

FCC PART 15D
TEST REPORT
For
PORTA PHONE CO., INC.

145 DEAN KNAUSS DRIVE, NARRAGANSETT, RI 02882, USA

FCC ID: B4HPRO2000

Report Type: Original Report	Product Type: FULL DUPLEX WIRELESS COMMUNICATION SYSTEM-BASE
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* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *PORTA PHONE CO., INC.*'s product, model number: *PRO2000 (FCC ID: B4HPRO2000)* or the "EUT" in this report was a base of *FULL DUPLEX WIRELESS COMMUNICATION SYSTEM*, Which was measured approximately: 20.7cm (L) x 16.8 cm (W) x 8.0 cm (H), input voltage: DC 9 V adapter or DC 6.0V Ni-MH Rechargeable battery.

Adapter information:

Model: PRS-C13US9VU;

Input: AC 100-240V 50/60Hz 0.4A MAX;

Output: DC 9.0V 1A

** All measurement and test data in this report was gathered from production sample serial number: 1011030 (Assigned by BACL, Shenzhen). The EUT was received on 2011-09-21.*

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.17-2006 and ANSI C63.4-2009

The tests were performed in order to determine compliance with FCC Part 15, Subpart D, and section, 15.203, 15.207, 15.315, 15.317, 15.319 and 15.323 rules.

The current device has the exactly same RF modules, radio PCB layouts and the antennas as the original approved device (FLX2000, FCC ID: B4HCS1900), the modification made by the manufacturer is remove the cord handset capability from FLX2000; take off the LED and the buttons. Based on the engineering justification, the radiated emissions have been investigated; the original test results can be represented for the current device.

Related Submittal(s)/Grant(s)

FCC ID: B4HCS1900

Test Methodology

All measurements contained in this report were conducted with ANSI C63.17 - 2006 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Justification

The EUT consists of four radios, the RF circuit and antenna components are totally identical. So one has been tested an antenna port, AC line conducted emissions and radiated spurious emission have been pre-scanned and the worst case mode will be fully tested.

Description of Test Configuration

The EUT was configured for test mode, which is provided by the manufacturer.

Equipment Modifications

The conducted items were tested under TBR6 mode.

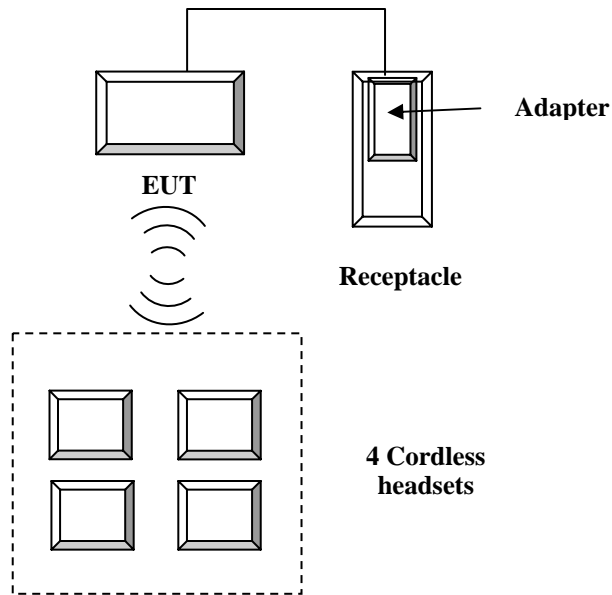
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
R & S	Digital Radio-Communication Tester	CMD60	829902/026	DoC

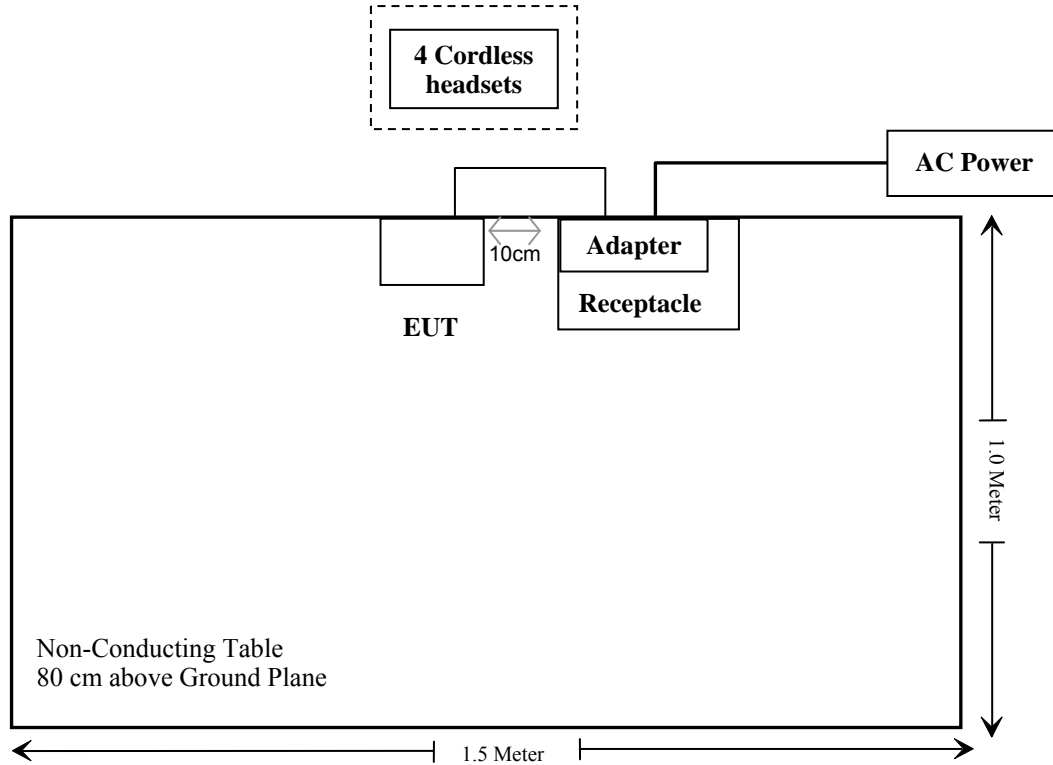
External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detectable Power Cable	1.5	Adapter	EUT

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.319 (i) & §2.1091	RF Exposure Information	Compliance
§15.317, §15.203	Antenna Requirement	Compliance
§15.319 (e)	Antenna Gain	Compliance
§15.315, §15.207	AC Line Conducted Emission	Compliance*
§15.323 (a)	Emission Bandwidth	Compliance*
§15.319 (c)	Peak Transmit Power	Compliance*
§15.319 (d)	Power Spectral Density	Compliance*
§15.323 (d)	Emission Inside and Outside the sub-band	Compliance*
§15.319 (g)	Radiated Spurious Emission	Compliance
§15.323 (f)	Frequency Stability	Compliance*
§15.323 (c)(e) §15.319 (f)	Specific Requirements for UPCS	Compliance*

Note: * please refer to FCC ID: B4HCS1900.

FCC §15.319 (i) & §2.1091 - RF EXPOSURE INFORMATION

Applicable Standard

According to FCC §15.319(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz;

* = Plane-wave equivalent power density;

MPE Calculation

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Radio	Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)
		(dBi)	(numeric)	(dBm)	(mW)			
A	1924.992	2.0	1.585	20.04	100.93	20	0.032	1.0
B	1924.992	2.0	1.585	20.04	100.93	20	0.032	1.0
C	1924.992	2.0	1.585	20.04	100.93	20	0.032	1.0
D	1924.992	2.0	1.585	20.04	100.93	20	0.032	1.0

Result: The device meets FCC MPE limit at 20 cm distance.

FCC §15.317 & §15.203 - ANTENNA REQUIREMENT

Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Antenna Connector Construction

This product has eight integrated antennas arrangement; please refer to the internal photos. Their maximum gains are 2.0 dBi, fulfill the requirement of this section.

Test Result: Compliance

FCC §15.319 (e) - ANTENNA GAIN

Applicable Standard

According to FCC §15.319 (e):

The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Result: The antenna gain is 2.0 dBi provided by manufacturer.

FCC §15.315 & §15.207 - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 2.4 dB ($k=2$, 95% level of confidence).

Test Data

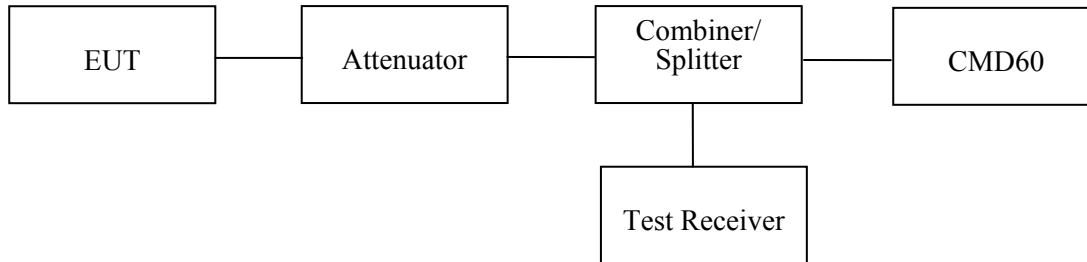
Please refer to FCC ID: B4HCS1900 which was granted on 2011-04-08.

FCC §15.323 (a) - EMISSION BANDWIDTH

Applicable Standard

Operation shall be contained within the 1920–1930 MHz band. The emission bandwidth shall be less than 2.5 MHz and greater than 50 kHz.

The emission bandwidth is measured in accordance with ANSI C63.17 sub-clause 6.1.3 using the setup below:



The width, in Hz, of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that is 26 dB down relative to the maximum level of the modulated carrier. It is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1% of the emission band-width of the device under measurement. [Extraction from 47 VFR 15, subpart D, 15.303 (C)].

Test Data

Please refer to FCC ID: B4HCS1900 which was granted on 2011-04-08.

FCC §15.319 (c) - PEAK TRANSMIT POWER

Applicable Standard

The peak transmit power is according to ANSI C63.17-2006 §6.1.2

Per FCC Part15.319 (a), Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz.

Per FCC Part15.319 (e), The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Calculation of Peak Transmit Power Limit (P_{\max}):

$$P_{\max} = 100\mu\text{W} \times (\text{EBW})^{1/2}$$

EBW is the transmit emission bandwidth in Hz determined in the other test item:

Test Data:

$$\text{EBW} = 1488000\text{Hz}$$

$$P_{\max} = 100 \mu \text{ W} \times (1488000)^{1/2} = 20.86 \text{ dBm}$$

Test Data

Please refer to FCC ID: B4HCS1900 which was granted on 2011-04-08.

FCC §15.319 (d) - POWER SPECTRAL DENSITY

Applicable Standard

The power spectral density is according to ANSI C63.17-2006 §6.1.5

The average pulse energy in a 3 kHz bandwidth is divided by the pulse duration.

The power spectral density shall not exceed 3mW in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

Test Data

Please refer to FCC ID: B4HCS1900 which was granted on 2011-04-08.

FCC §15.323 (d) - EMISSION INSIDE AND OUTSIDE THE SUB-BAND

Applicable Standard

Emissions inside the sub-band must comply with the following emission mask:

1. In the bands between 1B and 2B measured from the center of the emission bandwidth the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device;
2. in the bands between 2B and 3B measured from the center of the emission bandwidth the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator;
3. in the bands between 3B and the sub-band edge the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator.

Where B = emission bandwidth

Emission Outside the sub-band shall be attenuated below a reference power of 112 mW (20.5 dBm) as follows:

1. 30 dB between the sub-band and 1.25 MHz above or below the sub-band;
2. 50 dB between 1.25 and 2.5 MHz above or below the sub-band;
3. 60 dB at 2.5 MHz or greater above or below the sub-band.

Test Data

Please refer to FCC ID: B4HCS1900 which was granted on 2011-04-08.

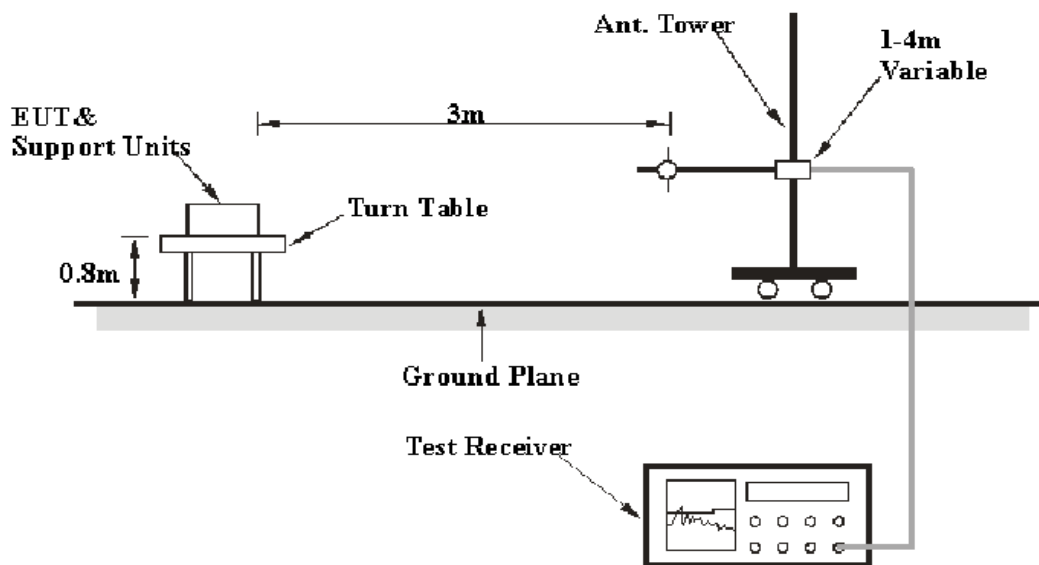
FCC §15.319 (g) - RADIATED SPUIOUS EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 4.0 dB ($k=2$, 95% level of confidence).

EUT Setup



The radiated emission tests were performed in the 3 meters chamber using the setup accordance with the ANSI C63.17-2006. The specification used was the FCC §15.319(g).

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 20 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>	
30 MHz – 1000 MHz	100 kHz	300 kHz	
1000 MHz – 20 GHz	1 MHz	3 MHz	PK
1000 MHz – 20 GHz	1 MHz	10 Hz	Ave.

Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2011-08-02	2012-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-11	2011-11-10
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2011-03-11	2012-03-10

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.319 (g), with the worst margin reading of:

9.3 dB at 34.550250 MHz in the **Vertical** polarization

Test Data

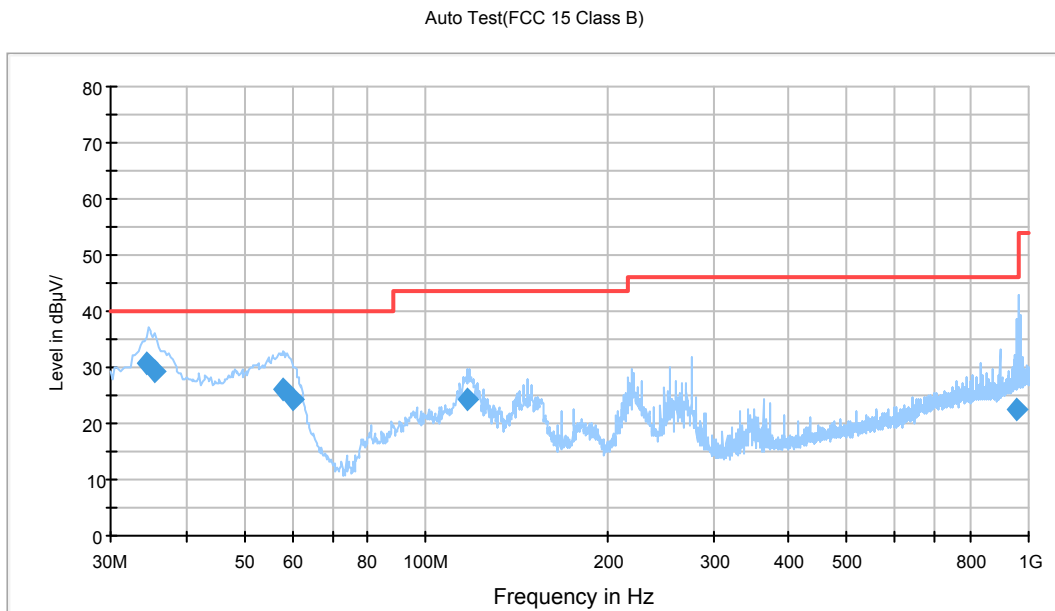
Environmental Conditions

Temperature:	20 °C
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Jim Huang on 2011-11-02.

Test Mode: The EUT has been pre-tested with 1 radio, 2 radios, 3 radios and 4 radios transmits separately and transmit simultaneously. Based on the pre-scan, EUT with four wireless earphones mode is the worse case)

1) 30-1000 MHz (worst case):



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
34.550250	30.7	103.0	V	179.0	-8.5	40.0	9.3
35.441750	29.2	124.0	V	198.0	-9.1	40.0	10.8
58.019250	26.2	103.0	V	3.0	-18.4	40.0	13.8
60.246500	24.4	103.0	V	0.0	-18.7	40.0	15.6
117.057500	24.2	310.0	H	61.0	-12.6	46.0	19.3
951.771500	22.6	193.0	V	256.0	0.6	46.0	23.4

2) Above 1 GHz:

No significant spurious emissions were found and consistent with the original data. Please refer to FCC ID: B4HCS1900.

FCC §15.323 (f) - FREQUENCY STABILITY

Applicable Standard

Per FCC §15.323(f), the frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20° to $+50^{\circ}$ °C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20 °C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

Test Data

Please refer to FCC ID: B4HCS1900 which was granted on 2011-04-08.

**FCC §15.323 & §15.319(f) – SPECIFIC REQUIREMENTS FOR UPCS
DEVICE**

Please refer to FCC ID: B4HCS1900 which was granted on 2011-04-08.

******* END OF REPORT *******