



American Telecom Services, Inc.

Application
For
Permissive Change Class II

Unlicensed Personal Communication Service Devices
(Handset)

FCC ID: UGXRA2184BBH

Test Report Number: 06176312

Issue Date: September 6, 2006

KL/ Ann Choy

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INTERTEK TESTING SERVICES

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INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

**American Telecom Services, Inc. - Model: RA216XXX, RA21602B,
RA21612B, RA218XXX,
RA2180BB, RA2181BB,
RA2184BB**

FCC ID: UGXRA2184BBH

This report concerns (check one:) Original Grant Class II Change

Equipment Type : PUE - Part 15 Unlicensed PCS portable Tx held to ear

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes No

If yes, defer until :

Date

Company Name agrees to notify the Commission by: _____
Date _____

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes No X

If no, assumed Part 15, Subpart D for Unlicensed Personal Communication Service Device - the new 47 CFR [04-05-05 Edition] Provision.

Report prepared by: Lam Chun Cheong, Kenneth

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List of Attached Files

Exhibit Type	File Description	Filename
Operation Description	Technical Description	descri.pdf
Operation Description	Purpose of Change	product change.pdf
Test Report	Test Report	report.pdf
Test Report	Emission Bandwidth and Test Frequency Plots	26bw.pdf
Test Report	Peak Transmit Power Plots	peaktp.pdf
Test Report	Unwanted Emission Inside Sub-Band Plots	inband.pdf
Test Setup Photo	Radiated Emission Test Configuration	config photos.doc
RF Exposure Info	RF Safety	RF exposure info.pdf
Attestation Statements	Fair Access Declaration	fair access.pdf
External Photos	External Photo	external photos.doc
Internal Photos	Internal Photo	internal photos.doc
ID Label/Location Info	Label Artwork and Location	label.pdf
Block Diagrams	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
User Manual	User Manual	manual.pdf
Cover Letter	UTAM affidavit	utam.pdf
Cover Letter	Confidentiality Request	request.pdf

EXHIBIT 1
SUMMARY OF TEST RESULTS

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1.0 Summary of Test Results

**American Telecom Services, Inc. - Model: RA218XXX, RA21602B,
RA21612B, RA218XXX,
RA2180BB, RA2181BB,
RA2184BB**

FCC ID: UGXRA2184BBH

General Technical Requirements				
Test Items	FCC Part 15 Section	Test Procedure ANSI C63.17 / ANSI C63.4[*]	Results	Details see section
Antenna Requirement	15.317	---	Pass	4.1
Digital Modulation Techniques	15.319(b)	6.1.4	Pass	4.2
Emission Bandwidth	15.323(a)	6.1.3	Pass	4.3
Directional Gain of the Antenna	15.319(e)	4.3.1	Pass	4.4
Peak Transmit Power	15.319(c)	6.1.2	Pass	4.5
AC Power Lines Conducted Emissions from Transmitter Portion of EUT	15.315	7 [*]	NA	4.8
Radiated Emissions from Computing Device Peripheral Portion of EUT	15.109(a)	8 [*]	NA	4.9
AC Power Lines Conducted Emissions from Computing Device Peripheral Portion of EUT	15.107(a)	7 [*]	NA	4.10
Radio Frequency Radiation Exposure	15.319(i)	---	Pass	4.11

Test Engineer:



Felix Ng
Lead Engineer

Date: September 6, 2006

Approved By:



Lam Chun Cheong, Kenneth
Senior Lead Engineer

Date: September 6, 2006

INTERTEK TESTING SERVICES

1.0 Summary of Test Results (continued)

**American Telecom Services, Inc. - Model: RA218XXX, RA21602B,
RA21612B, RA218XXX,
RA2180BB, RA2181BB,
RA2184BB**

FCC ID: UGXRA2184BBH

Specific Requirements for UPCS Device				
Test Items	FCC Part 15 Section	Test Procedure ANSI C63.17 / ANSI C63.4 *	Results	Details see section
Unwanted Emission Inside the Sub-Band	15.323(d)	6.1.6.1	Pass	4.6
Emissions Outside the Sub-Band	15.323(d)	6.1.6.2	Pass	4.7
Frame Repetition Stability	15.323(e)	6.2.2	Pass	4.12
Frame Period and Jitter	15.323(e)	6.2.3	Pass	4.13
Carrier Frequency Stability	15.323(f)	6.2.1	Pass	4.14
Lower Monitoring Threshold	15.323(c)(2)	7.3.1(b)	NA	4.15.1
Upper Monitoring Threshold	15.323(c)(5)	7.3.2	Pass	4.15.2.1
Monitoring Antenna	15.323(c)(8)	4	Pass	4.16
Duplex Connections	15.323(c)(10)	8.3	NA	4.17
Alternative Monitoring Interval for Co-located Device	15.323(c)(11)	8.4	N/A	4.18
Fair Access	5.323(c)(12)	---	Pass	4.19

Test Engineer:



Felix Ng
Lead Engineer

Date: September 6, 2006

Approved By:



Lam Chun Cheong, Kenneth
Senior Lead Engineer

Date: September 6, 2006

EXHIBIT 2
GENERAL DESCRIPTION

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2.0 General Description

2.1 Product Description

The RA216XXX is a 1.9GHz Digital Modulation Cordless Phone with Caller ID and Speakerphone - Handset. It operates at frequency range of 1921.536MHz to 1928.448MHz with 5 physical frequency channels. The unit is capable of either tone or pulse dialing. The internal power supply's isolation is accomplished through a power transformer having an adequate dielectric rating. The circuit wiring is consistent under the requirement of part 68.

The handset unit consists of a keypad with twelve standard keys (0,...9,*,#), seven function keys (LDS, C/Mute, Menu/OK/Power, Up/Redial, Down/CID, SPK/Pause, INT). A Phone key is provided to control pick and release telephone line in a toggle base.

The base unit has a page key, which is used to communicate with handset unit.

The antennas used in base unit and handset are integral, and the test sample is a prototype.

The model: RA21602B, RA21612B, RA218XXX, RA2180BB, RA2181BB and RA2184BB is one of the model: RA216XXX. The suffix "XXX", followed by the model number RA216 and RA218 stands for different packaging on the base unit, handset and extra charger. RA21602B and RA2180BB has one base unit and one handset, RA21612B and RA2181BB has one handset and one extra charger, RA2184BB has one base unit, four handsets and three extra chargers. The model numbers are identical in electrical, mechanical and physical design. The difference in model number serves as marketing strategy.

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

The circuit description and digital modulation techniques description are saved as filename: descri.pdf.

2.2 Purpose of Change

The purpose of change is saved as filename: product change.pdf

The RF module of base unit is remained the same, and the function is same as the original certified product. Therefore, only the AC line conducted emission results, radiated emission results, peak transmit power, emission bandwidth, frame repetition stability, frame period and jitter, carrier frequency stability and upper monitoring threshold results of handset were included in this report.

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2.3 Test Methodology

The radiated emission measurements for unintentional radiator and AC power line-conducted emission measurements were performed according to the test procedures specified in ANSI C63.4 (2003). The radiated emission measurements for intentional radiator contained in UPSC device, conducted emission measurements, Listen Before Transmit (LBT) tests, Time Frame and Frequency Stability tests were performed according to the test procedures specified in Revision Draft ANSI C63.17 (2006). All radiated measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application. All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.4 Test Facility

The open area test site measurement facility used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

EXHIBIT 3
SYSTEM TEST CONFIGURATION

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3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) was setup to transmit continuously in burst mode with pseudo-random data to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst-case emissions. The handset was powered by a fully charged battery.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Detector function was in peak mode. Radiated emissions are taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

All readings were extrapolated back to the equivalent three meters reading using inverse scaling with distance. The spectrum analyzer resolution bandwidth was approximately 1% of the EUT emission bandwidth, unless otherwise specified.

Radiated emission measurements were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

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3.2 Conducted Emission Test Configuration

The setup and equipment setting were made in accordance with ANSI C63.17. The antenna of EUT transmitter was replaced by a coaxial cable. The impedance matching of connection, cable loss and external RF attenuator are taken into account. The EUT was arranged to communicate via a fixed carrier frequency between its transmitter and a companion device. The transmission was configured in burst mode with pseudo-random data as typical as normal operation.

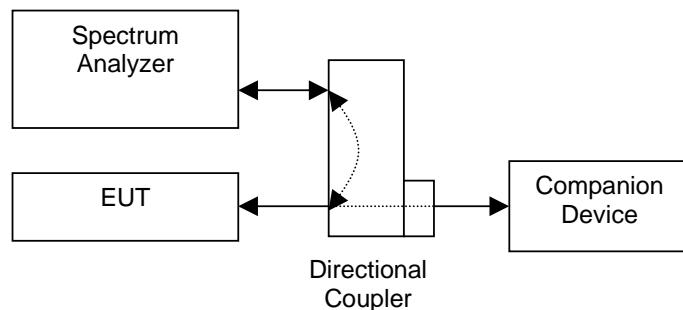


Figure 3.2.1

3.3 Conducted Monitoring and Operational Test Configuration

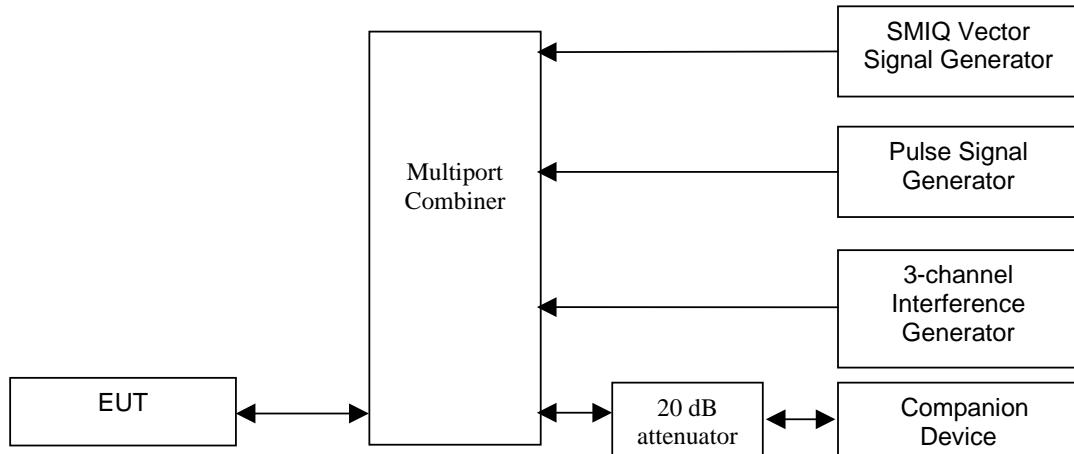


Figure 3.3.1

3.4 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

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3.5 Support Equipment List and Description

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

HARDWARE:

The unit was operated standalone. A battery (provided with the unit) was used to power the device. This descriptions is listed below.

- (1) Handset: A "Ni-MH" Type Rechargeable Battery (2.4V 600mAh)

CABLES:

There are no special accessories necessary for compliance of this product.

OTHERS:

There are no special accessories necessary for compliance of this product.

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3.6 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

3.7 Equipment Modification

Any modifications installed previous to testing by American Telecom Services, Inc. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by ETL Division, Intertek Testing Services Hong Kong Ltd.

All the items listed under section 3.0 of this report are confirmed by:

Confirmed by:

*Lam Chun Cheong, Kenneth
Senior Lead Engineer
Intertek Testing Services Hong Kong Ltd.
Agent for American Telecom Services, Inc.*



Signature

September 6, 2006

Date

EXHIBIT 4
MEASUREMENT RESULTS

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX

Date of Test: August 9-11, 2006

4.0 **Measurement Results**

4.1 Antenna Requirement, FCC Rule 15.317:

EUT must meet the antenna requirement of FCC Rule 15.203.

- EUT uses a permanently attached antenna which is considered sufficient to comply with the provisions of this rule. Please refer to Exhibit 5: Internal Photos for more details.
- EUT uses a unique antenna jack or electrical connector which is considered sufficient to comply with the provisions of this rule. Please refer to Exhibit 5: Internal Photos for more details.

4.2 Digital Modulation Techniques, FCC Rule 15.319(b):

All transmissions must use only digital modulation techniques.

The requirements are made in accordance with ANSI C63.17 sub-clause 6.1.4.

Attestation:

Please refer to the technical description in section 2.2 or relevant DECT standards for more details.

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX

Date of Test: August 9-11, 2006

4.3 Emission Bandwidth, FCC Rule 15.323(a):

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

Measurements are made in accordance with ANSI C63.17 sub-clause 6.1.3. Test setup is shown in section 3.2 Figure 3.2.1.

Test Results:

I. Traffic Carrier

Channel	Channel Frequency (MHz)	Measuring Signal Level	Measured Emission Bandwidth (MHz)	Results
Lowest	1921.536	26 dB down	1.49	Pass
Highest	1928.448	26 dB down	1.48	Pass

Please refer to the attached plots for more details:

Plot 1A: Lowest Channel 26dB Emission Bandwidth (Traffic Carrier)

Plot 1D: Highest Channel 26dB Emission Bandwidth (Traffic Carrier)

The plots of emission bandwidth and test frequency are saved as filename: 26bw.pdf

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX

Date of Test: August 9-11, 2006

4.4 Directional Gain of the Antenna, FCC Rule FCC 15.319(e):

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

The requirements are made in accordance with ANSI C63.17 sub-clause 4.3.1.

- Manufacturer declares that the directional gain of the antenna is less than or equal to 3dBi. No peak transmit power reduction is required.
- Manufacturer declares that the directional gain of the antenna is greater than 3dBi. The peak transmit power shall be reduced by _____ dB.

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX

Date of Test: August 9-11, 2006

4.5 Peak Transmit Power, FCC Rule 15.319(c):

The peak transmit power (P_{EUT}) shall not exceed $100\mu\text{W}$ multiplied by the square root of the emission bandwidth (B) in Hz or $5 \log_{10} B - 10 \text{ dBm}$. The peak transmit power shall be reduced by the amount in dB that the maximum directional gain of the antenna exceeds 3 dBi.

Measurements are made in accordance with ANSI C63.17 sub-clause 6.1.2. Test setup is shown in section 3.2 Figure 3.2.1. The cable loss and/or external attenuation are included in OFFSET function of spectrum analyzer.

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

$$\begin{aligned} [\times] \quad P_{\max} &= 5 \log_{10} B - 10 \text{ dBm} && \text{when } G_A \leq 3 \text{ dBi} \\ [] \quad P_{\max} &= 5 \log_{10} B - 10 \text{ dBm} - (G_A - 3 \text{ dBi}) && \text{when } G_A > 3 \text{ dBi} \end{aligned}$$

Where G_A = EUT Antenna Gain: 0 dBi

B = Measured Emission Bandwidth: (26dB down BW) in Hz

Test Results:

I. Traffic Carrier

Channel	Channel Frequency (MHz)	Measured Peak Transmit Power (dBm)	Limit (dBm)	Results
Lowest	1921.536	17.47	20.87	Pass
Highest	1928.448	17.44	20.85	Pass

Please refer to the attached plots for more details:

Plot 2A: Lowest Channel Peak Transmit Power (Traffic Carrier)

Plot 2B: Highest Channel Peak Transmit Power (Traffic Carrier)

The plots of peak transmit power are saved as filename: peaktp.pdf

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX

Date of Test: August 9-11, 2006

4.6 Unwanted Emission Inside the Sub-Band, FCC Rule 15.323(d):

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, emission shall be at least 30 dB below the permitted peak transmit power; i.e.-9.5 dBm
2. In the bands between $2B$ and $3B$ measured from the center of the emission bandwidth, emission shall be at least 50 dB below the permitted peak transmit power; i.e. -29.5 dBm
3. In the bands between $3B$ and the band edge, emission shall be at least 60 dB below the permitted peak transmit power. i.e. -39.5 dBm

Where B = emission bandwidth in Hz

Measurements are made in accordance with ANSI C63.17 sub-clause 6.1.6.1. Test setup is shown in section 3.2 Figure 3.2.1.

Test Results:

I. Traffic Carrier

Channel	Channel Frequency (MHz)	Results
Lowest	1921.536	Pass
Highest	1928.448	Pass

Please refer to the attached plots for more details:

Plot 4A: Lowest Channel Unwanted Emission Inside the Sub-Band (Traffic Carrier)

Plot 4B: Highest Channel Unwanted Emission Inside the Sub-Band (Traffic Carrier)

The plots of the unwanted emission inside the sub-band are saved as filename: inband.pdf

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Company: American Telecom Services, Inc.
Model: RA216XXX

Date of Test: August 9-11, 2006

4.7 Emissions Outside the Sub-Band, FCC Rule 15.323(d):

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

1. 30 dB between the band edge and 1.25 MHz above or below the band;
2. 50 dB between 1.25 and 2.5 MHz above or below the band; and
3. 60 dB at 2.5 MHz or greater above or below the band, or shall meet the requirement of FCC Rule 15.319(g) which shall not exceed the limits of FCC Rule 15.209.

Example: Calculation of Limit for emissions between the band edge and 1.25 MHz (1920.000 – 1918.750 MHz)

The emissions shall not exceed the Limit: 20.5 dBm – 30 dB = -9.5 dBm

Measurements are made in accordance with ANSI C63.17 sub-clause 6.1.6.2. As EUT has non-detachable antenna(s), radiated emissions test method is used for out-of-band emissions tests. Emissions that are directly caused by digital circuits in the transmit path and transmitter portion are measured. Test setup and procedures are described in section 3.2 Figure 3.2.1.

Test Results:

Channel	Carrier Frequency (MHz)	Measured Band (MHz)	Limit (dBm)	Results
Lowest	1921.536	1920.000 - 1918.750	-9.5	Pass
		1918.750 - 1917.500	-29.5	Pass
		0.009 - 1917.500 & 1932.500 - 19300.000	-39.5	Pass
Highest	1928.448	1930.000 - 1931.250	-9.5	Pass
		1931.250 - 1932.500	-29.5	Pass
		0.009 - 1917.500 & 1932.500 - 19300.000	-39.5	Pass

Please refer to the section 4.7.1 to 4.7.4 for more details.

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Company: American Telecom Services, Inc.
Model: RA216XXX
Mode: Transmission

Date of Test: August 9-11, 2006

4.7.1 Radiated Emissions Configuration Photographs:

Worst Case Radiated Emission
at

1917.110 MHz

The worst case radiated emission configuration photographs are saved as filename:
config photos.doc

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX
Mode: Transmission

Date of Test: August 9-11, 2006

4.7.2 Radiated Emissions Data:

Data are included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data in table 1 and 2 list the significant emission frequencies, the limit and the margin of compliance.

Judgement: Passed by 4.1 dB margin

TEST ENGINEER:



Signature

Felix Ng, Lead Engineer

Typed/Printed Name

September 6, 2006

Date

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX
Mode: Transmission

Date of Test: August 9-11, 2006

Table 1

Radiated Emissions Data Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Lowest Channel:

Polari-zation	Frequency (MHz)	Emission Level at 3m (dBm)	Limit (dBm)	Margin (dB)
H	1919.812	-40.8	-9.5	-31.3
H	1918.210	-42.9	-29.5	-13.4
H	1917.110	-43.6	-39.5	-4.1
H	3843.000	-43.8	-39.5	-4.3
H	5764.500	-50.2	-39.5	-10.7
H	7686.000	-43.9	-39.5	-4.4
H	9607.500	-45.3	-39.5	-5.8
V	11529.100	-48.6	-39.5	-9.1

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. In the band at 2.5 MHz or greater above or below the band,

[x] Emissions are below the limit -39.5 dBm.

[] Emissions meet the requirement of FCC Rule 15.319(g), and are below the limits of FCC Rule 15.209. The emissions data are included in table 3.

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Company: American Telecom Services, Inc.
Model: RA216XXX
Mode: Transmission

Date of Test: August 9-11, 2006

Table 2

Radiated Emissions Data Pursuant To FCC Part 15 Section 15.323 (d) Emissions Requirements

Highest Channel:

Polari-zation	Frequency (MHz)	Emission Level at 3m (dBm)	Limit (dBm)	Margin (dB)
H	1930.910	-43.0	-9.5	-33.5
H	1932.060	-44.1	-29.5	-14.6
H	1933.911	-44.8	-39.5	-5.3
H	3856.880	-44.6	-39.5	-5.1
H	5785.321	-49.6	-39.5	-10.1
H	7713.760	-44.3	-39.5	-4.8
H	9643.200	-44.6	-39.5	-5.1
V	11570.640	-48.8	-39.5	-9.3

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. In the band at 2.5 MHz or greater above or below the band,

[x] Emissions are below the limit -39.5 dBm.

[] Emissions meet the requirement of FCC Rule 15.319(g), and are below the limits of FCC Rule 15.209. The emissions data are included in table 4.

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Company: American Telecom Services, Inc.
Model: RA216XXX
Mode: Talk

Date of Test: August 9-11, 2006

Table 3

Radiated Emissions Data Pursuant To FCC Part 15 Section 15.3233(d) Emissions Requirements

Polari-zation	Frequency (MHz)	Emission Level at 3m (dBm)	Limit (dBm)	Margin (dB)
V	41.474	-71.4	-39.5	-31.9
V	62.210	-71.6	-39.5	-32.1
V	82.941	-71.5	-39.5	-32.0
H	114.045	-67.8	-39.5	-28.3
H	124.426	-68.4	-39.5	-28.9
H	155.509	-68.5	-39.5	-29.0
H	186.607	-68.0	-39.6	-28.4

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. In the band at 2.5 MHz or greater above or below the band,
 - [×] Emissions are below the limit -39.5 dBm.
 - [] Emissions meet the requirement of FCC Rule 15.319(g), and are below the limits of FCC Rule 15.209. The emissions data are included in table 4.

INTERTEK TESTING SERVICES

Company: American Telecom Services, Inc.
Model: RA216XXX

Date of Test: August 9-11, 2006

4.7.3 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

Where FS = Field Strength in $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Example

Assume a receiver reading of 62.0 $\text{dB}\mu\text{V}$ is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0 $\text{dB}\mu\text{V}/\text{m}$. This value in $\text{dB}\mu\text{V}/\text{m}$ is converted to its corresponding level in $\mu\text{V}/\text{m}$.

RA = 62.0 $\text{dB}\mu\text{V}$

AF = 7.4 dB

CF = 1.6 dB

AG = 29.0 dB

PD = 0.0 dB

AV = -10 dB

$$FS = 62.0 + 7.4 + 1.6 - 29.0 + 0.0 + (-10.0) = 32.0 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(32.0 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

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4.7.4 Average Factor Calculation and Transmitter ON Time Measurements, FCC Rule 15.35(b, c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SPAN function on the analyzer was set to ZERO. The transmitter ON time was determined from the resultant time-amplitude display:

- Please refer to the attached plots for more details:
Plot 5A: Transmitter ON Time Measurements (Traffic Carrier)
Plot 5B: Transmitter ON Time Measurements (Dummy Carrier)
- Please refer to the attached transmitter timing diagram that are provided by manufacturer
- Not applicable - No average factor is required.

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4.8 AC Power Lines Conducted Emissions from Transmitter portion of EUT, FCC Rule 15.315:

The AC power lines conducted emission shall not exceed the limits of FCC Rule 17.207.

Measurements are made in accordance with ANSI C63.4 sub-clause 7. Emissions that are directly caused by digital circuits in the transmit path and transmitter portion are measured.

Not applicable – EUT is only powered by battery for operation.

EUT connects to AC power lines. Emission Data are listed in following pages.
Please refer to the section 4.8.1 to 4.8.2 for more details.

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4.9 Radiated Emissions from Computing Device Peripheral Portion of EUT, FCC Rule 15.109(a):

EUT include digital circuitry not directly associated with the transmitter portion and is subject to the requirements of FCC Part 15 Subpart B. The radiated emission shall not exceed the limits of FCC Rule 15.109(a).

Measurements are made in accordance with ANSI C63.4 sub-clause 8. Radiated emissions shall be measured with EUT operating in receive and transmit modes. For transmit mode, no measurements are performed within 3.75 MHz or $3B$ (B = emission bandwidth in Hz), which is the largest, of the edges of the band.

- Not applicable – No computing device peripheral
- The computing device peripheral portion of EUT is subject to FCC Part 15 Subpart B, Certification. Please refer to the section 4.9.1 for more details.
- The computing device peripheral portion of EUT is subject to FCC Part 15 Subpart B, DoC. Emission Data are included in the separated DoC report.

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4.10 AC Power Lines Conducted Emissions from Computing Device Peripheral Portion of EUT, FCC Rule 15.107(a):

EUT include digital circuitry not directly associated with the transmitter portion and is subject to the requirements of FCC Part 15 Subpart B. The AC power lines conducted emission shall not exceed the limits of FCC Rule 15.107(a).

Measurements are made in accordance with ANSI C63.4 sub-clause 7. Conducted emissions shall be measured with EUT operating in receive and transmit modes.

- [x] Not applicable – No computing device peripheral
- [] The computing device peripheral portion of EUT is subject to FCC Part 15 Subpart B, Certification. Please refer to the section 4.10.1 for more details.
- [] The computing device peripheral portion of EUT is subject to FCC Part 15 Subpart B, DoC. Emission Data are included in the separated DoC report.

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4.11 Radio Frequency Radiation Exposure, FCC Rule 15.319(i):

EUT is subject to the radio frequency exposure requirements specified in FCC Rule §§ 1.1307(b), 2.1091 and 2.1093. It shall be considered to operate in a “general population / uncontrolled” environment.

- EUT was evaluated for Specific Absorption Rate (SAR) evaluation compliance according to OET Bulletin 65, Supplement C (Edition 01-01). It is in compliance with the SAR evaluation requirements. The caution statement is saved as filename: RF exposure info.pdf. A SAR test report was submitted at same time.
- EUT was evaluated for Maximum Permissible Exposure (MPE) evaluation compliance according to OET Bulletin 65, Supplement C (Edition 01-01). The evaluation calculation results are saved as filename: RF exposure.pdf

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4.12 Frame Repetition Stability, FCC Rule 15.323(e):

- EUT implements Time Division Duplex (TDD) in order to support duplex connection on a given frequency carrier shall maintain a frame repetition rate whereby 3 X the standard deviation of the frequency stability shall not exceed 50 ppm, not including a shift of the mean.
- EUT uses Time Division Multiple Access (TDMA) in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate whereby 3 X standard deviation of the frequency stability shall not exceed 10 ppm, not including a shift of the mean.

Measurements are made in accordance with ANSI C63.17 sub-clause 6.2.2. Test setup is shown in section 3.2 Figure 3.2.1. A spectrum analyzer measures the time duration between rising edges of two consecutive frames over a time period of at least 1000 frame periods. These measurement values are used to compute the 3 X standard deviation of the frequency stability.

Test Results:

Maximum Frame Repetition Stability (ppm)	Limit (ppm)	Results
0.19	10	Pass

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4.13 Frame Period and Jitter, FCC Rule 15.323(e):

The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of EUT operating in these sub-bands shall be 20 ms or 10 ms/X where X is a positive whole number.

The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 μ s for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for EUT.

Measurements are made in accordance with ANSI C63.17 sub-clause 6.2.3. Test setup is shown in section 3.2 Figure 3.2.1. A spectrum analyzer measures the time duration between the rising edges of two consecutive frames. The measurements are taken over 100,000 frames. These measurement values are used to compute mean value and the difference between any two consecutive frame periods. The mean value is the frame period.

Test Results:

I. Jitter

Measured Maximum Jitter (μ s)	Limit (μ s)	Results
-0.96	± 25	Pass

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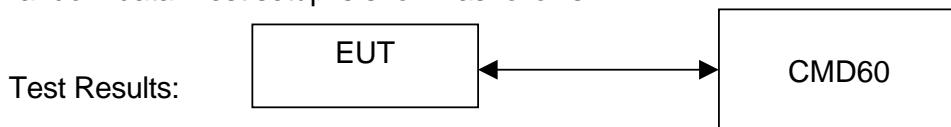
4.14 Carrier Frequency Stability, FCC Rule 15.323(f):

The carrier frequency stability of EUT shall be maintained within +/-10 ppm at the following conditions:

1. Over 1 hour at nominal supply voltage and a temperature of +20 °C;
2. Over a variation in the primary supply voltage of 85 % to 115 % of nominal supply voltage at a temperature of +20 °C. This test does not apply to an EUT that is only powered by battery for operation;
3. Over a temperature variation of -20 °C to +50 °C or at extreme temperatures as declared by manufacturer, and at nominal supply voltage.

The nominal supply voltage: 2.4 VDC and the extreme temperatures of -20°C to +50°C is declared by manufacturer.

Measurements are made in accordance with ANSI C63.17 sub-clause 6.2.1 The EUT and CMD60 is connected with shielded coaxial cable. The EUT is controlled by DECT Radio Communication Tester, CMD60, to use a fixed frequency channel during test as well as record the frequency offset. The transmission of EUT is in burst mode with pseudo-random data. Test setup is shown as follows.



I. Carrier Frequency Stability over time

Supply Voltage	Temperature (°C)	Measured Frequency Offset Over an hour (ppm)		Limit (ppm)	Results
		Max.	Min.		
Nominal	+20°C	1.47	-2.17	±10	Pass

II. Carrier Frequency Stability over Power Supply Voltage

Supply Voltage	Temperature (°C)	Measured Frequency Offset (ppm)	Limit (ppm)	Results
85%	+20°C	NA	±10	NA
115%	+20°C	NA	±10	NA

III. Carrier Frequency Stability over Temperature

Supply Voltage	Temperature (°C)	Measured Frequency Offset (ppm)	Limit (ppm)	Results
Nominal	-20°C	8.69	±10	Pass
Nominal	+50°C	4.53	±10	Pass

NA - Not applicable

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4.15 Monitoring Threshold:

Monitoring threshold can be relaxed according to FCC Rule 15.323(c)(9). EUT that has a power output lower than the maximum permitted under FCC Rule 15.319(c) may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

Calculation of Monitoring Threshold Limit:

$$\begin{aligned}\text{Monitoring Threshold } (T) &\leq -174 + 10 \log_{10} B + M + P_{\max} - P_{\text{EUT}} \text{ dBm} \\ &\leq 15 \log_{10} B - 184 + M - P_{\text{EUT}} \text{ dBm}\end{aligned}$$

Where B = Measured Emission Bandwidth: 1.48 $\times 10^6$ Hz
 M = 30 dB for Lower Monitoring Threshold (T_L), or
= 50 dB for Upper Monitoring Threshold (T_U)
 P_{\max} = $5 \log_{10} B - 10$ dBm
 P_{EUT} = Measured Peak Transmit Power: 17.44 dBm

Calculated Monitoring Threshold Limits:

Lower Monitoring Threshold (T_L) in dBm	-78.9
Upper Monitoring Threshold (T_U) in dBm	-58.9

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4.15.1 Lower Monitoring Threshold, FCC Rule 15.323(c)(2):

- Not applicable – EUT which supports at least of 40 duplex system access channels and implements Least Interfered Channel (LIC) algorithm is permitted to use an upper monitoring threshold. Please refer to the section 4.15.2 for more details.
- The lower monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by EUT.

Measurements are made in accordance with ANSI C63.17 sub-clause 7.3.1(b). Test setup is shown in section 3.3 Figure 3.3.1. The test is performed on the carrier closest to center of the band. RF signal generators apply uniform CW interference on all EUT carriers each at level $T_L + 10$ dB. Then, the interference level is reduced uniformly on all carriers until the EUT can transmit. The interference level shall be lower than or equal to the threshold limit.

Test Results:

Measured Maximum Interference Level (dBm)	Adjusted Lower Monitoring Threshold Limit (dBm)	Results
NA	-78.9	NA

NA - Not applicable

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4.15.2 Least Interfered Channel, LIC, FCC Rule 15.323(c)(5):

- [] Not implemented – EUT met lower monitoring threshold requirements. Please refer to the section 4.17.1 for more details
- [x] If access to spectrum is not available as determined by section 4.15.1 and a minimum of 40 duplex system access channels are defined for the EUT, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed

Number of duplex channels per frequency channel = 12

Number of frequency channel = 5

Total Duplex Channels = 60

Hence, the time and spectrum windows below upper monitoring threshold may be accessed.

4.15.2.1 Upper Monitoring Threshold, FCC Rule 15.323(c)(5):

Measurements are made in accordance with ANSI C63.17 sub-clause 7.3.2(b). Test setup is shown in section 3.3 Figure 3.3.1. The test is performed on the carrier closest to center of the band. RF signal generators apply uniform CW interference on all EUT carriers each at level $T_U + 10$ dB. Then, the interference level is reduced uniformly on all carriers until the EUT can transmit. The interference level shall be lower than or equal to the threshold limit.

Test Results:

Measured Maximum Interference Level (dBm)	Upper Monitoring Threshold Limit (dBm)	Results
-63.9	-58.9	Pass

NA - Not applicable

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4.15.2.2 Maximum Spectrum Occupancy, FCC Rule 15.323(c)(5):

No EUT or group of co-operating EUTs located within 1 meter of each other shall during any frame period occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the EUT.

Attestation:

According to the technical description provided, the total number of the time and spectrum windows defined by the system is $5*12 = 60$.

During any frame period, the maximum number of time and spectrum windows occupied by the system will be 12, which is less than one third of the time and spectrum windows defined by the system.

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4.16 Monitoring Antenna, FCC Rule 15.323(c)(8):

The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

- EUT uses the same antenna used for transmission and monitoring that is in compliance meet above provision.
- EUT uses difference antenna used for transmission and monitoring. It must be verified that the monitoring antenna provides coverage equivalent to that of the transmitting antenna. Measurements are made in accordance with ANSI C63.17 sub-clause 4.

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4.17 Duplex Connections, FCC 15.323(c)(10):

An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit (Tx) and receive (Rx) time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

Measurements are made in accordance with ANSI C63.17 sub-clause 8.3. Test setup is shown in section 3.3 Figure 3.3.1.

Attestation:

Not applicable.
 The EUT is the initiating device of the duplex connection

Test Results:

Dual Access Criteria Check for EUT not Implemented the Upper Threshold:

Interference	Reaction of EUT	Results
All Tx and Rx Window, except one for Rx Window	NA	N/A
All Tx and Rx Window, except one for Tx Window	NA	N/A

A – Could be connected on the target Rx window and its duplex mate
B – Could be connected on the target Tx window and its duplex mate
C – Could not be connected
NA – Not applicable

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4.17 Duplex Connections, FCC 15.323(c)(10): continued

[] Dual Access Criteria Check for EUT Implemented the Upper Threshold:

Interference	Reaction of EUT	Results
All Tx windows with level T_L & Rx windows with level $T_L+7\text{dB}$, except one for Tx window & one for Rx window, which are not duplex.	NA	NA
All Tx windows with level $T_L+7\text{dB}$ & Rx windows with level T_L , except one for Tx window & one for Rx, which are not duplex	NA	NA
All Tx & Rx windows with level T_U , except one for Tx window & one fro Rx Window, which are not duplex	NA	NA

A – Could be connected on the target Rx window and its duplex mate

B – Could be connected on the target Tx window and its duplex mate

C – Could not be connected

NA – Not applicable

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4.18 Alternative Monitoring Interval for Co-located Device, FCC Rule 15.323(c)(11):

An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 ms. The monitored time and spectrum window must total at least 50 % of the 10 ms frame interval and the monitored spectrum must be within the 1.25 MHz frequency channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

Measurements are made in accordance with ANSI C63.17 sub-clause 8.4.

Attestation:

- Appropriate as it is Co-located Device, in which the monitoring system will be blocked from the transmissions of a co-located (Within one meter) transmitter of the same system. Please refer to attachment, 15.323(c)(11).pdf, for details.
- Not appropriate, as it is Cordless Telephone Application.

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4.19 Fair Access, FCC Rule 15.323(c)(12):

The provisions of FCC Rule 15.323(c)(10) or (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

Attestation:

The manufacturer declares that the device does not use any mechanisms as provided by Part 15.323(c)(10) or (c)(11) to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

The Declaration is saved as filename: fair access.pdf.

EXHIBIT 5
EQUIPMENT PHOTOGRAPHS

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5.0 Equipment Photographs

The photographs are saved as filename: external photos.doc & internal photos.doc

EXHIBIT 6
PRODUCT LABELLING

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6.0 Product Labelling

The FCC ID label artwork and its location are saved as filename: label.pdf

EXHIBIT 7
TECHNICAL SPECIFICATIONS

INTERTEK TESTING SERVICES

7.0 Technical Specifications

The block diagram and circuit diagram are saved as filename: block.pdf and circuit.pdf respectively.

EXHIBIT 8
INSTRUCTION MANUAL

INTERTEK TESTING SERVICES

8.0 Instruction Manual

A preliminary copy of the Instruction Manual is saved as filename: manual.pdf

The required FCC Information to the User is stated on P.6 of Instruction Manual.

This manual will be provided to the end-user with each unit sold/leased in the United States.

EXHIBIT 9
UTAM Affidavit

INTERTEK TESTING SERVICES

9.0 UTAM Affidavit

A copy of the UTAM affidavit is saved as filename: utam.pdf

INTERTEK TESTING SERVICES

EXHIBIT 10
CONFIDENTIALITY REQUEST

INTERTEK TESTING SERVICES

10.0 Confidentiality Request

A copy of the Confidentiality Request is saved as filename: request.pdf