



FCC RF Test Report

APPLICANT : Honeywell International Inc.
EQUIPMENT : 99EX mobile computer
BRAND NAME : Honeywell
MODEL NAME : 99EXLF
MARKETING NAME : Dolphin 99EX
FCC ID : HD5-99EXLF
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on Aug. 20, 2015 and testing was completed on Sep. 30, 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 : HD5-99EXLF

Page Number : 1 of 21

Report Issued Date : Nov. 24, 2015

Report Version : Rev. 01

Report Template No.: BU5-FG22/24 Version 1.0



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant.....	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test	5
1.4 Product Specification subjective to this standard	6
1.5 Modification of EUT	6
1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator	7
1.7 Testing Location	8
1.8 Applicable Standards	8
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	9
2.1 Test Mode.....	9
2.2 Connection Diagram of Test System	10
2.3 Support Unit used in test configuration	10
2.4 Measurement Results Explanation Example	10
3 CONDUCTED TEST RESULT	11
3.1 Measuring Instruments.....	11
3.2 Test Setup	11
3.3 Test Result of Conducted Test.....	11
3.4 Conducted Output Power	12
3.5 Peak-to-Average Ratio	12
3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement.....	13
3.7 Conducted Band Edge	14
3.8 Conducted Spurious Emission	15
3.9 Frequency Stability	16
4 RADIATED TEST ITEMS	17
4.1 Measuring Instruments.....	17
4.2 Test Setup	17
4.3 Test Result of Radiated Test.....	17
4.4 Effective Radiated Power and Effective Isotropic Radiated Power Measurement	18
4.5 Field Strength of Spurious Radiation Measurement	19
5 LIST OF MEASURING EQUIPMENT	20
6 UNCERTAINTY OF EVALUATION	21
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
FG0D0904-35	Rev. 01	Initial issue of report	Nov. 24, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	N/A	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	N/A	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355 §2.1055 §24.235	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22 Within Authorized Band	PASS	-
4.4	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
4.5	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 3.14 dB at 3819.000 MHz

Remark: The FG0D0904-35 report reuses test data from the FG0D0904-29 report.



1 General Description

1.1 Applicant

Honeywell International Inc.

9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.2 Manufacturer

Honeywell International Inc.

9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	99EX mobile computer
Brand Name	Honeywell
Model Name	99EXLF
Marketing Name	Dolphin 99EX
FCC ID	HD5-99EXLF
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA WLAN 11a/b/g/n HT20 Bluetooth v2.1 EDR
HW Version	8
SW Version	26.07
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 CDMA2000: BC0: 824.70 MHz ~ 848.31 MHz BC1: 1851.25 MHz ~ 1908.75 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 CDMA2000: BC0: 869.70 MHz ~ 893.31 MHz BC1: 1931.25 MHz ~ 1988.75 MHz
Maximum Output Power to Antenna	GSM/GPRS/EDGE: 850: 33.39 dBm 1900: 30.69 dBm WCDMA: Band V: 23.67 dBm Band II: 24.20 dBm CDMA2000: BC0: 24.57 dBm BC1: 24.43 dBm
Antenna Type	PIFA Antenna
Type of Modulation	GPRS: GMSK EDGE: GMSK / 8PSK WCDMA: QPSK (Uplink) HSDPA: 16QAM (Downlink) HSUPA: QPSK (Uplink) CDMA2000 1xRTT: QPSK CDMA2000 1xEV-DO: QPSK/8PSK

1.5 Modification of EUT

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



1.6 Maximum ERP/EIRP Power, 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	1.7022	0.0658 ppm	247KGXW
Part 22	GSM850 EDGE class 8	8PSK	0.4508	0.1040 ppm	249KG7W
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.1849	0.0359 ppm	4M14F9W
Part 22	CDMA2000 BC0 1xRTT	QPSK	0.2871	0.0371 ppm	1M28F9W
Part 24	GSM1900 GPRS class 8	GMSK	1.6032	0.0122 ppm	247KGXW
Part 24	GSM1900 EDGE class 8	8PSK	0.3999	0.0314 ppm	246KG7W
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.2109	0.0298 ppm	4M15F9W
Part 24	CDMA2000 BC1 1xRTT	QPSK	0.2958	0.0303 ppm	1M28F9W

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.
	TH03-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.
	03CH10-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)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

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

Radiated 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:

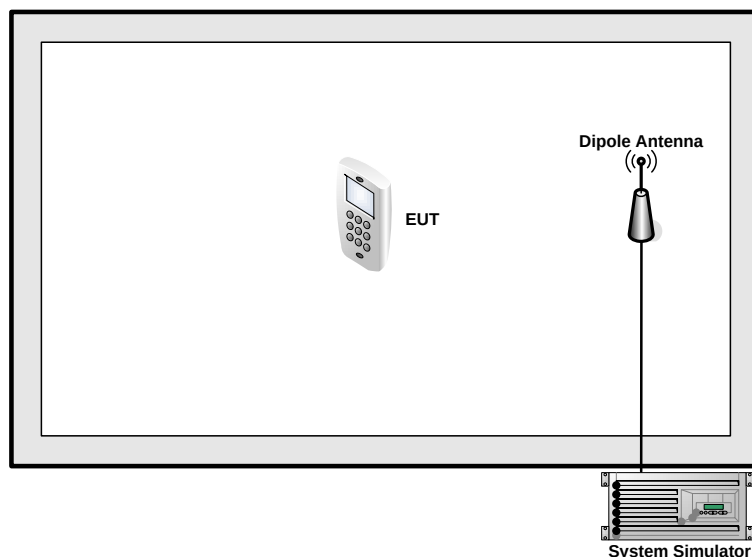
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V and CDMA BC0.
2. 30 MHz to 19000 MHz for GSM1900 and WCDMA Band II and CDMA BC1.

All modes and data rates and positions were investigated.

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

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GPRS class 8 Link ■ EDGE class 8 Link	■ GPRS class 8 Link ■ EDGE class 8 Link
GSM 1900	■ GPRS class 8 Link ■ EDGE class 8 Link	■ GPRS class 8 Link ■ EDGE class 8 Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
CDMA BC0	■ 1xRTT Link	■ 1xRTT Link
CDMA BC1	■ 1xRTT Link	■ 1xRTT Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	Charging Base	Honeywell	99EX-HB	Verification	NA	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 :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

$$= 4.2 + 10 = 14.2 \text{ (dB)}$$

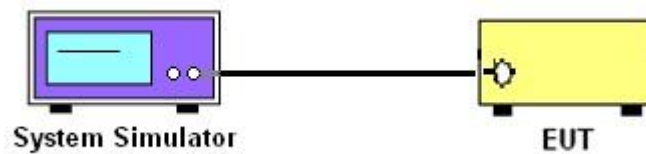
3 Conducted Test Result

3.1 Measuring Instruments

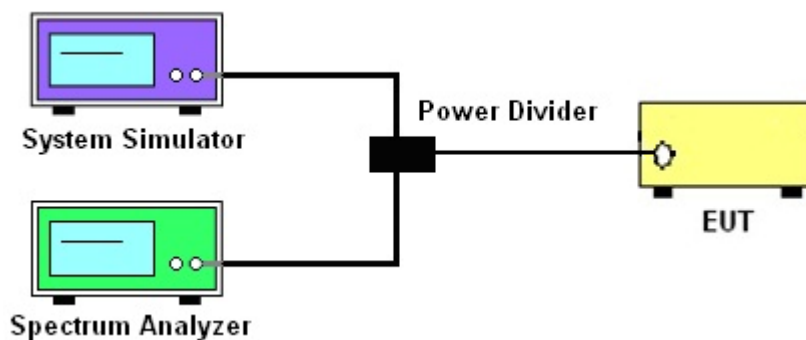
See list of measuring instruments of this test report.

3.2 Test Setup

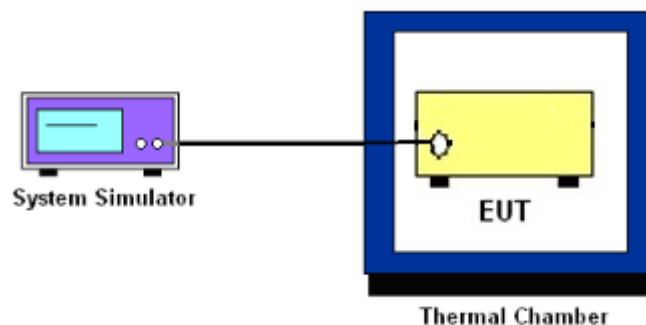
3.2.1 Conducted Output Power



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.
6. 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)
 $= -13\text{dBm}$.

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.

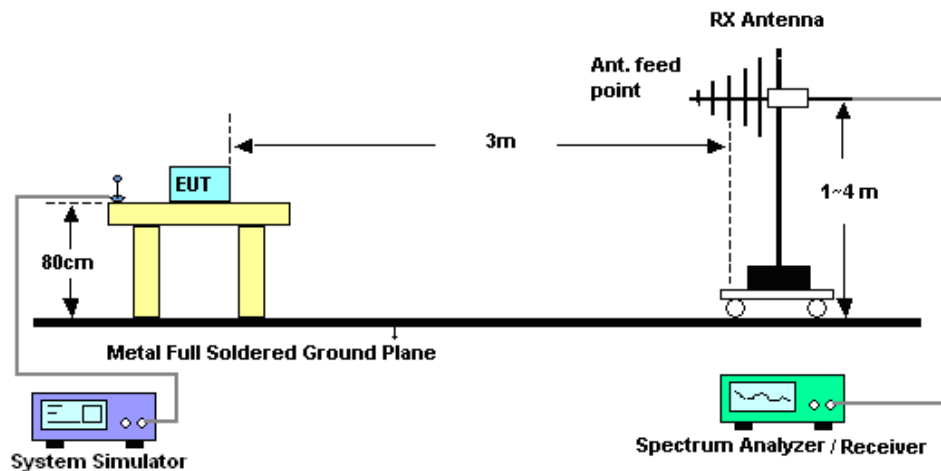
4 Radiated Test Items

4.1 Measuring Instruments

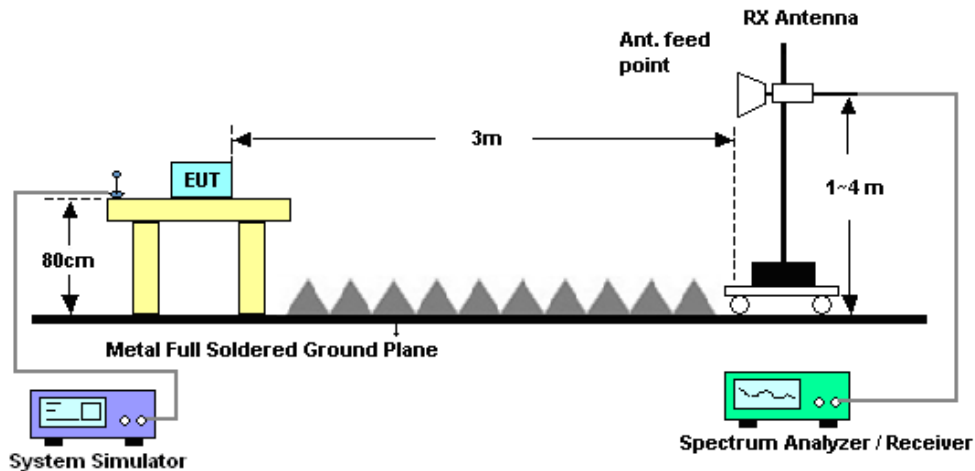
See list of measuring instruments of this test report.

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).

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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ 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	Sep. 07, 2015~ Sep. 30, 2015	Jun. 23, 2016	Conducted (TH02-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL883644	Voltage:0~20V; Current:0~5A	Dec. 01, 2014	Sep. 07, 2015~ Sep. 30, 2015	Nov. 30, 2015	Conducted (TH02-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30 70 degree	Dec. 01, 2014	Sep. 07, 2015~ Sep. 30, 2015	Nov. 30, 2015	Conducted (TH02-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 24, 2014	Sep. 05, 2015~ Sep. 24, 2015	Nov. 23, 2015	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Sep. 05, 2015~ Sep. 24, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
EMI Test Receiver	Keysight	N9038A	MY541300 85	20Hz ~ 8.4GHz	Nov. 05, 2014	Sep. 05, 2015~ Sep. 24, 2015	Nov. 04, 2015	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-132 5	1GHz ~ 18GHz	Oct. 03, 2014	Sep. 05, 2015~ Sep. 24, 2015	Oct. 02, 2015	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY532700 78	1GHz~26.5GHz	Nov. 20, 2014	Sep. 05, 2015~ Sep. 24, 2015	Nov. 19, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004 85	10Hz ~ 44GHZ	Oct. 14, 2014	Sep. 05, 2015~ Sep. 24, 2015	Oct. 13, 2015	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Sep. 05, 2015~ Sep. 24, 2015	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0-360 degree	N/A	Sep. 05, 2015~ Sep. 24, 2015	N/A	Radiation (03CH10-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 576	18GHz ~40GHz	Apr. 20, 2015	Sep. 05, 2015~ Sep. 24, 2015	Apr. 19, 2016	Radiation (03CH10-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
GPRS class 8	33.39	33.30	33.19	30.31	30.69	30.66
GPRS class 10	33.22	33.12	33.06	30.17	30.59	30.58
EGPRS class 8	26.94	26.92	26.98	26.27	26.34	26.34
EGPRS class 10	26.34	26.33	26.73	26.17	26.19	26.24
EGPRS class 11	26.16	26.07	26.20	26.06	26.08	26.06
EGPRS class 12	26.15	25.99	26.14	25.88	25.90	25.92

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2K	23.64	23.56	23.67	24.20	24.00	23.91
HSDPA Subtest-1	23.11	23.12	23.52	23.92	23.93	23.85
HSDPA Subtest-2	23.26	23.13	23.23	23.99	23.85	23.81
HSDPA Subtest-3	22.74	22.75	22.83	23.57	23.60	23.44
HSDPA Subtest-4	22.70	22.71	22.75	23.48	23.51	23.35
HSUPA Subtest-1	22.75	22.65	22.83	23.68	23.61	23.55
HSUPA Subtest-2	20.79	20.73	20.94	21.74	21.69	21.64
HSUPA Subtest-3	21.83	21.78	21.86	22.80	22.75	22.70
HSUPA Subtest-4	21.13	21.00	21.19	21.94	21.85	21.75
HSUPA Subtest-5	22.84	22.81	23.00	23.83	23.72	23.50

Conducted Power (*Unit: dBm)						
Band	CDMA 2000 BC0			CDMA 2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1 SO55	24.57	24.52	24.56	24.39	24.41	24.43
1xRTT RC3 SO55	24.56	24.50	24.55	24.37	24.40	24.41
1xRTT RC3 SO32 (+ F-SCH)	24.54	24.49	24.54	24.38	24.42	24.39
1xRTT RC3 SO32 (+SCH)	24.54	24.51	24.56	24.39	24.39	24.42
1xEVDO RTAP 153.6Kbps	24.53	24.50	24.56	24.39	24.36	24.41
1xEVDO RETAP 4096Bits	24.52	24.49	24.54	24.36	24.37	24.39



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	32.30	1.6982	28.07	0.6412
Middle		32.31	1.7022	28.63	0.7295
Highest		32.07	1.6106	28.47	0.7031
Lowest	GSM850 EDGE class 8	26.54	0.4508	22.19	0.1656
Middle		26.18	0.4150	22.33	0.1710
Highest		25.39	0.3459	22.13	0.1633
Lowest	WCDMA Band V RMC 12.2Kbps	21.34	0.1361	17.13	0.0516
Middle		22.41	0.1742	18.53	0.0713
Highest		22.67	0.1849	19.21	0.0834
Lowest	CDMA BC0 1xRTT	23.01	0.2000	18.69	0.0740
Middle		23.98	0.2500	20.03	0.1007
Highest		24.58	0.2871	20.82	0.1208
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900 GPRS class 8	31.77	1.5031	30.90	1.2303
Middle		31.65	1.4622	30.94	1.2417
Highest		32.05	1.6032	30.90	1.2303
Lowest	GSM1900 EDGE class 8	25.76	0.3767	25.29	0.3381
Middle		25.79	0.3793	25.34	0.3420
Highest		26.02	0.3999	24.76	0.2992
Lowest	WCDMA Band II RMC 12.2Kbps	22.56	0.1803	22.48	0.1770
Middle		22.89	0.1945	22.50	0.1778
Highest		23.24	0.2109	22.16	0.1644
Lowest	CDMA BC1 1xRTT	24.71	0.2958	24.33	0.2710
Middle		24.61	0.2891	24.06	0.2547
Highest		24.43	0.2773	23.32	0.2148
Limit	EIRP < 2W	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	1651	-43.56	-13	-30.56	-52.95	-45.31	0.98	4.88	H
	2476	-55.80	-13	-42.80	-68.69	-57.69	1.28	5.33	H
	3296	-60.51	-13	-47.51	-77.14	-63.92	1.54	7.10	H
	1651	-45.63	-13	-32.63	-53.2	-47.38	0.98	4.88	V
	2476	-58.93	-13	-45.93	-74.05	-60.82	1.28	5.33	V
	3295	-61.74	-13	-48.74	-77.07	-65.15	1.54	7.10	V
Middle	1675	-42.15	-13	-29.15	-51.25	-43.82	0.99	4.81	H
	2512	-53.86	-13	-40.86	-67.09	-55.83	1.29	5.41	H
	3349	-58.68	-13	-45.68	-74.82	-62.31	1.56	7.34	H
	1675	-46.68	-13	-33.68	-53.5	-48.35	0.99	4.81	V
	2512	-51.42	-13	-38.42	-66.64	-53.39	1.29	5.41	V
	3349	-60.45	-13	-47.45	-75.61	-64.08	1.56	7.34	V
Highest	1702	-46.48	-13	-33.48	-55.67	-48.06	1.00	4.73	H
	2548	-51.91	-13	-38.91	-65.55	-53.89	1.31	5.44	H
	3397	-58.52	-13	-45.52	-74.9	-62.34	1.57	7.55	H
	1702	-53.58	-13	-40.58	-61.11	-55.16	1.00	4.73	V
	2548	-49.41	-13	-36.41	-64.64	-51.39	1.31	5.44	V
	3397	-60.40	-13	-47.40	-76.11	-64.22	1.57	7.55	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	-32.46	-13	-19.46	-51.06	-39.03	1.67	8.24	H
	5548	-43.92	-13	-30.92	-67.62	-50.99	2.65	9.72	H
	7403	-34.63	-13	-21.63	-63.54	-43.78	2.46	11.61	H
	9251	-39.03	-13	-26.03	-69.94	-49.09	2.54	12.60	H
	3700	-29.29	-13	-16.29	-47.78	-35.86	1.67	8.24	V
	5548	-45.67	-13	-32.67	-67.87	-52.74	2.65	9.72	V
	7403	-39.76	-13	-26.76	-68.03	-48.91	2.46	11.61	V
	9251	-43.27	-13	-30.27	-73.62	-53.33	2.54	12.60	V
Middle	3763	-39.74	-13	-26.74	-58.92	-46.37	1.69	8.32	H
	5639	-43.74	-13	-30.74	-67.49	-50.79	2.71	9.76	H
	7522	-43.67	-13	-30.67	-73.29	-53.06	2.42	11.81	H
	9398	-36.57	-13	-23.57	-67.91	-46.54	2.57	12.54	H
	3763	-35.38	-13	-22.38	-53.92	-42.01	1.69	8.32	V
	5639	-49.03	-13	-36.03	-71.32	-56.08	2.71	9.76	V
	7522	-43.47	-13	-30.47	-71.74	-52.86	2.42	11.81	V
	9398	-38.98	-13	-25.98	-68.13	-48.95	2.57	12.54	V
Highest	3819	-36.45	-13	-23.45	-56.07	-43.13	1.70	8.38	H
	5730	-49.11	-13	-36.11	-73.14	-56.14	2.76	9.79	H
	7641	-46.94	-13	-33.94	-75.35	-56.44	2.38	11.88	H
	9552	-44.35	-13	-31.35	-75.96	-54.22	2.60	12.47	H
	3819	-36.62	-13	-23.62	-55.31	-43.3	1.70	8.38	V
	5730	-49.52	-13	-36.52	-72.61	-56.55	2.76	9.79	V
	7641	-48.07	-13	-35.07	-76	-57.57	2.38	11.88	V
	9552	-42.42	-13	-29.42	-76.07	-52.29	2.60	12.47	V

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