



FCC RF Test Report

APPLICANT : ASUSTeK COMPUTER INC.
EQUIPMENT : ASUS Phone
BRAND NAME : ASUS
MODEL NAME : ASUS_Z00TD
MARKETING NAME : ZE551KL
FCC ID : MSQZ00TD
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E), 27(L)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Aug. 05, 2015 and testing was completed on Aug. 25, 2015. 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 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 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 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

SPORTON INTERNATIONAL INC.

TEL : 886-3-327-3456

FAX : 886-3-328-4978

FCC ID : MSQZ00TD

Page Number : 1 of 25

Report Issued Date : Sep. 16, 2015

Report Version : Rev. 01

Report Template No.: BU5-FG22/24/27 Version 1.2



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 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator	8
1.7 Testing Location	8
1.8 Applicable Standards	9
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	10
2.1 Test Mode.....	10
2.2 Connection Diagram of Test System	11
2.3 Support Unit used in test configuration	12
2.4 Measurement Results Explanation Example	12
3 CONDUCTED TEST RESULT	13
3.1 Measuring Instruments.....	13
3.2 Test Setup	13
3.3 Test Result of Conducted Test.....	13
3.4 Conducted Output Power	14
3.5 Peak-to-Average Ratio	15
3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement.....	16
3.7 Conducted Band Edge	17
3.8 Conducted Spurious Emission	18
3.9 Frequency Stability	19
4 RADIATED TEST ITEMS	20
4.1 Measuring Instruments.....	20
4.2 Test Setup	20
4.3 Test Result of Radiated Test.....	20
4.4 Effective Radiated Power and Effective Isotropic Radiated Power Measurement	21
4.5 Field Strength of Spurious Radiation Measurement	23
5 LIST OF MEASURING EQUIPMENT	24
6 UNCERTAINTY OF EVALUATION	25
APPENDIX A. TEST RESULTS OF CONDUCTED TEST	
APPENDIX B. TEST RESULTS OF RADIATED TEST	
APPENDIX C. TEST SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG580547A	Rev. 01	Initial issue of report	Sep. 16, 2015



SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.4	§2.1046	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.5)	Conducted Output Power	Reporting Only	PASS	-
3.5	§24.232(d)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.5)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049 §22.917(b) §24.238(b) §27.53(g)	RSS-GEN(6.6) 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(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (6.6)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (6.6)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	RSS-GEN(6.11) RSS-132 (5.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
	§2.1055 §24.235 §27.54	RSS-GEN(6.11) RSS-133 (6.3) RSS-139 (6.4)		Within Authorized Band		



Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
4.4	§22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
	§27.50(d)(4)	RSS-139 (6.5) SRSP-513(5.1.2)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
4.5	§2.1053 §22.917(a) §24.238(a) §27.53(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (6.6)	Field Strength of Spurious Radiation	< 43+10log ₁₀ (P[Watts])	PASS	Under limit 19.49 dB at 5639.000 MHz



1 General Description

1.1 Applicant

ASUSTeK COMPUTER INC.

4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.2 Manufacturer

ASUSTeK COMPUTER INC.

4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	ASUS Phone
Brand Name	ASUS
Model Name	ASUS_Z00TD
Marketing Name	ZE551KL
FCC ID	MSQZ00TD
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE WLAN 11b/g/n HT20 Bluetooth v4.0 EDR/LE
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	GSM/GPRS/EDGE: 850: 824.2 MHz ~ 848.8 MHz 1900: 1850.2 MHz ~ 1909.8MHz WCDMA: Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz Band IV: 1712.4 MHz ~ 1752.6 MHz
Rx Frequency	GSM/GPRS/EDGE: 850: 869.2 MHz ~ 893.8 MHz 1900: 1930.2 MHz ~ 1989.8 MHz WCDMA: Band V: 871.4 MHz ~ 891.6 MHz Band II: 1932.4 MHz ~ 1987.6 MHz Band IV: 2112.4 MHz ~ 2152.6 MHz
Maximum Output Power to Antenna	GSM/GPRS/EDGE: 850: 32.99 dBm 1900: 29.49 dBm WCDMA: Band V: 22.85 dBm Band II: 22.23 dBm Band IV: 23.95 dBm
Antenna Type	PIFA Antenna
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA: QPSK (Uplink) HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink)

1.5 Modification of EUT

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

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

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	GSM850 GPRS class 8	GMSK	0.6695	0.1578 ppm	243KGXW
Part 22	GSM850 EDGE class 8	8PSK	0.2271	0.2056 ppm	252KG7W
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.0572	0.0191 ppm	4M17F9W
Part 24	GSM1900 GPRS class 8	GMSK	0.6891	0.1926 ppm	244KGXW
Part 24	GSM1900 EDGE class 8	8PSK	0.4112	0.0064 ppm	245KG7W
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.1776	0.0277 ppm	4M18F9W
Part 27	WCDMA Band IV RMC 12.2Kbps	QPSK	0.2315	0.0283 ppm	4M17F9W

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.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH02-HY

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH11-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(L)
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

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 were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

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

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 18000 MHz for WCDMA Band IV.
3. 30 MHz to 19000 MHz for GSM1900 and WCDMA Band II.

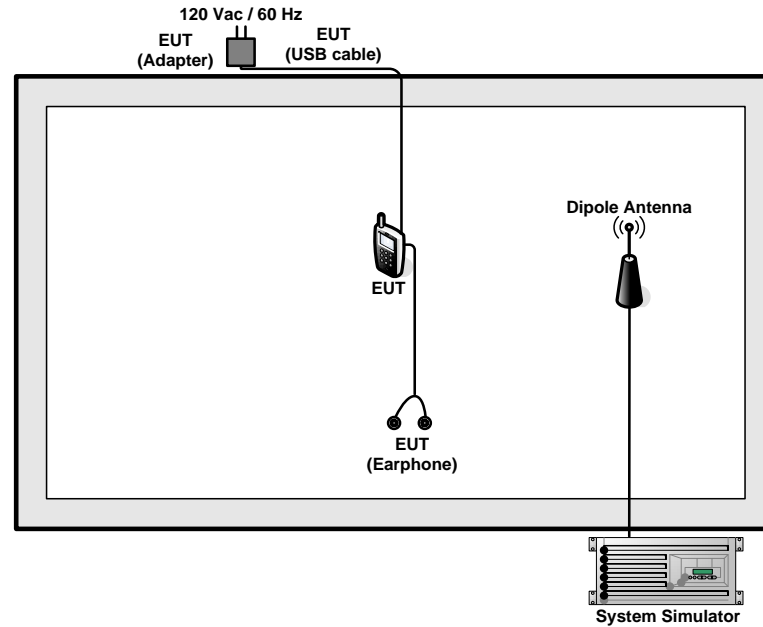
All modes and data rates and positions were investigated.

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

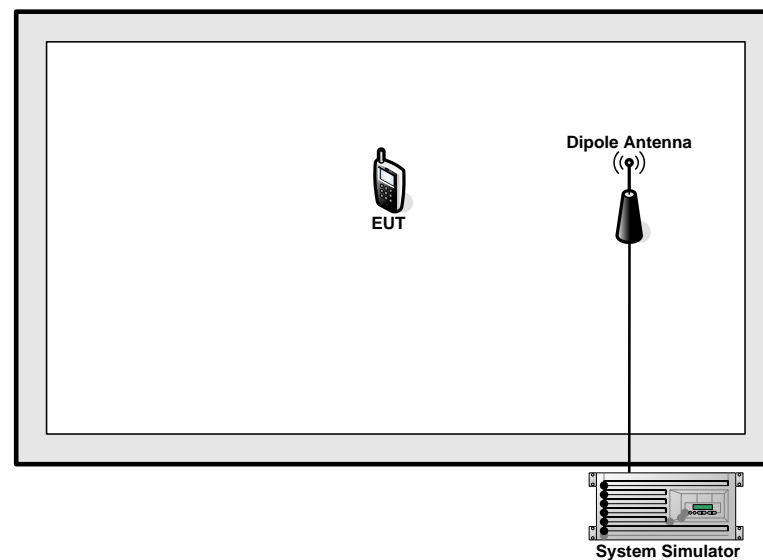
Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	<ul style="list-style-type: none"> ■ GPRS class 8 Link ■ EDGE class 8 Link 	<ul style="list-style-type: none"> ■ GPRS class 8 Link ■ EDGE class 8 Link
GSM 1900	<ul style="list-style-type: none"> ■ GPRS class 8 Link ■ EDGE class 8 Link 	<ul style="list-style-type: none"> ■ GPRS class 8 Link ■ EDGE class 8 Link
WCDMA Band V	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link 	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link
WCDMA Band II	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link 	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link
WCDMA Band IV	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link 	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System

<EUT with Accessory>



<EUT without Accessory>





2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m

2.4 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 RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

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

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 10dB attenuator.

Example :

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

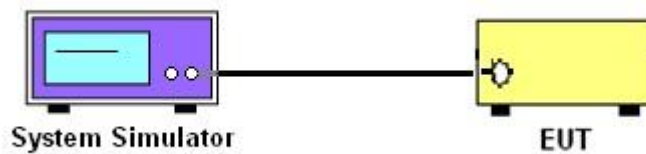
3 Conducted Test Result

3.1 Measuring Instruments

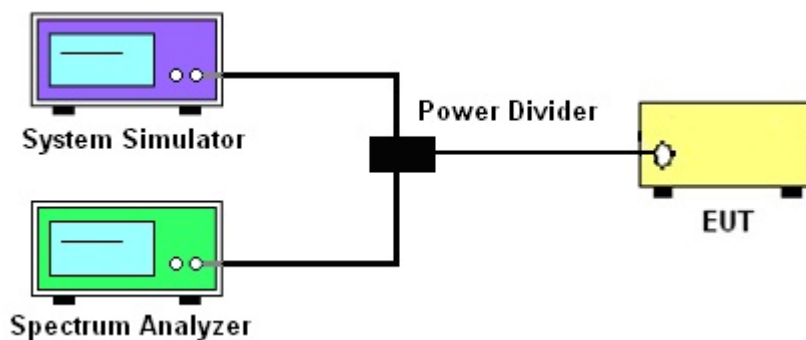
See list of measuring instruments of this test report.

3.2 Test Setup

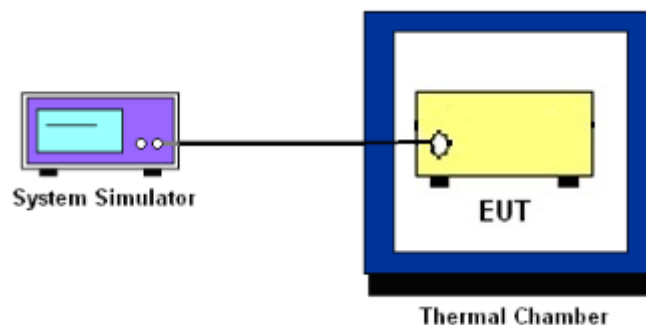
3.2.1 Conducted Output Power



3.2.2 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

3.4.1 Description of the Conducted Output Power

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

3.4.2 Test Procedures

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



3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

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 D01 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. Set EUT to transmit at maximum output power.
4. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
5. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer.
Record the maximum PAPR level associated with a probability of 0.1%.

3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.6.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The 99% 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 emission bandwidth is defined as the width of the signal between two points, located at the two sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.6.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 4.2.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of the 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 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.
5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge 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.

3.7.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator.
The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
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)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$

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 10th harmonic.

3.8.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an 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. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. 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 testing follows FCC KDB 971168 D01 v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C steps up to 50°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 D01 v02r02 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.

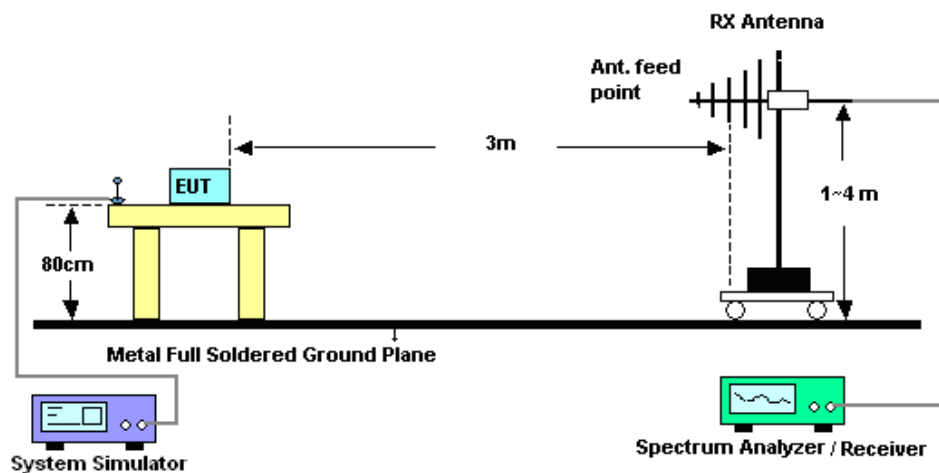
4 Radiated Test Items

4.1 Measuring Instruments

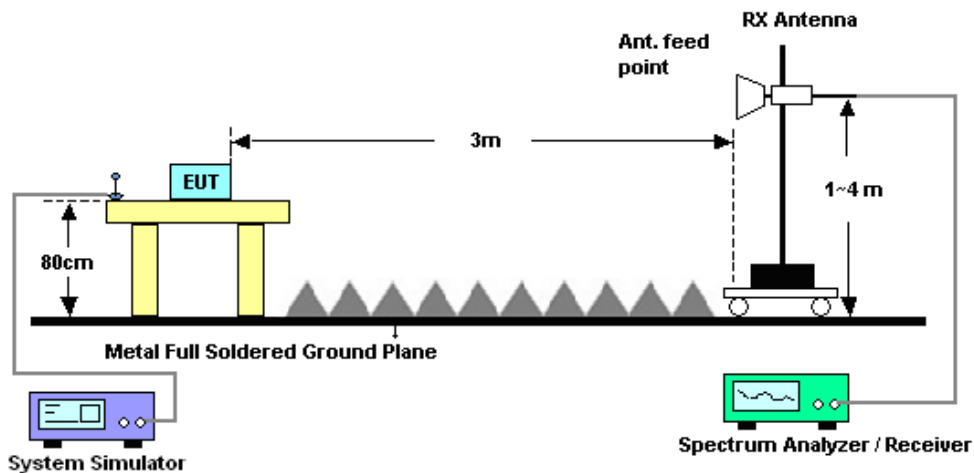
See list of measuring instruments of this test report.

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 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

4.4.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-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 (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band) and 1 Watts (AWS Band).

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-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, $EIRP = LVL + \text{Correction factor}$ and $ERP = EIRP - 2.15$. Take the record of the output power at substitution antenna.



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

4.5 Field Strength of Spurious Radiation Measurement

4.5.1 Description of Field Strength of Spurious Radiated Measurement

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

4.5.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.8 and ANSI / TIA-603-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. $\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$
12. $\text{ERP (dBm)} = \text{EIRP} - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 24, 2015	Aug. 17, 2015	Jun. 23, 2016	Conducted (TH03-HY)
Base Station (Measure)	Rohde & Schwarz	CMU200	117995	GSM / GPRS / WCDMA / CDMA	Jul. 26, 2015	Aug. 17, 2015	Jul. 25, 2016	Conducted (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL883644	Voltage:0~20V;Current:0~5A	Dec. 01, 2014	Aug. 17, 2015	Nov. 30, 2015	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃~70℃	Dec. 01, 2014	Aug. 17, 2015	Nov. 30, 2015	Conducted (TH03-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz- 40GHz	Oct. 02, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Oct. 01, 2015	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 03, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Nov. 02, 2015	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Oct. 23, 2015	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A	MY54130085	20Hz ~ 8.4GHz	Nov. 05, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Nov. 04, 2015	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Oct. 03, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Oct. 02, 2015	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 24, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Nov. 23, 2015	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D	35414	30MHz~1GHz	Oct. 24, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Oct. 23, 2015	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 03, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Oct. 02, 2015	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 20, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Nov. 19, 2015	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHZ	Sep. 24, 2014	Aug. 24, 2015 ~ Aug. 25, 2015	Sep. 23, 2015	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Aug. 24, 2015 ~ Aug. 25, 2015	N/A	Radiation (03CH11-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May 22, 2015	Aug. 24, 2015 ~ Aug. 25, 2015	May 21, 2016	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0-360 degree	N/A	Aug. 24, 2015 ~ Aug. 25, 2015	N/A	Radiation (03CH11-HY)



6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.9
-------------------------------------------------------------------------	-----



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	32.90	32.95	32.94	29.20	29.38	29.44
GPRS class 8	32.91	32.99	32.95	29.24	29.41	29.49
GPRS class 10	31.57	31.68	31.38	26.48	26.60	26.67
GPRS class 11	29.58	29.65	29.42	24.91	24.94	24.95
GPRS class 12	28.57	28.65	28.61	23.56	23.61	23.98
EGPRS class 8	26.44	26.35	26.29	25.59	25.76	25.80
EGPRS class 10	26.26	26.18	26.09	25.52	25.67	25.72
EGPRS class 11	26.00	25.92	25.85	24.97	24.99	25.00
EGPRS class 12	25.80	25.66	25.52	23.83	23.92	23.95

Conducted Power (*Unit: dBm)									
Band	WCDMA Band V			WCDMA Band II			WCDMA Band IV		
Channel	4132	4182	4233	9262	9400	9538	1312	1413	1513
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
RMC 12.2K	22.85	22.82	22.70	22.19	21.67	22.23	23.95	23.80	23.58
HSDPA Subtest-1	21.74	21.78	21.66	21.18	21.17	21.17	23.23	23.02	22.60
HSDPA Subtest-2	21.86	21.86	21.74	21.26	21.28	21.24	23.21	22.98	22.58
HSDPA Subtest-3	21.27	21.36	21.24	20.79	20.80	20.76	22.75	22.59	22.18
HSDPA Subtest-4	21.39	21.40	21.25	20.81	20.85	20.78	22.74	22.50	22.16
HSUPA Subtest-1	22.52	22.40	22.48	21.13	21.68	21.03	23.80	23.76	23.30
HSUPA Subtest-2	21.73	21.26	21.27	20.35	20.12	20.41	22.58	22.49	22.67
HSUPA Subtest-3	21.75	20.73	20.79	20.18	20.09	20.62	22.84	22.08	22.53
HSUPA Subtest-4	22.37	21.80	21.69	20.39	20.64	20.95	22.63	22.59	23.00
HSUPA Subtest-5	22.80	22.78	22.66	21.55	21.64	21.76	23.71	23.78	23.76



Appendix B. Test Results of Radiated Test

ERP/EIRP

Channel	Mode	Horizontal		Vertical	
		ERP(dBm)	ERP(W)	ERP(dBm)	ERP(W)
Lowest	GSM850 GPRS class 8	28.26	0.6695	14.89	0.0308
Middle		27.35	0.5431	14.67	0.0293
Highest		27.10	0.5125	15.09	0.0323
Lowest	GSM850 EDGE class 8	23.56	0.2271	9.81	0.0096
Middle		22.85	0.1927	10.24	0.0106
Highest		22.12	0.1630	9.90	0.0098
Lowest	WCDMA Band V RMC 12.2Kbps	17.58	0.0572	4.23	0.0026
Middle		17.34	0.0542	4.62	0.0029
Highest		17.27	0.0533	5.23	0.0033
Limit	ERP < 7W	Result		PASS	



Channel	Mode	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900 GPRS class 8	28.24	0.6672	23.49	0.2235
Middle		28.38	0.6891	24.70	0.2949
Highest		28.22	0.6637	27.28	0.5344
Lowest	GSM1900 EDGE class 8	24.86	0.3061	20.10	0.1023
Middle		24.68	0.2936	21.28	0.1342
Highest		26.14	0.4112	23.29	0.2135
Lowest	WCDMA Band II RMC 12.2Kbps	21.63	0.1454	17.56	0.0570
Middle		21.40	0.1381	18.16	0.0654
Highest		22.49	0.1776	20.27	0.1065
Limit	EIRP < 2W	Result		PASS	

Channel	Mode	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	WCDMA Band IV RMC 12.2Kbps	23.26	0.2116	22.06	0.1608
Middle		23.65	0.2315	21.98	0.1578
Highest		23.56	0.2268	21.88	0.1541
Limit	EIRP < 1W	Result		PASS	



Radiated Spurious Emission

GSM850 (GPRS class 8)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1648	-49.26	-13	-36.26	-53.71	-51.02	0.98	4.89	H
	2472	-49.49	-13	-36.49	-58.63	-51.37	1.28	5.32	H
	3296	-63.28	-13	-50.28	-75.56	-66.69	1.54	7.10	H
									H
									H
									H
	1648	-50.12	-13	-37.12	-53.16	-51.88	0.98	4.89	V
	2472	-50.67	-13	-37.67	-60.8	-52.55	1.28	5.32	V
	3296	-64.24	-13	-51.24	-75.5	-67.65	1.54	7.10	V
									V
									V
									V
Middle	1672	-50.53	-13	-37.53	-54.86	-52.21	0.99	4.82	H
	2512	-54.11	-13	-41.11	-63.44	-56.08	1.29	5.41	H
	3345	-63.62	-13	-50.62	-75.54	-67.23	1.56	7.32	H
									H
									H
									H
	1672	-55.13	-13	-42.13	-57.89	-56.81	0.99	4.82	V
	2512	-52.18	-13	-39.18	-62.18	-54.15	1.29	5.41	V
	3345	-64.14	-13	-51.14	-75.29	-67.75	1.56	7.32	V
									V
									V
									V
Highest	1696	-55.73	-13	-42.73	-60.19	-57.33	1.00	4.75	H
	2544	-55.08	-13	-42.08	-64.42	-57.06	1.30	5.44	H
	3395	-63.64	-13	-50.64	-75.68	-67.46	1.57	7.54	H
									H
									H
									H
	1696	-56.24	-13	-43.24	-59.77	-57.84	1.00	4.75	V
	2544	-55.43	-13	-42.43	-65.42	-57.41	1.30	5.44	V
	3395	-64.27	-13	-51.27	-75.79	-68.09	1.57	7.54	V
									V
									V
									V

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



GSM850 (EDGE class 8)

Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1648	-54.93	-13	-41.93	-59.42	-56.69	0.98	4.89	H
	2472	-52.75	-13	-39.75	-61.85	-54.63	1.28	5.32	H
	3296	-63.54	-13	-50.54	-75.79	-66.95	1.54	7.10	H
									H
									H
									H
	1648	-57.84	-13	-44.84	-60.83	-59.6	0.98	4.89	V
	2472	-58.24	-13	-45.24	-68.35	-60.12	1.28	5.32	V
	3296	-64.38	-13	-51.38	-75.66	-67.79	1.54	7.10	V
									V
									V
									V
Middle	1672	-58.48	-13	-45.48	-62.82	-60.16	0.99	4.82	H
	2512	-63.85	-13	-50.85	-73.18	-65.82	1.29	5.41	H
	3345	-63.65	-13	-50.65	-75.58	-67.26	1.56	7.32	H
									H
									H
									H
	1672	-59.26	-13	-46.26	-62.03	-60.94	0.99	4.82	V
	2512	-64.44	-13	-51.44	-74.44	-66.41	1.29	5.41	V
	3345	-64.56	-13	-51.56	-75.72	-68.17	1.56	7.32	V
									V
									V
									V
Highest	1696	-65.37	-13	-52.37	-69.84	-66.97	1.00	4.75	H
	2544	-65.24	-13	-52.24	-74.55	-67.22	1.30	5.44	H
	3395	-63.65	-13	-50.65	-75.67	-67.47	1.57	7.54	H
									H
									H
									H
	1696	-69.32	-13	-56.32	-72.83	-70.92	1.00	4.75	V
	2544	-64.73	-13	-51.73	-74.71	-68.86	1.30	5.44	V
	3395	-64.22	-13	-51.22	-75.75	-70.19	1.57	7.54	V
									V
									V
									V

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



GSM1900 (GPRS class 8)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3700	-56.38	-13	-43.38	-70.63	-62.95	1.67	8.24	H
	5548	-47.26	-13	-34.26	-67.14	-54.33	2.65	9.72	H
	7400	-52.41	-13	-39.41	-77.67	-61.55	2.46	11.60	H
									H
									H
									H
	3700	-59.02	-13	-46.02	-73.19	-65.59	1.67	8.24	V
	5548	-43.64	-13	-30.64	-61.95	-50.71	2.65	9.72	V
	7400	-53.57	-13	-40.57	-77.59	-62.71	2.46	11.60	V
									V
									V
									V
Middle	3763	-53.76	-13	-40.76	-68.23	-60.39	1.69	8.32	H
	5639	-32.49	-13	-19.49	-52.14	-39.54	2.71	9.76	H
	7520	-52.86	-13	-39.86	-77.61	-62.25	2.42	11.81	H
									H
									H
									H
	3763	-54.31	-13	-41.31	-68.33	-60.94	1.69	8.32	V
	5639	-35.34	-13	-22.34	-53.51	-42.39	2.71	9.76	V
	7520	-53.84	-13	-40.84	-77.66	-63.23	2.42	11.81	V
									V
									V
									V
Highest	3819	-53.26	-13	-40.26	-67.81	-59.94	1.70	8.38	H
	5730	-38.87	-13	-25.87	-58.78	-45.9	2.76	9.79	H
	9552	-49.21	-13	-36.21	-78.1	-59.08	2.60	12.47	H
									H
									H
									H
	3819	-52.38	-13	-39.38	-66.28	-59.06	1.70	8.38	V
	5730	-33.46	-13	-20.46	-52.16	-40.49	2.76	9.79	V
	9552	-50.47	-13	-37.47	-76.21	-60.34	2.60	12.47	V
									V
									V
									V

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



GSM1900 (EDGE class 8)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3700	-61.33	-13	-48.33	-75.58	-67.9	1.67	8.24	H
	5548	-53.31	-13	-40.31	-73.2	-60.38	2.65	9.72	H
	7400	-52.28	-13	-39.28	-77.56	-61.42	2.46	11.60	H
									H
									H
									H
	3700	-62.58	-13	-49.58	-76.75	-69.15	1.67	8.24	V
	5548	-47.06	-13	-34.06	-65.39	-54.13	2.65	9.72	V
	7400	-53.47	-13	-40.47	-77.5	-62.61	2.46	11.60	V
									V
									V
									V
Middle	3763	-57.86	-13	-44.86	-72.31	-64.49	1.69	8.32	H
	5639	-42.24	-13	-29.24	-61.92	-49.29	2.71	9.76	H
	7520	-52.89	-13	-39.89	-77.65	-62.28	2.42	11.81	H
									H
									H
									H
	3763	-55.98	-13	-42.98	-70.01	-62.61	1.69	8.32	V
	5639	-42.84	-13	-29.84	-60.97	-49.89	2.71	9.76	V
	7520	-53.76	-13	-40.76	-77.59	-63.15	2.42	11.81	V
									V
									V
									V
Highest	3819	-59.09	-13	-46.09	-73.63	-65.77	1.70	8.38	H
	5730	-43.94	-13	-30.94	-63.83	-50.97	2.76	9.79	H
	7635	-53.36	-13	-40.36	-77.8	-62.86	2.39	11.88	H
									H
									H
									H
	3819	-60.23	-13	-47.23	-74.09	-66.91	1.70	8.38	V
	5730	-42.05	-13	-29.05	-60.81	-49.08	2.76	9.79	V
	7635	-53.86	-13	-40.86	-77.58	-63.36	2.39	11.88	V
									V
									V
									V

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



WCDMA Band V(RMC 12.2Kbps)									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1656	-69.83	-13	-56.83	-74.21	-71.56	0.98	4.86	H
	2480	-66.41	-13	-53.41	-75.06	-68.32	1.28	5.34	H
	3304	-64.48	-13	-51.48	-76.31	-67.92	1.54	7.14	H
									H
									H
									H
	1656	-56.82	-13	-43.82	-59.69	-58.55	0.98	4.86	V
	2480	-63.87	-13	-50.87	-73.61	-65.78	1.28	5.34	V
	3304	-64.69	-13	-51.69	-75.51	-68.13	1.54	7.14	V
									V
									V
									V
Middle	1672	-59.73	-13	-46.73	-63.73	-61.41	0.99	4.82	H
	2512	-64.74	-13	-51.74	-73.63	-66.71	1.29	5.41	H
	3344	-63.58	-13	-50.58	-75.26	-67.19	1.56	7.31	H
									H
									H
									H
	1672	-62.96	-13	-49.96	-65.48	-64.64	0.99	4.82	V
	2512	-63.74	-13	-50.74	-73.94	-65.71	1.29	5.41	V
	3344	-63.96	-13	-50.96	-74.96	-67.57	1.56	7.31	V
									V
									V
									V
Highest	1696	-53.94	-13	-40.94	-58.16	-55.54	1.00	4.75	H
	2536	-64.21	-13	-51.21	-73.31	-66.19	1.30	5.43	H
	3384	-62.95	-13	-49.95	-74.48	-66.72	1.57	7.49	H
									H
									H
									H
	1696	-56.94	-13	-43.94	-60.31	-58.54	1.00	4.75	V
	2536	-63.97	-13	-50.97	-73.73	-65.95	1.30	5.43	V
	3384	-63.55	-13	-50.55	-74.98	-67.32	1.57	7.49	V
									V
									V
									V

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



WCDMA Band II(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3707	-59.34	-13	-46.34	-73.22	-65.92	1.67	8.25	H
	5555	-58.84	-13	-45.84	-78.03	-65.91	2.66	9.72	H
	7410	-53.03	-13	-40.03	-77.57	-62.19	2.46	11.62	H
									H
									H
									H
	3707	-61.24	-13	-48.24	-75.22	-67.82	1.67	8.25	V
	5555	-60.29	-13	-47.29	-78.08	-67.36	2.66	9.72	V
	7410	-52.82	-13	-39.82	-76.24	-61.98	2.46	11.62	V
									V
									V
									V
Middle	3763	-61.50	-13	-48.50	-75.73	-68.13	1.69	8.32	H
	5639	-58.88	-13	-45.88	-77.83	-65.93	2.71	9.76	H
	7522	-53.36	-13	-40.36	-77.56	-62.75	2.42	11.81	H
									H
									H
									H
	3763	-61.90	-13	-48.90	-75.8	-68.53	1.69	8.32	V
	5639	-60.78	-13	-47.78	-78.23	-67.83	2.71	9.76	V
	7522	-53.78	-13	-40.78	-77.47	-63.17	2.42	11.81	V
									V
									V
									V
Highest	3812	-59.15	-13	-46.15	-73.55	-65.82	1.70	8.37	H
	5723	-59.11	-13	-46.11	-78.3	-66.15	2.75	9.79	H
	7627	-53.16	-13	-40.16	-77.34	-62.65	2.39	11.88	H
									H
									H
									H
	3812	-61.06	-13	-48.06	-74.42	-67.73	1.70	8.37	V
	5723	-60.32	-13	-47.32	-78.34	-67.36	2.75	9.79	V
	7627	-54.00	-13	-41.00	-77.37	-63.49	2.39	11.88	V
									V
									V
									V

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



WCDMA Band IV(RMC 12.2Kbps)									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3427	-62.11	-13	-49.11	-73.82	-68.21	1.58	7.68	H
	5135	-59.19	-13	-46.19	-77.67	-66.48	2.41	9.70	H
	6850	-53.91	-13	-40.91	-76.65	-61.89	2.64	10.62	H
									H
									H
									H
	3427	-61.35	-13	-48.35	-72.94	-67.45	1.58	7.68	V
	5135	-60.56	-13	-47.56	-77.91	-67.85	2.41	9.70	V
	6850	-55.81	-13	-42.81	-78.22	-63.79	2.64	10.62	V
									V
									V
									V
Middle	3462	-60.91	-13	-47.91	-72.99	-67.15	1.59	7.83	H
	5198	-59.08	-13	-46.08	-77.65	-66.33	2.45	9.70	H
	6927	-53.85	-13	-40.85	-76.39	-61.95	2.61	10.71	H
									H
									H
									H
	3462	-61.71	-13	-48.71	-74.13	-67.95	1.59	7.83	V
	5198	-59.87	-13	-46.87	-77.47	-67.12	2.45	9.70	V
	6927	-55.87	-13	-42.87	-78.17	-63.97	2.61	10.71	V
									V
									V
									V
Highest	3504	-60.86	-13	-47.86	-73.54	-67.26	1.61	8.00	H
	5254	-58.76	-13	-45.76	-77.11	-65.98	2.48	9.70	H
	7011	-53.57	-13	-40.57	-76.52	-61.81	2.59	10.82	H
									H
									H
									H
	3504	-60.49	-13	-47.49	-73.76	-66.89	1.61	8.00	V
	5254	-59.86	-13	-46.86	-77.65	-67.08	2.48	9.70	V
	7011	-55.02	-13	-42.02	-77.8	-63.26	2.59	10.82	V
									V
									V
									V

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