Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1
Telephone (416) 246-1116, Fax (416) 246-1020

Authorized by: Professional Engineers Ontario

Engineering & Administrative

CERTIFICATED UL AGENCY

Testing For FCC Submissions/Verifications

Industry Canada Industrie Canada

Approved Test Facility

Qualified SP Facility

TEST REPORT

REPORT DATE:	15 March 2004	REPORT NO: 24002D1
CONTENTS:	See Table of Contents	
SUBMITTOR:	ATLINKS USA, Inc. 101 West 103rd Street Indianapolis, IN 46290-1102 USA	
SUBJECT:	Model No:	**25825XXX-A (Handset)** [identical to previously registered Model 25830XXX-M (Handset) except for model designation, pcb layout change, component/value changes and addition of handset speakerphone. This also covers Model 25826XXX-A (handset) and optional handset Model 25802XXX-A, which are identical to Model 25825XXX-A (handset) except for model designation.]
	FCC ID:	G9HFH24R19
TEST SPECIFICATION	FCC CFR 47 Part 15 FCC DA 00-705 "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems." NOTE: Tests Conducted Are "Type" Tests.	
DATE SAMPLE RECEIVED:	15 January 2004	DATE TESTED: 20 January 2004; and 19 & 20 February 2004
RESULTS:	Equipment tested complies with referenced specifications.	
ALTERATIONS	None	
Tested by:	Ed. Chang Edward Chang	Approved by: for Date:
	Ed. Chang Robert G. Marshall, P. Eng.	24 March 2004

TECHNICAL REPORT - FCC 2.1033(b)

Applicant

ATLINKS USA, Inc.
101 West 103rd Street
Indianapolis, IN
46290-1102 USA

FCC Identifier

G9HFH24R19

Manufacturer

Dongguan Humen Taida Electric Co. Ltd.
National Highway 107, Cuntou Cun, Humen Town
Dongguan, Guangdong, China

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EXHIBIT D

[FCC Ref. 2.1033(b)(6)]

"Report of Measurements"

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TEST REPORT CONTAINING:

PRODUCT DESCRIPTION

The Model 25825XXX-A (handset unit) is a 2.4GHz single line, spread spectrum, frequency hopping, cordless telephone with caller ID and handset speakerphone, that operates from 2409.696 MHz to 2473.632 MHz. This model is identical to previously registered Model 25830XXX-M (handset unit) except for model designation, pcb layout change, component/value changes, addition of handset speakerphone. This also covers Model 25826XXX-A (handset) and optional handset Model 25802XXX-A, which are identical to Model 25825XXX-A (handset) except for model designation. The handset unit Models 25825XXX-A and 25826XXX-A as well as the optional handset Model 25802XXX-A will also bear the same FCC ID: G9HFH24R19 as the original Model 25830XXX-M.

The antenna used for the handset is permanently attached to the EUT.

Refer to Exhibit B(1)-6 and B(1)-7 for channel frequency table.

NOTE: 1. The handset uses **75** Channels.

15.205(c)/15.209 **SPURIOUS RADIATED EMISSIONS INCLUDING RESTRICTED BANDS**

Procedure

The test procedure used was ANSI STANDARD C63.4-1992 and DA-00-705 using an appropriate spectrum analyzer, as listed in the Test Equipment List. The bandwidth (RBW) of the spectrum analyzer was 100KHz/120KHz up to 1GHz with an appropriate sweep speed. The RBW above 1.0GHz was = 1.0MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the EUT was 24°C with a humidity of 60%.

Requirements:

Emissions that fall in the restricted bands (15.205) must be less than 54dBμV/m

15.209	
30-88 MHz	40 dBμV/m@ 3m
88-216 MHz	43.5
216-960 MHz	46
Above 960 MHz	54

Test Data:

Refer to Exhibit D(3)-2

Note: Emissions falling in the band 30 MHz to 1000 MHz were more than 20 dB below the limit.

15.205(c)/15.209 **FIELD STRENGTH OF RADIATED EMISSIONS INCLUDING RESTRICTED BANDS**

HANDSET UNIT

Frequency Band MHz	Meter Reading (Peak) @3m dBμV/M	Meter Reading (Average) @3m dBμV/M	Antenna and Polarization	Cable & Antenna Factor	Peak F. S. dBμV/M	Average F. S dBuV/M	Average FCC Limit	Margin dB
Channel 1								
2409.696	**87.00**	—	**Horn V**	**33.08**	**120.08**	—	—	—
4819.392	18.00	2.00	Horn H	38.36	56.36	40.36	54	-13.64
Channel 38								
2441.664	**87.00**	—	**Horn V**	**33.20**	**120.20**	—	—	—
4883.328	18.00	2.00	Horn H	38.74	56.74	40.74	54	-13.26
Channel 75								
2473.632	**85.00**	—	**Horn V**	**33.23**	**118.23**	—	—	—
2483.500	24.00	3.00	Horn V	33.89	57.89	36.89	54	-17.11
2493.17	22.00	2.00	Horn V	33.89	55.89	35.89	54	-18.11
4947.264	18.00	2.00	Horn H	38.83	56.83	40.83	54	-13.17

1. If the peak meets the average limit, nothing further is required.
2. If the peak exceeds the average limit, then an average measurement is required (may be calculated) and must be below the average limit and also;
3. The peak measurement cannot exceed the average limit +20dB.

15.247(a)(1) HOPPING CHANNEL SEPARATION

Requirements:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Frequency hopping systems in the 2.4GHz band may have hopping channel carrier frequencies separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems employ fewer than 75 hopping channels and operate with an output power no greater than 125 mW.

Measurement Procedure

1. Position the EUT without connection to the Spectrum Analyzer (SA). Turn on the EUT and connect it to the SA. Then set it to any one convenient frequency within its operating range.

2. By using the MaxHold function record the separation of two adjacent channels.

3. Measure the frequency difference of these two adjacent channels by SA MARK function and then plot the result on the SA screen.

4. Repeat above procedures until all frequencies measured were complete.

Measurement Data - Refer Appendix 1 to 3 for plotted data

Handet Unit

Channel 1/2:	Adjacent Hopping Channel Separation is **914** kHz.
Channel 37/38:	Adjacent Hopping Channel Separation is **916** kHz.
Channel 74/75:	Adjacent Hopping Channel Separation is **912** kHz.

15.247(a)(1) FREQUENCY HOPPING SYSTEMS

CHANNEL BANDWIDTH [15.247(a)]

Requirements:

The 20dB bandwidth of the hopping channel is less than 1 MHz.

Measurement Procedure

1. Position the EUT without connection to the Spectrum Analyzer (SA). Turn on the EUT and connect it to the SA. Then set it to any one convenient frequency within its operating range. Set a reference level on the SA equal to the highest peak value.

2. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.

3. Repeat above procedures until all frequencies measured were complete.

Measurement Data - Refer Appendix 4 to 6 for plotted data

Handset	Channel 1:	Channel Bandwidth is **680** kHz.
	Channel 33:	Channel Bandwidth is **660** kHz.
	Channel 75:	Channel Bandwidth is **670** kHz.

15.247(a)(1) FREQUENCY HOPPING SYSTEMS (continued)

DWELL TIME ON EACH CHANNEL

Requirements:

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a (0.4 x **75**) 30 second period.

Measurement Procedure

1. Position the EUT without connection to Spectrum Analyzer (SA). Turn on the EUT and connect its antenna terminal to SA via a low loss cable and set it to any one measured frequency within its operating range and ensure that the SA is operated in its linear range.

2. Adjust the centre frequency of SA on any frequency to be measured and set SA to zero span mode. Set RBW and VBW of SA to proper value.

3. Measure the time duration of one transmission on the measured frequency and then plot the result with the time difference of this time duration.

4. Repeat the above procedures until all frequencies measured were complete.

Measurement Data - Refer Appendix 7 and 8 for plotted data.

Handset Unit

The dwell time is (0.870 mS x 1) x 40 = **34.8** mS.

The maximum time of occupancy for a particular channel is **34.8** mS in any 30 second period.

15.247(b) (1) MAXIMUM PEAK OUTPUT POWER (ERP)

Requirements:

For frequency hopping systems in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHZ band: 1 Watt. For all other frequency hopping systems in the 2400-2483.5 band: 0.125 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Measurement Procedure

1. Position the EUT without connection to Spectrum Analyzer (SA). Turn on the EUT and connect its antenna terminal to SA via a low loss cable and set it to any one measured frequency within its operating range and ensure that the SA is operated in its linear range.

2. Set RBW of SA to 5MHz and VBW to NONE.

3. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.

4. Repeat the above procedures until all frequencies measured were complete.

Measurement Data -

Handset	Channel 1:	Output Peak Power is **0.186** W (ERP).
	Channel 38:	Output Peak Power is **0.191** W (ERP).
	Channel 75:	Output Peak Power is **0.122** W (ERP).

15.247(c) BANDWIDTH OF BAND EDGE MEASUREMENT

Requirements:

In any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Measurement Procedure

1. Position the EUT without connection to Spectrum Analyzer (SA). Turn on the EUT and connect its antenna terminal to SA via a low loss cable and set it to any one measured frequency within its operating range and ensure that the SA is operated in its linear range.

2. Set RBW to 120 kHz and suitable frequency span 500 KHz or 1000 kHz; VBW = none.

3. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

4. Repeat the above procedures until all frequencies measured were complete.

5. Note: Measurements made with hopping and modulation.

Measurement Data - Refer Appendix 9 and 10 for plotted data

Handset Unit

Channel 1: All emissions in this 100 kHz bandwidth are attenuated more than **53.23** dB.

Channel 74: All emissions in this 100 kHz bandwidth are attenuated more than **51.87** dB.

Part 15.247(g): Exhibit D(3)-9 provides information on how the system is designed while the transmitter is presented with a continuous voice stream and a description of the system transmitting short bursts.

Part 15.247(h): Exhibit D(3)-9 provides information concerning the avoidance of simultaneous occupancy of hopping frequencies by multiple transmitters, system synchronization procedure, frequency hopping algorithm, hopping tables, and dual slot diversity.

Part 15.247 (g). Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both transmitter and the receiver, must be designed to comply with all the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing a short transmission burst must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

In active mode (there is voice communication), the information (voice) are transmitted continuously.

In idle mode (there is no voice communication), the base will broadcast a pilot signal which is distributed in 16 channels.

Part15.247 (h). The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognized other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

We do not use co-ordination frequency system. The system will adjust its hopping sequence and hopping channel according to the operating mode.

In idle mode, the base will continue to check the pilot signal from other base. If the sequence of pilot signal is same, the base will change to another sequence to avoid the jamming.

In active mode, the base and handset will continue to check the jamming from other system. When a jamming is found, the jammed channel will be skipped, but the total number of channel will be kept greater than 15.

TEST FACILITY AND EQUIPMENT LIST

FACILITIES:

Radiated — ANSI C63.4 (FCC OET/55) open field 3 metre test range. This test range is protected from the cold and moisture by a non-conductive enclosure.

EQUIPMENT:

Anritsu 2601A Spectrum Analyzer
Advantest R3261A Spectrum Analyzer
Hewlett-Packard RF generator # 8640 B with an 002 doubler
A.H. Systems biconical antenna; ..... 20 MHz to 330 MHz
A.H. Systems log periodic antenna; ..... 300 MHz to 1.8 GHz
Compliance Design P950 Preamp (16 dB) ... 25 MHz to 1.0 GHz

NOTE:

The Anritsu 2601A Spectrum Analyzer and the Advantest R3261A Spectrum Analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada. (NRC) This equipment is only used by qualified technicians and only for the purpose of EMI measurements. The three metre test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

ADDITIONAL TEST EQUIPMENT LIST

1. Spectrum Analyzer: HP 8591EM, S/N 3639A00995, (9KHz - 1.8GHz), Calibrated April 2003
2. Spectrum Analyzer: ANRITSU 2601A, S/N MT64544, (10KHz - 2.2GHz), Calibrated May 2003
3. Spectrum Analyzer: IFR AN940, S/N 635001039, (9KHz - 26.5GHz), Calibrated March 2003
4. Preamp: HP 8449B, S/N 3008A00378, (1 - 26.5GHz), Calibrated August 2003
5. Horn Antenna: Q-PAR 6878/24, S/N 1721, (1.5-18GHz)
6. Horn Antenna: A. H. Systems SAS 572, S/N 164 (18 - 26.5GHz)
7. Line Impedance Stabilization Network.: Marstech, Cal. July 2003
8. Horn Antenna: Radar System (Flange 3/4" Square) MIL F 3922/68 (26.5 - 40GHz)
9. OML Mixer: M28HWD, S/N Ka31114-1 (26.5 - 40GHz), Calibration Due Nov. 10, 2004
10. OML Diplexer: DPL.313A (Unit plugs into M28HWD)
11. Semflex Cable: Used with M28HWD and DPL.313A