile and portable equipment.

27.53 (g) for Band 17

For operations in the 698 -746 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

27.53 (h) for Band 4

For operations in the 1710 – 1755 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.



### 3.7.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured. Set RBW  $\geq 1\%$  EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)  
= P(W)- [43 + 10log(P)] (dB)  
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)  
= -13dBm.



### 3.8 Conducted Spurious Emission

#### 3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10<sup>th</sup> harmonic.

#### 3.8.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. 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.



### **3.9 Frequency Stability**

#### **3.9.1 Description of Frequency Stability Measurement**

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

#### **3.9.2 Test Procedures for Temperature Variation**

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

#### **3.9.3 Test Procedures for Voltage Variation**

1. The testing follows FCC KDB 971168 v02r01 Section 9.0.
2. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

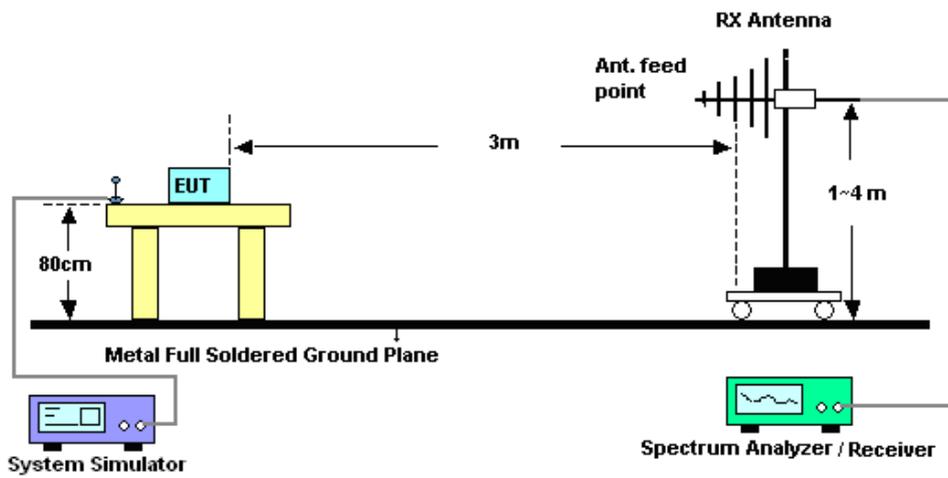
## 4 Radiated Test Items

### 4.1 Measuring Instruments

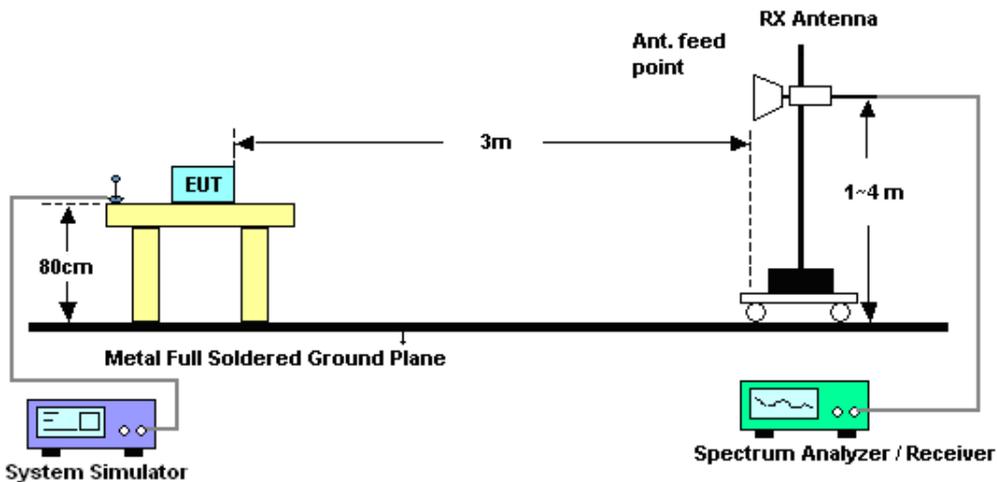
See list of measuring instruments of this test report.

### 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 Radiated Spurious Emission

### 4.4.1 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.

For LTE Band 13,17

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and  $-80$  dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 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.

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)  
 $= -13$ dBm.

12. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
13. ERP (dBm) = EIRP - 2.15



## 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Sep. 29, 2014 ~ Sep. 30, 2014	Jun. 08, 2015	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 17, 2014	Sep. 29, 2014 ~ Sep. 30, 2014	Jul. 16, 2015	Conducted (TH02-HY)
LTE Base Station	Anritsu	MT8820C	6201026480	30MHz~2.7GHz SISO (FDD Band 1~26)	Jan. 07, 2014	Sep. 29, 2014 ~ Sep. 30, 2014	Jan. 06, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz ~ 30GHz	Feb. 10, 2014	Sep. 23, 2014	Feb. 09, 2015	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 10, 2013	Sep. 23, 2014	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 19, 2014	Sep. 23, 2014	Aug. 18, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 17, 2014	Sep. 23, 2014	Mar. 16, 2015	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Nov. 29, 2013	Sep. 23, 2014	Nov. 28, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Sep. 23, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	M-400-0	114/8000604/L	N/A	N/A	Sep. 23, 2014	N/A	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 03, 2013	Sep. 23, 2014	Oct. 02, 2014	Radiation (03CH07-HY)



## 6 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.50
---	------



## Appendix A. Test Results of Conducted Test

### Conducted Output Power(Average power)

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	22.78	22.79	22.51
1.4	1	2		22.77	22.75	22.46
1.4	1	5		22.72	22.76	22.26
1.4	3	0		22.76	22.78	22.43
1.4	3	1		22.76	22.78	22.41
1.4	3	2		22.74	22.77	22.34
1.4	6	0		21.70	21.83	21.40
1.4	1	0	16-QAM	21.81	21.89	21.52
1.4	1	2		21.72	21.78	21.43
1.4	1	5		21.66	21.82	21.56
1.4	3	0		21.80	21.88	21.49
1.4	3	1		21.77	21.88	21.45
1.4	3	2		21.78	21.85	21.40
1.4	6	0		20.77	20.88	20.51
3	1	0	QPSK	22.77	22.83	22.84
3	1	7		22.66	22.76	22.62
3	1	14		22.55	22.71	22.26
3	8	0		21.68	21.81	21.74
3	8	4		21.60	21.79	21.60
3	8	7		21.67	21.76	21.53
3	15	0		21.55	21.75	21.57
3	1	0	16-QAM	21.77	21.91	21.82
3	1	7		21.68	21.88	21.67
3	1	14		21.61	21.73	21.25
3	8	0		20.71	20.78	20.75
3	8	4		20.66	20.78	20.57
3	8	7		20.62	20.77	20.48
3	15	0		20.66	20.78	20.59



LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	22.72	22.93	23.02
5	1	12		22.57	22.75	22.78
5	1	24		22.40	22.72	22.44
5	12	0		21.59	21.89	21.86
5	12	6		21.54	21.80	21.74
5	12	11		21.48	21.80	21.62
5	25	0		21.40	21.68	21.54
5	1	0	16-QAM	21.70	21.98	22.00
5	1	12		21.59	21.78	21.80
5	1	24		21.38	21.72	21.44
5	12	0		20.73	20.88	20.95
5	12	6		20.64	20.79	20.80
5	12	11		20.55	20.83	20.63
5	25	0		20.45	20.66	20.60
10	1	0	QPSK	22.99	22.82	22.78
10	1	24		22.87	22.62	22.76
10	1	49		22.97	22.54	22.69
10	25	0		21.96	21.68	21.62
10	25	12		21.97	21.61	21.62
10	25	24		21.90	21.56	21.66
10	50	0		21.77	21.48	21.47
10	1	0	16-QAM	22.23	21.89	21.77
10	1	24		22.15	21.68	21.74
10	1	49		21.99	21.59	21.76
10	25	0		21.01	20.69	20.61
10	25	12		20.92	20.60	20.61
10	25	24		20.96	20.59	20.61
10	50	0		20.73	20.45	20.38



LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
15	1	0	QPSK	22.75	22.68	22.40
15	1	37		22.38	22.58	22.38
15	1	74		22.33	22.39	22.39
15	36	0		21.49	21.58	21.21
15	36	18		21.45	21.55	21.50
15	36	37		21.42	21.41	21.57
15	75	0		21.35	21.42	21.27
15	1	0	16-QAM	21.76	21.60	21.43
15	1	37		21.37	21.54	21.33
15	1	74		21.32	21.40	21.35
15	36	0		20.71	20.62	20.22
15	36	18		20.56	20.57	20.54
15	36	37		20.52	20.47	20.62
15	75	0		20.45	20.42	20.33
20	1	0	QPSK	22.78	23.04	22.61
20	1	49		22.43	22.88	22.43
20	1	99		22.36	22.69	22.34
20	50	0		21.36	21.83	21.34
20	50	24		21.33	21.82	21.33
20	50	49		21.33	21.76	21.30
20	100	0		21.36	21.70	21.24
20	1	0	16-QAM	21.78	21.76	21.81
20	1	49		21.42	21.74	21.57
20	1	99		21.36	21.53	21.46
20	50	0		20.47	20.85	20.55
20	50	24		20.44	20.92	20.51
20	50	49		20.32	20.65	20.77
20	100	0		20.30	20.71	20.49



LTE Band 25 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	22.83	22.88	22.71
1.4	1	2		22.79	22.81	22.62
1.4	1	5		22.75	22.79	22.70
1.4	3	0		22.80	22.87	22.65
1.4	3	1		22.80	22.86	22.62
1.4	3	2		22.79	22.82	22.67
1.4	6	0		21.86	21.80	21.60
1.4	1	0	16-QAM	21.85	21.93	21.90
1.4	1	2		21.80	21.80	21.65
1.4	1	5		21.77	21.72	21.54
1.4	3	0		21.83	21.87	21.67
1.4	3	1		21.81	21.86	21.83
1.4	3	2		21.80	21.86	21.88
1.4	6	0		20.85	20.80	20.55
3	1	0	QPSK	22.80	22.84	22.64
3	1	7		22.74	22.78	22.59
3	1	14		22.62	22.66	22.56
3	8	0		21.83	21.82	21.73
3	8	4		21.74	21.85	21.72
3	8	7		21.73	21.73	21.68
3	15	0		21.68	21.71	21.63
3	1	0	16-QAM	21.79	21.87	21.69
3	1	7		21.75	21.78	21.55
3	1	14		21.64	21.69	21.64
3	8	0		20.74	20.78	20.63
3	8	4		20.69	20.73	20.63
3	8	7		20.64	20.69	20.49
3	15	0		20.75	20.74	20.54



LTE Band 25 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	22.84	22.81	22.44
5	1	12		22.68	22.78	22.32
5	1	24		22.60	22.55	22.38
5	12	0		21.78	21.81	21.33
5	12	6		21.71	21.78	21.29
5	12	11		21.61	21.75	21.28
5	25	0		21.48	21.61	21.20
5	1	0	16-QAM	21.78	21.77	21.34
5	1	12		21.66	21.75	21.28
5	1	24		21.52	21.58	21.26
5	12	0		20.81	20.78	20.35
5	12	6		20.69	20.80	20.30
5	12	11		20.66	20.77	20.36
5	25	0		20.54	20.57	20.43
10	1	0	QPSK	22.81	22.86	22.82
10	1	24		22.54	22.80	22.40
10	1	49		22.20	22.32	22.41
10	25	0		21.59	21.64	21.66
10	25	12		21.38	21.64	21.88
10	25	24		21.34	21.43	21.50
10	50	0		21.21	21.42	21.56
10	1	0	16-QAM	21.79	21.87	22.05
10	1	24		21.56	21.78	21.40
10	1	49		21.22	21.36	21.41
10	25	0		20.53	20.64	20.60
10	25	12		20.42	20.58	20.51
10	25	24		20.42	20.44	20.53
10	50	0		20.28	20.36	20.68



LTE Band 25 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
15	1	0	QPSK	22.85	22.82	22.69
15	1	37		22.48	22.76	22.65
15	1	74		22.24	22.13	22.19
15	36	0		21.46	21.52	21.77
15	36	18		21.35	21.42	21.52
15	36	37		21.32	21.31	21.61
15	75	0		21.33	21.28	21.32
15	1	0	16-QAM	21.79	21.81	21.68
15	1	37		21.42	21.74	21.66
15	1	74		21.33	21.15	21.18
15	36	0		20.70	20.52	20.82
15	36	18		20.64	20.48	20.55
15	36	37		20.58	20.42	20.70
15	75	0		20.45	20.27	20.22
20	1	0	QPSK	22.87	22.89	22.65
20	1	49		22.42	22.77	22.61
20	1	99		22.27	22.24	22.10
20	50	0		21.30	21.58	21.48
20	50	24		21.27	21.39	21.28
20	50	49		21.20	21.26	21.17
20	100	0		21.35	21.42	21.34
20	1	0	16-QAM	21.84	21.66	21.63
20	1	49		21.30	21.56	21.50
20	1	99		21.24	21.28	21.00
20	50	0		20.25	20.49	20.30
20	50	24		20.35	20.35	20.41
20	50	49		20.29	20.24	20.28
20	100	0		20.34	20.33	20.43



LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	23.12	22.78	22.83
1.4	1	2		23.11	22.76	22.80
1.4	1	5		23.10	22.70	22.80
1.4	3	0		23.08	22.68	22.80
1.4	3	1		22.82	22.69	22.81
1.4	3	2		23.05	22.67	22.82
1.4	6	0		22.21	21.79	21.88
1.4	1	0	16-QAM	22.11	21.81	21.88
1.4	1	2		22.12	21.76	21.80
1.4	1	5		22.06	21.71	21.78
1.4	3	0		22.16	21.78	21.84
1.4	3	1		22.21	21.78	21.86
1.4	3	2		22.14	21.76	21.87
1.4	6	0		21.25	20.82	20.89
3	1	0	QPSK	23.17	22.79	22.79
3	1	7		23.15	22.73	22.74
3	1	14		23.08	22.74	22.72
3	8	0		22.07	21.78	21.80
3	8	4		22.15	21.69	21.83
3	8	7		22.19	21.85	21.79
3	15	0		22.12	21.73	21.75
3	1	0	16-QAM	22.09	21.73	21.83
3	1	7		22.05	21.76	21.78
3	1	14		22.01	21.73	21.75
3	8	0		21.10	20.76	20.74
3	8	4		21.07	20.70	20.77
3	8	7		21.13	20.82	20.76
3	15	0		21.13	20.70	20.76



LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	23.16	22.77	22.76
5	1	12		23.02	22.74	22.72
5	1	24		23.06	22.71	22.72
5	12	0		22.06	21.77	21.77
5	12	6		22.01	21.78	21.82
5	12	11		22.04	21.81	21.79
5	25	0		21.89	21.63	21.59
5	1	0	16-QAM	22.11	21.84	21.76
5	1	12		22.06	21.80	21.74
5	1	24		22.07	21.74	21.75
5	12	0		21.15	20.81	20.81
5	12	6		21.06	20.74	20.82
5	12	11		21.14	20.84	20.80
5	25	0		20.94	20.61	20.67
10	1	0	QPSK	23.12	22.86	22.78
10	1	24		23.11	22.63	22.73
10	1	49		23.01	22.55	22.75
10	25	0		21.95	21.74	21.64
10	25	12		21.95	21.57	21.59
10	25	24		21.99	21.59	21.63
10	50	0		21.75	21.44	21.42
10	1	0	16-QAM	22.17	21.87	21.78
10	1	24		22.10	21.71	21.76
10	1	49		22.02	21.66	21.75
10	25	0		20.94	20.68	20.59
10	25	12		20.96	20.60	20.61
10	25	24		20.95	20.65	20.64
10	50	0		20.74	20.46	20.44



LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
15	1	0	QPSK	23.17	22.80	22.82
15	1	37		23.13	22.79	22.70
15	1	74		22.74	22.68	22.70
15	36	0		21.93	21.65	21.51
15	36	18		21.85	21.54	21.52
15	36	37		21.77	21.52	21.45
15	75	0		21.79	21.43	21.47
15	1	0	16-QAM	22.10	21.83	21.82
15	1	37		22.11	21.78	21.70
15	1	74		21.80	21.74	21.67
15	36	0		20.98	20.68	20.55
15	36	18		20.91	20.55	20.49
15	36	37		20.74	20.49	20.51
15	75	0		20.78	20.44	20.44
20	1	0	QPSK	23.18	22.93	22.79
20	1	49		23.11	22.76	22.75
20	1	99		22.85	22.72	22.70
20	50	0		21.92	21.75	21.48
20	50	24		21.88	21.55	21.40
20	50	49		21.77	21.51	21.39
20	100	0		21.85	21.62	21.55
20	1	0	16-QAM	22.14	21.98	21.87
20	1	49		22.12	21.76	21.80
20	1	99		21.85	21.72	21.74
20	50	0		20.89	20.65	20.58
20	50	24		20.85	20.52	20.42
20	50	49		20.71	20.46	20.26
20	100	0		20.79	20.53	20.48



LTE Band 5 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
1.4	1	0	QPSK	23.15	23.18	22.95
1.4	1	2		23.14	23.16	22.89
1.4	1	5		23.12	23.08	22.78
1.4	3	0		23.14	23.16	22.91
1.4	3	1		23.14	23.10	22.90
1.4	3	2		23.11	23.09	22.85
1.4	6	0		22.13	22.24	21.91
1.4	1	0	16-QAM	22.20	22.28	21.98
1.4	1	2		22.14	22.21	21.88
1.4	1	5		22.13	22.09	21.82
1.4	3	0		22.19	22.22	21.94
1.4	3	1		22.19	22.20	21.95
1.4	3	2		22.15	22.17	21.89
1.4	6	0		21.16	21.25	20.97
3	1	0	QPSK	23.11	23.16	22.86
3	1	7		23.06	23.10	22.76
3	1	14		23.09	23.01	22.73
3	8	0		22.16	22.29	21.94
3	8	4		22.16	22.19	21.93
3	8	7		22.18	22.18	21.91
3	15	0		22.17	22.19	21.74
3	1	0	16-QAM	22.20	22.35	21.88
3	1	7		22.10	22.24	21.81
3	1	14		22.14	22.01	21.83
3	8	0		21.11	21.27	20.91
3	8	4		21.14	21.15	20.90
3	8	7		21.15	21.06	20.87
3	15	0		21.11	21.23	20.81



LTE Band 5 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	23.23	23.11	22.74
5	1	12		23.12	23.08	22.66
5	1	24		23.06	23.00	22.57
5	12	0		22.13	22.37	21.92
5	12	6		22.20	22.26	21.86
5	12	11		22.18	22.12	21.83
5	25	0		22.01	22.14	21.68
5	1	0	16-QAM	22.28	22.38	21.95
5	1	12		22.14	22.22	21.79
5	1	24		22.07	22.11	21.68
5	12	0		21.16	21.38	20.94
5	12	6		21.22	21.29	20.82
5	12	11		21.21	21.13	20.88
5	25	0		21.07	21.17	20.72
10	1	0	QPSK	23.14	23.27	22.92
10	1	24		23.08	23.10	22.70
10	1	49		23.22	22.80	22.78
10	25	0		22.08	22.28	21.85
10	25	12		22.18	22.20	21.87
10	25	24		22.14	22.00	21.66
10	50	0		21.96	21.98	21.54
10	1	0	16-QAM	22.30	22.30	21.97
10	1	24		22.10	22.13	21.81
10	1	49		22.15	21.85	21.77
10	25	0		21.03	21.20	20.81
10	25	12		21.20	21.08	20.77
10	25	24		21.17	20.84	20.70
10	50	0		21.02	20.85	20.65



LTE Band 13 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	22.63	22.54	22.28
5	1	12		22.39	22.26	22.07
5	1	24		22.40	22.18	22.18
5	12	0		21.51	21.50	21.11
5	12	6		21.42	21.29	21.09
5	12	11		21.41	21.17	21.16
5	25	0		21.32	21.06	21.01
5	1	0	16-QAM	21.56	21.52	21.27
5	1	12		21.41	21.25	21.09
5	1	24		21.41	21.15	21.19
5	12	0		20.48	20.42	20.16
5	12	6		20.47	20.30	20.15
5	12	11		20.42	20.20	20.20
5	25	0		20.26	20.09	20.01
10	1	0	QPSK		22.66	
10	1	24			22.23	
10	1	49			22.33	
10	25	0			21.33	
10	25	12			21.26	
10	25	24			21.24	
10	50	0			21.17	
10	1	0	16-QAM		21.64	
10	1	24			21.28	
10	1	49			21.30	
10	25	0			20.32	
10	25	12			20.16	
10	25	24			20.23	
10	50	0			20.24	



LTE Band 17 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0	QPSK	22.53	22.53	22.62
5	1	12		22.42	22.46	22.50
5	1	24		22.51	22.43	22.52
5	12	0		21.40	21.55	21.49
5	12	6		21.40	21.54	21.52
5	12	11		21.50	21.55	21.58
5	25	0		21.35	21.39	21.48
5	1	0	16-QAM	21.54	21.54	21.55
5	1	12		21.48	21.51	21.47
5	1	24		21.50	21.48	21.47
5	12	0		20.42	20.55	20.52
5	12	6		20.43	20.51	20.54
5	12	11		20.53	20.50	20.67
5	25	0		20.36	20.36	20.40
10	1	0	QPSK	22.88	22.89	22.71
10	1	24		22.84	22.68	22.61
10	1	49		22.53	22.45	22.45
10	25	0		21.54	21.57	21.52
10	25	12		21.53	21.55	21.49
10	25	24		21.48	21.53	21.45
10	50	0		21.47	21.51	21.37
10	1	0	16-QAM	21.75	21.73	21.67
10	1	24		21.49	21.60	21.57
10	1	49		21.74	21.43	21.44
10	25	0		20.49	20.43	20.46
10	25	12		20.63	20.46	20.51
10	25	24		20.63	20.56	20.49
10	50	0		20.41	20.34	20.32



**ERP/EIRP**

Cellular Band ( $G_T - L_C = -6.08$ dB)						
Modes	LTE Band 5 (QPSK, BW=1.4M)			LTE Band 5 (16QAM, BW=1.4M)		
Channel	20407 (Low)	20525 (Mid)	20643 (High)	20407 (Low)	20525 (Mid)	20643 (High)
Frequency (MHz)	824.7	836.5	848.3	824.7	836.5	848.3
Conducted Power $P_T$ (dBm)	23.15	23.18	22.95	22.20	22.28	21.98
Conducted Power $P_T$ (Watts)	0.21	0.21	0.20	0.17	0.17	0.16
ERP(dBm)	14.92	14.95	14.72	13.97	14.05	13.75
ERP(Watts)	0.03	0.03	0.03	0.02	0.03	0.02

Cellular Band ( $G_T - L_C = -6.08$ dB)						
Modes	LTE Band 5 (QPSK, BW=3M)			LTE Band 5 (16QAM, BW=3M)		
Channel	20415 (Low)	20525 (Mid)	20635 (High)	20415 (Low)	20525 (Mid)	20635 (High)
Frequency (MHz)	825.5	836.5	847.5	825.5	836.5	847.5
Conducted Power $P_T$ (dBm)	23.11	23.16	22.86	22.20	22.35	21.88
Conducted Power $P_T$ (Watts)	0.20	0.21	0.19	0.17	0.17	0.15
ERP(dBm)	14.88	14.93	14.63	13.97	14.12	13.65
ERP(Watts)	0.03	0.03	0.03	0.02	0.03	0.02



Cellular Band ( $G_T - L_C = -6.08$ dB)						
Modes	LTE Band 5 (QPSK, BW=5M)			LTE Band 5 (16QAM, BW=5M)		
Channel	20425 (Low)	20525 (Mid)	20625 (High)	20425 (Low)	20525 (Mid)	20625 (High)
Frequency (MHz)	826.5	836.5	846.5	826.5	836.5	846.5
Conducted Power $P_T$ (dBm)	23.23	23.11	22.74	22.28	22.38	21.95
Conducted Power $P_T$ (Watts)	0.21	0.20	0.19	0.17	0.17	0.16
ERP(dBm)	15.00	14.88	14.51	14.05	14.15	13.72
ERP(Watts)	0.03	0.03	0.03	0.03	0.03	0.02

Cellular Band ( $G_T - L_C = -6.08$ dB)						
Modes	LTE Band 5 (QPSK, BW=10M)			LTE Band 5 (16QAM, BW=10M)		
Channel	20450 (Low)	20525 (Mid)	20600 (High)	20450 (Low)	20525 (Mid)	20600 (High)
Frequency (MHz)	829	836.5	844	829	836.5	844
Conducted Power $P_T$ (dBm)	23.14	23.27	22.92	22.30	22.30	21.97
Conducted Power $P_T$ (Watts)	0.21	0.21	0.20	0.17	0.17	0.16
ERP(dBm)	14.91	15.04	14.69	14.07	14.07	13.74
ERP(Watts)	0.03	0.03	0.03	0.03	0.03	0.02



PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 2 (QPSK, BW=1.4M)			LTE Band 2 (16QAM, BW=1.4M)		
Channel	18607(Low)	18900 (Mid)	19193 (High)	18607(Low)	18900 (Mid)	19193 (High)
Frequency (MHz)	1850.7	1880	1909.3	1850.7	1880	1909.3
Conducted Power $P_T$ (dBm)	22.78	22.79	22.51	21.81	21.89	21.52
Conducted Power $P_T$ (Watts)	0.19	0.19	0.18	0.15	0.15	0.14
EIRP(dBm)	19.70	19.71	19.43	18.73	18.81	18.44
EIRP(Watts)	0.09	0.09	0.09	0.07	0.08	0.07

PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 2 (QPSK, BW=3M)			LTE Band 2 (16QAM, BW=3M)		
Channel	18615(Low)	18900 (Mid)	19185 (High)	18615(Low)	18900 (Mid)	19185 (High)
Frequency (MHz)	1851.5	1880	1908.5	1851.5	1880	1908.5
Conducted Power $P_T$ (dBm)	22.77	22.83	22.84	21.77	21.91	21.82
Conducted Power $P_T$ (Watts)	0.19	0.19	0.19	0.15	0.16	0.15
EIRP(dBm)	19.69	19.75	19.76	18.69	18.83	18.74
EIRP(Watts)	0.09	0.09	0.09	0.07	0.08	0.07



PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 2 (QPSK, BW=5M)			LTE Band 2 (16QAM, BW=5M)		
Channel	18625(Low)	18900 (Mid)	19175 (High)	18625(Low)	18900 (Mid)	19175 (High)
Frequency (MHz)	1852.5	1880	1907.5	1852.5	1880	1907.5
Conducted Power $P_T$ (dBm)	22.72	22.93	23.02	21.70	21.98	22.00
Conducted Power $P_T$ (Watts)	0.19	0.20	0.20	0.15	0.16	0.16
EIRP(dBm)	19.64	19.85	19.94	18.62	18.90	18.92
EIRP(Watts)	0.09	0.10	0.10	0.07	0.08	0.08

PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 2 (QPSK, BW=10M)			LTE Band 2 (16QAM, BW=10M)		
Channel	18650(Low)	18900 (Mid)	19150 (High)	18650(Low)	18900 (Mid)	19150 (High)
Frequency (MHz)	1855	1880	1905	1855	1880	1905
Conducted Power $P_T$ (dBm)	22.99	22.82	22.78	22.23	21.89	21.77
Conducted Power $P_T$ (Watts)	0.20	0.19	0.19	0.17	0.15	0.15
EIRP(dBm)	19.91	19.74	19.70	19.15	18.81	18.69
EIRP(Watts)	0.10	0.09	0.09	0.08	0.08	0.07



PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 2 (QPSK, BW=15M)			LTE Band 2 (16QAM, BW=15M)		
Channel	18675(Low)	18900 (Mid)	19125 (High)	18675(Low)	18900 (Mid)	19125 (High)
Frequency (MHz)	1857.5	1880	1902.5	1857.5	1880	1902.5
Conducted Power $P_T$ (dBm)	22.75	22.68	22.40	21.76	21.60	21.43
Conducted Power $P_T$ (Watts)	0.19	0.19	0.17	0.15	0.14	0.14
EIRP(dBm)	19.67	19.60	19.32	18.68	18.52	18.35
EIRP(Watts)	0.09	0.09	0.09	0.07	0.07	0.07

PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 2 (QPSK, BW=20M)			LTE Band 2 (16QAM, BW=20M)		
Channel	18700(Low)	18900 (Mid)	19100 (High)	18700(Low)	18900 (Mid)	19100 (High)
Frequency (MHz)	1860	1880	1900	1860	1880	1900
Conducted Power $P_T$ (dBm)	22.78	23.04	22.61	21.78	21.76	21.81
Conducted Power $P_T$ (Watts)	0.19	0.20	0.18	0.15	0.15	0.15
EIRP(dBm)	19.70	19.96	19.53	18.70	18.68	18.73
EIRP(Watts)	0.09	0.10	0.09	0.07	0.07	0.07



PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 25 (QPSK, BW=1.4M)			LTE Band 25 (16QAM, BW=1.4M)		
Channel	26047 (Low)	26340 (Mid)	26683 (High)	26047 (Low)	26340 (Mid)	26683 (High)
Frequency (MHz)	1850.7	1880	1914.3	1850.7	1880	1914.3
Conducted Power $P_T$ (dBm)	22.83	22.88	22.71	21.85	21.93	21.90
Conducted Power $P_T$ (Watts)	0.19	0.19	0.19	0.15	0.16	0.15
EIRP(dBm)	19.75	19.80	19.63	18.77	18.85	18.82
EIRP(Watts)	0.09	0.10	0.09	0.08	0.08	0.08

PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 25 (QPSK, BW=3M)			LTE Band 25 (16QAM, BW=3M)		
Channel	26055 (Low)	26340 (Mid)	26675 (High)	26055 (Low)	26340 (Mid)	26675 (High)
Frequency (MHz)	1851.5	1880	1913.5	1851.5	1880	1913.5
Conducted Power $P_T$ (dBm)	22.80	22.84	22.64	21.79	21.87	21.69
Conducted Power $P_T$ (Watts)	0.19	0.19	0.18	0.15	0.15	0.15
EIRP(dBm)	19.72	19.76	19.56	18.71	18.79	18.61
EIRP(Watts)	0.09	0.09	0.09	0.07	0.08	0.07



PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 25 (QPSK, BW=5M)			LTE Band 25 (16QAM, BW=5M)		
Channel	26065 (Low)	26340 (Mid)	26665 (High)	26065 (Low)	26340 (Mid)	26665 (High)
Frequency (MHz)	1852.5	1880	1912.5	1852.5	1880	1912.5
Conducted Power $P_T$ (dBm)	22.84	22.81	22.44	21.78	21.77	21.34
Conducted Power $P_T$ (Watts)	0.19	0.19	0.18	0.15	0.15	0.14
EIRP(dBm)	19.76	19.73	19.36	18.70	18.69	18.26
EIRP(Watts)	0.09	0.09	0.09	0.07	0.07	0.07

PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 25 (QPSK, BW=10M)			LTE Band 25 (16QAM, BW=10M)		
Channel	26090 (Low)	26340 (Mid)	26640 (High)	26090 (Low)	26340 (Mid)	26640 (High)
Frequency (MHz)	1855	1880	1910	1855	1880	1910
Conducted Power $P_T$ (dBm)	22.81	22.86	22.82	21.79	21.87	22.05
Conducted Power $P_T$ (Watts)	0.19	0.19	0.19	0.15	0.15	0.16
EIRP(dBm)	19.73	19.78	19.74	18.71	18.79	18.97
EIRP(Watts)	0.09	0.10	0.09	0.07	0.08	0.08



PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 25 (QPSK, BW=15M)			LTE Band 25 (16QAM, BW=15M)		
Channel	26115 (Low)	26340 (Mid)	26615 (High)	26115 (Low)	26340 (Mid)	26615 (High)
Frequency (MHz)	1857.5	1880	1907.5	1857.5	1880	1907.5
Conducted Power $P_T$ (dBm)	22.85	22.82	22.69	21.79	21.81	21.68
Conducted Power $P_T$ (Watts)	0.19	0.19	0.19	0.15	0.15	0.15
EIRP(dBm)	19.77	19.74	19.61	18.71	18.73	18.60
EIRP(Watts)	0.09	0.09	0.09	0.07	0.07	0.07

PCS Band ( $G_T - L_C = -3.08$ dB)						
Modes	LTE Band 25 (QPSK, BW=20M)			LTE Band 25 (16QAM, BW=20M)		
Channel	26140 (Low)	26340 (Mid)	26590 (High)	26140 (Low)	26340 (Mid)	26590 (High)
Frequency (MHz)	1860	1880	1905	1860	1880	1905
Conducted Power $P_T$ (dBm)	22.87	22.89	22.65	21.84	21.66	21.63
Conducted Power $P_T$ (Watts)	0.19	0.19	0.18	0.15	0.15	0.15
EIRP(dBm)	19.79	19.81	19.57	18.76	18.58	18.55
EIRP(Watts)	0.10	0.10	0.09	0.08	0.07	0.07



PCS Band ( $G_T - L_C = -4.76$ dB)						
Modes	LTE Band 4 (QPSK, BW=1.4M)			LTE Band 4 (16QAM, BW=1.4M)		
Channel	19957 (Low)	20175 (Mid)	20393 (High)	19957 (Low)	20175 (Mid)	20393 (High)
Frequency (MHz)	1710.7	1732.5	1754.3	1710.7	1732.5	1754.3
Conducted Power $P_T$ (dBm)	23.12	22.78	22.83	22.21	21.78	21.86
Conducted Power $P_T$ (Watts)	0.21	0.19	0.19	0.17	0.15	0.15
EIRP(dBm)	18.36	18.02	18.07	17.45	17.02	17.10
EIRP(Watts)	0.07	0.06	0.06	0.06	0.05	0.05

PCS Band ( $G_T - L_C = -4.76$ dB)						
Modes	LTE Band 4 (QPSK, BW=3M)			LTE Band 4 (16QAM, BW=3M)		
Channel	19965(Low)	20175 (Mid)	20385 (High)	19965(Low)	20175 (Mid)	20385 (High)
Frequency (MHz)	1711.5	1732.5	1753.5	1711.5	1732.5	1753.5
Conducted Power $P_T$ (dBm)	23.17	22.79	22.79	22.09	21.73	21.83
Conducted Power $P_T$ (Watts)	0.21	0.19	0.19	0.16	0.15	0.15
EIRP(dBm)	18.41	18.03	18.03	17.33	16.97	17.07
EIRP(Watts)	0.07	0.06	0.06	0.05	0.05	0.05



PCS Band ( $G_T - L_C = -4.76$ dB)						
Modes	LTE Band 4 (QPSK, BW=5M)			LTE Band 4 (16QAM, BW=5M)		
Channel	19975(Low)	20175 (Mid)	20375 (High)	19975(Low)	20175 (Mid)	20375 (High)
Frequency (MHz)	1712.5	1732.5	1752.5	1712.5	1732.5	1752.5
Conducted Power $P_T$ (dBm)	23.16	22.77	22.76	22.11	21.84	21.76
Conducted Power $P_T$ (Watts)	0.21	0.19	0.19	0.16	0.15	0.15
EIRP(dBm)	18.40	18.01	18.00	17.35	17.08	17.00
EIRP(Watts)	0.07	0.06	0.06	0.05	0.05	0.05

PCS Band ( $G_T - L_C = -4.76$ dB)						
Modes	LTE Band 4 (QPSK, BW=10M)			LTE Band 4 (16QAM, BW=10M)		
Channel	20000 (Low)	20175 (Mid)	20350 (High)	20000 (Low)	20175 (Mid)	20350 (High)
Frequency (MHz)	1715	1732.5	1750	1715	1732.5	1750
Conducted Power $P_T$ (dBm)	23.12	22.86	22.78	22.17	21.87	21.78
Conducted Power $P_T$ (Watts)	0.21	0.19	0.19	0.16	0.15	0.15
EIRP(dBm)	18.36	18.10	18.02	17.41	17.11	17.02
EIRP(Watts)	0.07	0.06	0.06	0.06	0.05	0.05



PCS Band ( $G_T - L_C = -4.76$ dB)						
Modes	LTE Band 4 (QPSK, BW=15M)			LTE Band 4 (16QAM, BW=15M)		
Channel	20025 (Low)	20175 (Mid)	20325 (High)	20025 (Low)	20175 (Mid)	20325 (High)
Frequency (MHz)	1717.5	1732.5	1747.5	1717.5	1732.5	1747.5
Conducted Power $P_T$ (dBm)	23.17	22.80	22.82	22.11	21.78	21.70
Conducted Power $P_T$ (Watts)	0.21	0.19	0.19	0.16	0.15	0.15
EIRP(dBm)	18.41	18.04	18.06	17.35	17.02	16.94
EIRP(Watts)	0.07	0.06	0.06	0.05	0.05	0.05

PCS Band ( $G_T - L_C = -4.76$ dB)						
Modes	LTE Band 4 (QPSK, BW=20M)			LTE Band 4 (16QAM, BW=20M)		
Channel	20050 (Low)	20175 (Mid)	20300 (High)	20050 (Low)	20175 (Mid)	20300 (High)
Frequency (MHz)	1720	1732.5	1745	1720	1732.5	1745
Conducted Power $P_T$ (dBm)	23.18	22.93	22.79	22.14	21.98	21.87
Conducted Power $P_T$ (Watts)	0.21	0.20	0.19	0.16	0.16	0.15
EIRP(dBm)	18.42	18.17	18.03	17.38	17.22	17.11
EIRP(Watts)	0.07	0.07	0.06	0.05	0.05	0.05



Cellular Band (G <sub>T</sub> - L <sub>C</sub> = -7.04 dB)						
Modes	LTE Band 13 (QPSK,BW=5M)			LTE Band 13 (16QAM,BW=5M)		
Channel	23205 (Low)	23230 (Mid)	23255 (High)	23205 (Low)	23230 (Mid)	23255 (High)
Frequency (MHz)	779.5	782	784.5	779.5	782	784.5
Conducted Power P <sub>T</sub> (dBm)	22.63	22.54	22.28	21.56	21.52	21.27
Conducted Power P <sub>T</sub> (Watts)	0.18	0.18	0.17	0.14	0.14	0.13
ERP(dBm)	13.44	13.35	13.09	12.37	12.33	12.08
ERP(Watts)	0.02	0.02	0.02	0.02	0.02	0.02

Cellular Band (G <sub>T</sub> - L <sub>C</sub> = -7.04 dB)		
Modes	LTE Band 13 (QPSK,BW=10M)	LTE Band 13 (16QAM,BW=10M)
Channel	23230 (Mid)	23230 (Mid)
Frequency (MHz)	782	782
Conducted Power P <sub>T</sub> (dBm)	22.66	21.64
Conducted Power P <sub>T</sub> (Watts)	0.18	0.15
ERP(dBm)	13.47	12.45
ERP(Watts)	0.02	0.02



Cellular Band (G <sub>T</sub> - L <sub>C</sub> = -7.72 dB)						
Modes	LTE Band 17 (QPSK,BW=5M)			LTE Band 17 (16QAM,BW=5M)		
Channel	23755(Low)	23790 (Mid)	23825 (High)	23755(Low)	23790 (Mid)	23825 (High)
Frequency (MHz)	706.5	710	713.5	706.5	710	713.5
Conducted Power P <sub>T</sub> (dBm)	22.53	22.53	22.62	21.54	21.54	21.55
Conducted Power P <sub>T</sub> (Watts)	0.18	0.18	0.18	0.14	0.14	0.14
ERP(dBm)	12.66	12.66	12.75	11.67	11.67	11.68
ERP(Watts)	0.02	0.02	0.02	0.01	0.01	0.01

Cellular Band (G <sub>T</sub> - L <sub>C</sub> = -7.72 dB)						
Modes	LTE Band 17 (QPSK,BW=10M)			LTE Band 17 (16QAM,BW=10M)		
Channel	23780(Low)	23790 (Mid)	23800 (High)	23780(Low)	23790 (Mid)	23800 (High)
Frequency (MHz)	709	710	711	709	710	711
Conducted Power P <sub>T</sub> (dBm)	22.88	22.89	22.71	21.75	21.73	21.67
Conducted Power P <sub>T</sub> (Watts)	0.19	0.19	0.19	0.15	0.15	0.15
ERP(dBm)	13.01	13.02	12.84	11.88	11.86	11.80
ERP(Watts)	0.02	0.02	0.02	0.02	0.02	0.02