Application for Certification

Per

Title 47 USC Part 2, Subpart J, Equipment Authorization Procedures, Paragraph 2.907, Certification and Part 15, Subpart C, Intentional Radiators, Paragraph 15.231, Periodic Operation in the band 40.66 MHz to 40.70 MHz and above 70 MHz

For the

CoolTrax Asia Pacific Pty Ltd.

CoolTrax Fresh In Transit System
Model: UMD V2.0 GSM RFID, Wireless Universal Monitoring Device (UMD)

FCC ID: WSB-CTRZ-UB-01

Dated: February 6, 2009

Number of Pages in this report: 43

3505 Francis Circle Alpharetta, GA 30004
PH: 770-740-0717 Fax: 770-740-1508
www.ustech-lab.com

MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **CoolTrax Asia Pacific Pty Ltd.**

MODEL: **Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Universal Monitoring Device (UMD)**

FCC ID: **WSB-CTRZ-UB-01**

DATE: **February 6, 2009**

This report concerns (check one): Original grant X
Class II change_____

Equipment type: Remote Control/Security Device Transceiver (DSR)

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

If yes, defer until:_____
date

N.A. agrees to notify the Commission by N.A.
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
Alpharetta, GA 30004

Phone Number: (770) 740-0717
Fax Number: (770) 740-1508

Table of Contents

Table of Contents (Cont'd)

List of Figures

List of Tables

1. General Information

The information contained in this report is presented for the purpose of gaining an FCC Equipment Authorization of *CERTIFICATION* for the CoolTrax Asia Pacific Pty Ltd., Model CoolTrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Universal Monitor Device (UMD).

1.1 Product Description

The Equipment under Test (EUT) is the CoolTrax Asia Pacific Pty Ltd., Model CoolTrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Universal Monitor Device. The EUT, among other things, contains a Low Power RFID Transceiver operating at 433.9 MHz. The EUT receives periodic temperature reports and/or door-open alarms from remotely located RF ID Tags. The EUT utilizes an externally located half -wave rod antenna for communication with the RFID Tags.

The UMD receives temperature data plus housekeeping information (i.e. tag type, ID, temperature reading, switch state and charge state) as well as door open alarms from the door tags. The UMD acknowledges the receipt of the door open alarm. This acknowledgement is just an echo of the payload data and is on the order of 3.6 mSec in length. Once the door-open alarm is acknowledged and received by the RFID Tag, the Tag does not send the alarm again. This insures that the length of the transmission is less than 1 second (actually it is 3.6 mSec) and will not occur again for more than 10 seconds (the alarm condition must be manually re-set before the Tag can send a new alarm indication and no one can reset the alarm condition by programming it within 10 seconds – likely no one will be around when the alarm occurs). Figure 5 below shows the RF pulse and how it ceases within the 5 second period referred to in paragraph 15.231(a)(2) and 15.231(e).

1.2 Related Submittal(s)/Grant(s)

The EUT will be used as part of a system to send/receive data. The UMD, among other things, also houses a GSM Communications transmitter that has been approved under the FCC ID: PY7BC051021

1.3 The EUT is subject to the following authorizations:

a) Certification of the transmitter part of the transceiver
b) Verification as a Digital Device.

2 Tests and Measurements

2.1 Configuration of Tested System

The Test sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003). Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. A block diagram of the tested system is shown in Figure 1. Test configuration setup photographs for fundamental and harmonic emissions measurement are shown in Figure 2.

The sample used for testing was received by US Tech on October 17, 2008 in good operating condition.

2.2 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and registered with the FCC, under designation number US5117. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 2982A-1.

2.3 Test Equipment

Table 2 describes test equipment used to evaluate this product.

2.4 Modifications to Equipment

No modifications were needed to bring the EUT into compliance with the FCC Part 15.207 and 15.209, conducted and radiated emissions limits for an intentional radiator and 15.231, Periodic Operation in the Band 40.66 – 40.70 MHz and above 70 MHz.

2.5 Test Procedure

The EUT was configured as shown in the following block diagram(s) and photograph(s). The sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992) paragraph 7 for conducted emissions and paragraph 8 for radiated emissions measurement. Conducted and radiated emissions data are attained with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter on the spectrum analyzer was OFF throughout the evaluation process. Interconnecting cables are manipulated as necessary to maximize emissions.

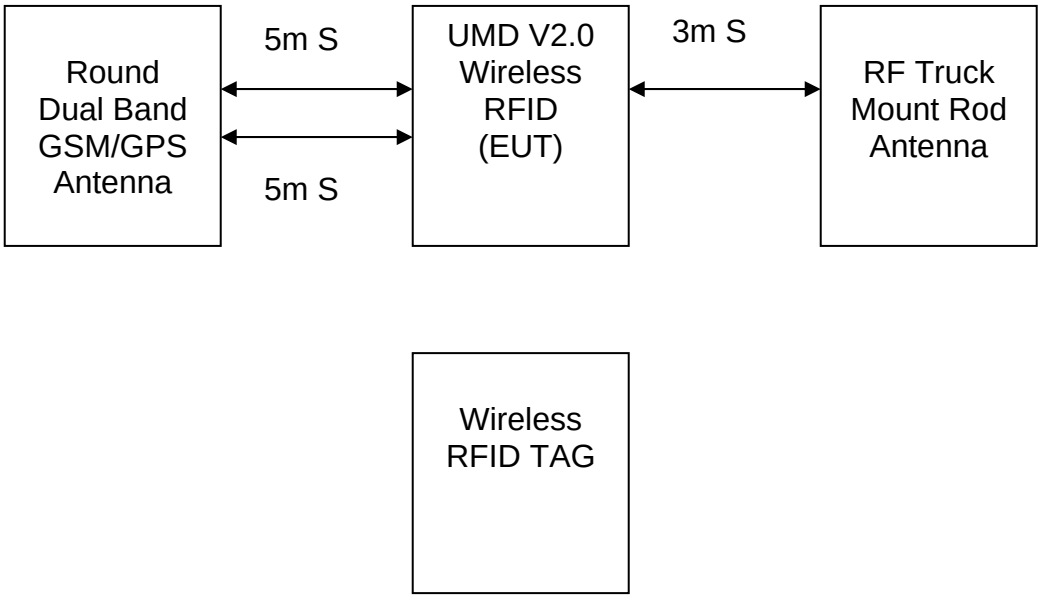

Figure 1. Test Configuration

Table 1. EUT and Peripherals

PERIPHERAL AND MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
CoolTrax Asia Pacific Pty Ltd. (EUT)	CoolTrax Fresh In Transit System Model: UMD V2.0 RFID, Wireless UMD	None	WSB-CTRZ-UB-01 (for UMD)	3m C
Antenna CoolTrax Asia Pacific Pty Ltd.	Round GSM/GPS	None	None	None
Antenna CoolTrax Asia Pacific Pty Ltd.	Rod RF Truck Mount	None	None	None
Wireless RFID TAG CoolTrax Asia Pacific Pty Ltd. Temperature and Door RFID Tags	None	None	WSB-CTRX-UB-T2	None

P = Power D = data S = Shielded U = Unshielded

Table 2. Test Instruments

TYPE	MANUFACTURER	MODEL	SN.	Cal Date.
SPECTRUM ANALYZER	HEWLETT-PACKARD	8593E	3205A00124	9/9/08
RF PREAMP 10 MHz to 1000 MHz	HEWLETT-PACKARD	8447D	2944A07436	9/12/08
RF PREAMP 1 GHz to 26.5 GHz	HEWLETT- PACKARD	8449B	3008A00480	9/2/08
HORN ANTENNA 1 GHz to 13 GHz	EMCO	3115	9107-3723	11/4/08
BICONICAL ANTENNA 25 MHz to 200 MHz	EMCO	3110B	9307-1431	11/15/08
LOG PERIODIC ANTENNA 100 MHz to 1000 MHz	EMCO	3146	9110-3632	11/21/07 2 Yr.

2.6 EUT Antenna Description (FCC Sec. 15.203)

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.

The CoolTrax Asia Pacific Pty Ltd. Cooltrax Fresh In Transit System incorporates the following antennas only.

Table 3. Antenna description for Model Cooltrax Fresh In Transit System Model: UMD RFID, Wireless UMD

Manufacturer	Type	Model	Gain dB_i
Laser Antenna	UHF Monopole	411/432 For UMD	2.5

The above antenna will be installed by professional installers who have been trained by Cooltrax. Such installation shall be accomplished using only antennas and installation materials provided by Cooltrax. Said installation will preclude any unauthorized switching of antennas.

2.7 Duty Cycle of Transmitter Data (47 CFR 15.35 (b))

Unless otherwise specified, when the radiated emissions limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

The UMD sends a 3.6 millisecond acknowledgement data word to the RFID Tag whenever it receives a door-open alarm. Refer to Figure 5 below.

The duty cycle modifier term, DC, is calculated by the formula:

$$DC = 20 \log_{10} (t_{on} \text{ (milliseconds)}/100 \text{ milliseconds})$$

$$= 20 \log 3.6/100 = 20 \log (0.036) = \boxed{- 28.9 \text{ dB}}$$

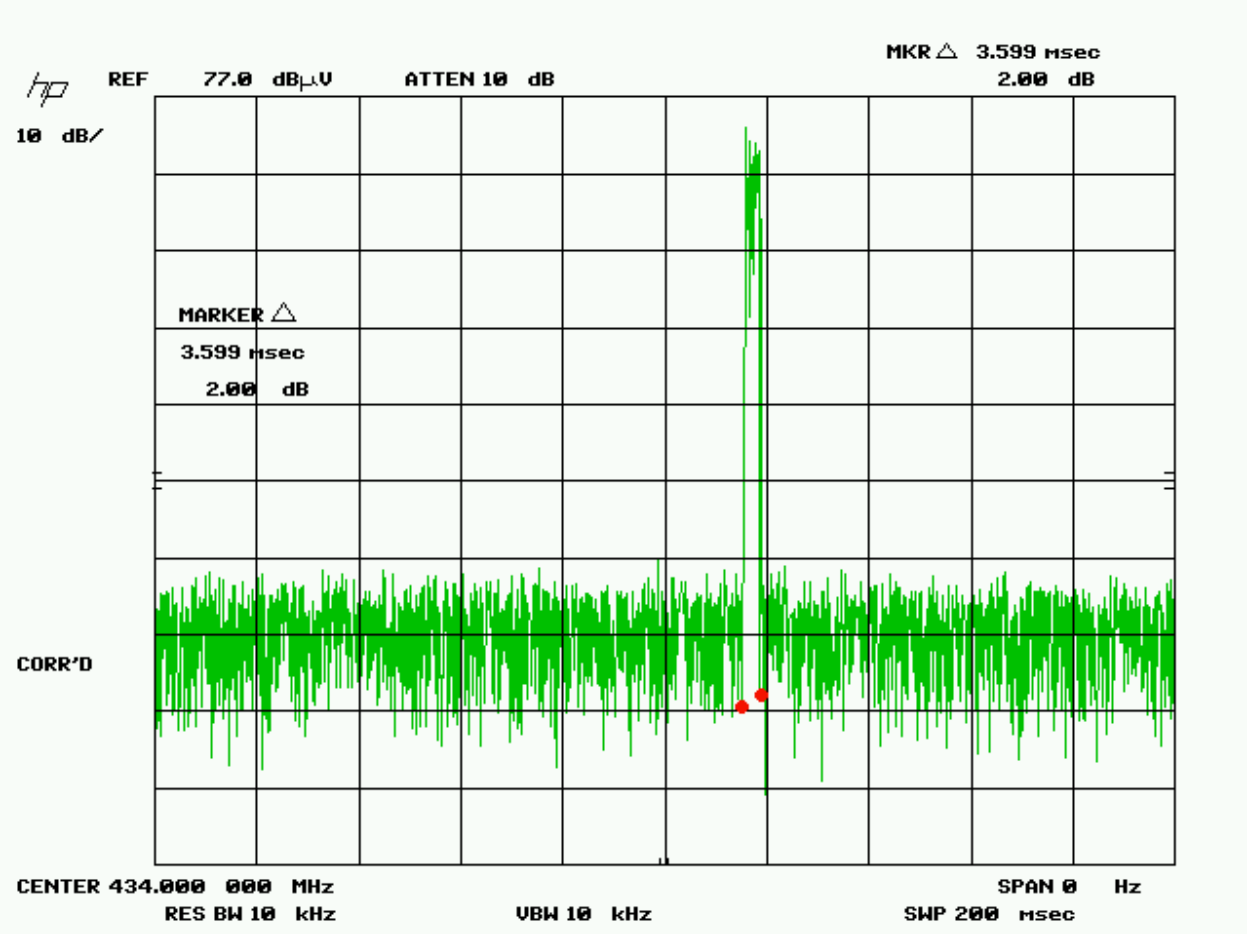

Figure 5. RF Pulse from UMD for a 100 mSec period.

2.8 Field Strength of Fundamental (47 CFR 15.231(e))

The results of the measurements for peak and average fundamental emissions are given in Tables 4 and 5 and Figure 6. Test limits are determined as in paragraph 2.9 below and part 15.35.

The EUT emissions measurement was started by setting up the Log-periodic Antenna (L-pA) or generally, any antenna, in the vertical orientation at a distance of 3 meters from the EUT and at a height of 1.0 meters above the ground. The EUT packages' major axis was set normal to the direction of the measuring antenna.

The Spectrum Analyzer displays were set to: Channel A: free-running, Channel B: to Max-Hold. Choose a frequency or frequency range and scan it at a coupled rate. When a suspicious signal is found, center the signal on the screen and raise the L-pA to the 4-meter height while observing the SA display for changes to the max-hold and free-running display. Next, the antenna is lowered to 1 meters height above the ground plane while observing the channel A and B displays. The display having max-hold shows the maximum signal seen across the height range of 1 to 4 meters. The next action is to raise or lower the antenna until the free-running display matches the Max-hold display's magnitude on the SA screen. When this occurs, the signal is maximized for antenna height. Record the antenna height on the data sheet corresponding to the present frequency.

When the antenna height has been maximized, the next step in the measurement process is to maximize the EUT direction with respect to the receiving antenna. Rotate the turn-table through 360 degrees with one SA channel set for max-hold and the other channel in free-run mode. The object is to find that azimuthal direction where the free-running indication just matches the greatest max-hold indication. This is the direction where the signal is peaked for azimuth. Record the direction on the data sheet next to the frequency.

When all signals have been maximized for antenna height and direction, the EUT case is carefully maneuvered in each of the three mutually exclusive orthogonal planes while observing the same Max-hold/free-running SA display indication. When the EUT position is found that allows a maximized signal to be read from the display, then that signals' magnitude is recorded on the data sheet for that particular frequency.

Next, re-orient the measurement antenna to Horizontal polarization at 1 meter height and repeat the above antenna and directional maximization processes for the six (6) greatest signals found across the frequency spectrum of interest. Record all signals within 6 dB of the limit.

2.8 Field Strength of Fundamental (47 CFR 15.231(e)) (Cont'd)

Finally, add to the SA reading, the antenna correction factor, cable losses and duty cycle factors. Subtract the preamplifier gain. This value becomes the corrected value for the signal under consideration. Compare this corrected value of signal to the specification limit and record its margin as compared to the limit.

2.9 Operation in the Band above 70 MHz (CFR15.231 (e))

The limit versus frequency is as follows (test distance = 3.0 meters) from paragraph 15.231(e):

Frequency Of Fundamental In the range of (MHz)	Limit for the Fundamental uV/m, Average	Limit for any Harmonics and other spurious uV/m, Average
260 to 470*	1500 to 5000*	150 to 500*

* Linear Interpolation:
Fundamental limit, $L_1 = mx_1+b_1$, where m = 40.4; $x_1 = \log f_{1(MHz)}$; $b_1 = - 34$
Harmonics limit, $L_2 = mx_2+b_2$, where m = 40.4; $x_2 = \log f_{1(MHz)}$; $b_2 = - 54$

The above frequency spectrum shall be examined and handled for signals falling into the restricted bands of 15.205. Fundamentals cannot be allowed to exist in the restricted bands. Spurious and harmonics shall meet the requirements of the above table or paragraph 15.209, whichever requirement permits a greater field strength.

2.10 Radiated Spurious Emissions, 30 MHz to 1000 MHz (47 CFR 15.205, 15.209 and 15.231 (e))

The peak and average radiated spurious emissions related to the fundamental were measured over the frequency range of 30 MHz to 4.4 GHz. Only two emissions were found in that frequency range. All others were at least 20 dB below the specification limit. Test data are found in Tables 6 and 7 and Figures 6 and 7 below.

2.11 Bandwidth of Fundamental (CFR15.231 (c))

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined by the frequencies that are at least 20 dB down from the peak of the pulse.

0.0025 x 433,900,000.00 = 1.084 MHz

The measured bandwidth is 277.5 kHz, well within the limit. See Figure 8, below.

Table 4. Field Strength of Fundamental Emission, Peak Value

Peak Radiated Emissions of Fundamental							
Test By: DA	**Test:** FCC Part 15.231(e)			**Client:** CoolTrax Asia Pacific Pty. Ltd.			
	Project: 09-0017			**Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless UMD			
Frequency (MHz)	**Test Data @ 3 m Peak (dBuV)**	**AF+CL-PA (dB)**	**Converted Results (dBuV/m)**	**Peak Limits (dBuV/m)**	**Test Distance/ Antenna Polarization**	**Margin (dB)**	**Detector Type**
433.99	69.82	20.90	90.72	92.6	3m/HORZ	1.9	**Peak**

SAMPLE CALCULATIONS:

RESULTS @ 433.98 MHz = 69.82 + 20.90 = 90.72 dBuV/m @ 3 m

Test Date: November 12, 2008

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

Table 5. Field Strength of Fundamental Emission, Average Value

Average Radiated Emissions of Fundamental							
Test By: DA	**Test:** FCC Part 15.231			**Client:** CoolTrax Asia Pacific Pty. Ltd.			
	Project: 09-0017			**Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless UMD			
Frequency (MHz)	**Test Data @ 3 m Peak (dBuV)**	**AF+CL-PA-DC (dB)**	**Converted Results AVG (dBuV/m)**	**Limits AVG (dBuV/m)**	**Test Distance/ Antenna Polarization**	**Margin (dB)**	**Detector Type**
433.99	69.82	20.90- 28.9	61.8	72.6	3m/HORZ	10.8	**Peak**

Note: Peak dBuV = 69.82; Duty Cycle Correction Factor, DC = - 28.9 dB

SAMPLE CALCULATIONS:

RESULTS @ 433.98 MHz = 69.82 + 20.90 – 28.9 = 61.8 dBuV/m @ 3 m

Test Date: November 12, 2008

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

Table 6. Peak Field Strength of Spurious Emissions.

Peak Radiated Spurious Emissions							
Test By:	**Test:** FCC Part 15.231(e)			**Client:** CoolTrax Asia Pacific Pty. Ltd.			
DA	**Project:** 09-0017		Limits per 15.231(e)	**Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 RFID, Wireless UMD			
Frequency (MHz)	**Test Data Peak (dBuV)**	**AF+CL-PA (dB/m)**	**Calculated Results (dBuV/m)**	**Peak Limits @ 3 m (dBuV/m)**	**Test Distance/ Antenna Polarization**	**Margin (dB)**	**Detector Type**
Tested over the Frequency Range of 30 MHz to 4.4 GHz							
868.00	27.61	29.01	56.6	72.6	3m./HORZ	16.0	**PEAK**
1301.94	33.10	-11.18	21.9	74.0	3m./HORZ	52.1	**PEAK**

SAMPLE CALCULATIONS:

RESULTS @ 433.98 MHz = 27.61 + 29.01 = 56.6 dBuV/m @ 3 m

Test Date: November 12, 2008

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

Table 7. Average Field Strength of Spurious Emissions.

Average Radiated Spurious Emissions							
Test By:	**Test:** FCC Part 15.231(e)			**Client:** CoolTrax Asia Pacific Pty. Ltd.			
DA	**Project:** 09-0017		Limits per 15.231(e)	**Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 RFID, Wireless UMD			
Frequency (MHz)	**Test Data Peak (dBuV)**	**AF+CL-PA-DC (dB/m)**	**Calculated Results Average (dBuV/m)**	**Average Limits @ 3 m (dBuV/m)**	**Test Distance/ Antenna Polarization**	**Margin (dB)**	**Detector Type**
Tested over the Frequency Range of 30 MHz to 4.4 GHz							
868.00	27.61	29.01-28.9	27.7	52.6	3m./HORZ	24.9	**PEAK**
1301.94	33.10	-11.18-28.9	-6.98	54	3m./HORZ	61	**PEAK**

Note: Peak dBuV = 27.6; Duty Cycle Correction Factor, DC = -28.9 dB

SAMPLE CALCULATIONS:

RESULTS @ 433.98 MHz = 27.6 + 20.90 – 28.9 = 27.7 dBuV/m @ 3 m

Test Date: November 12, 2008

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

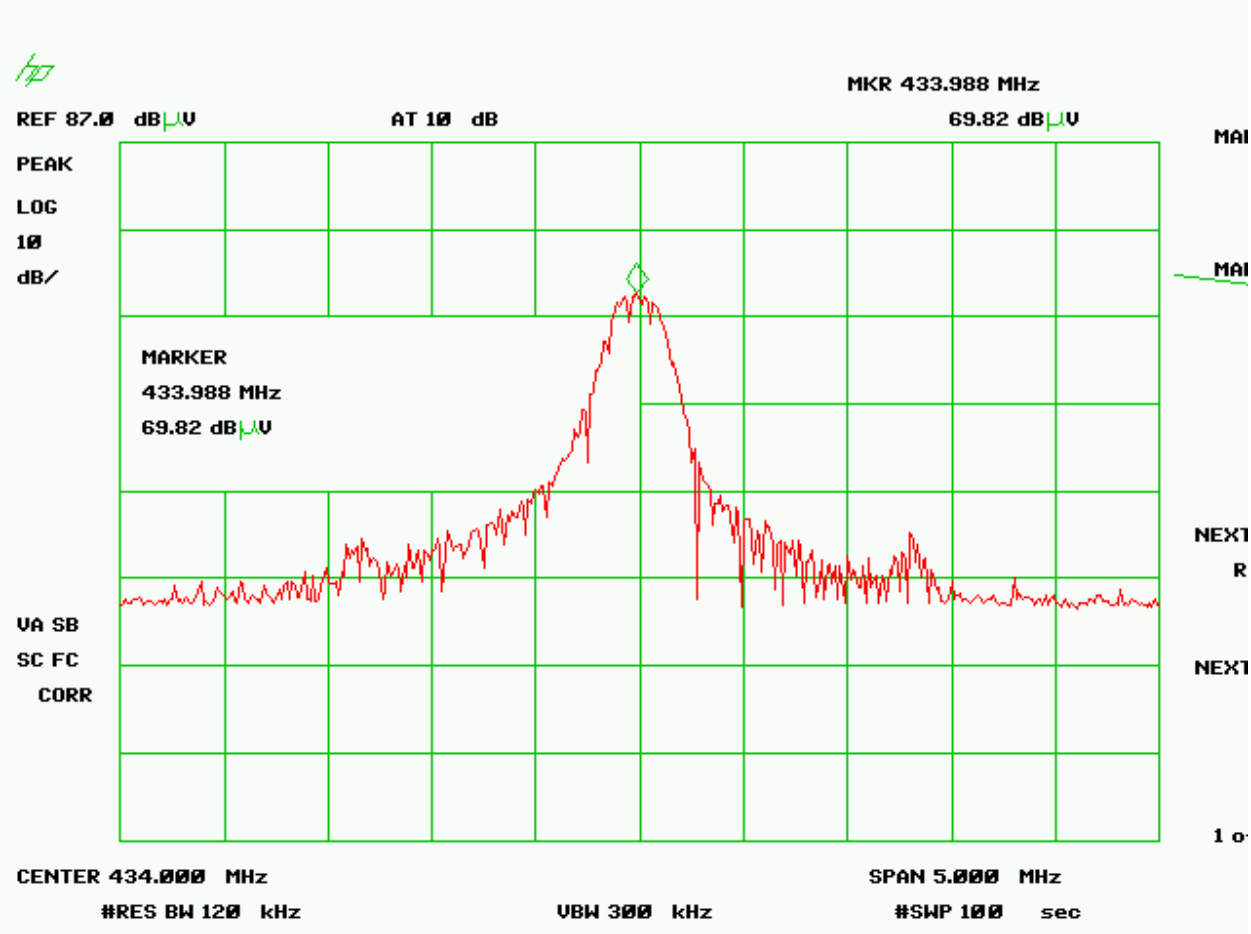

Figure 6. Peak Value of Fundamental.

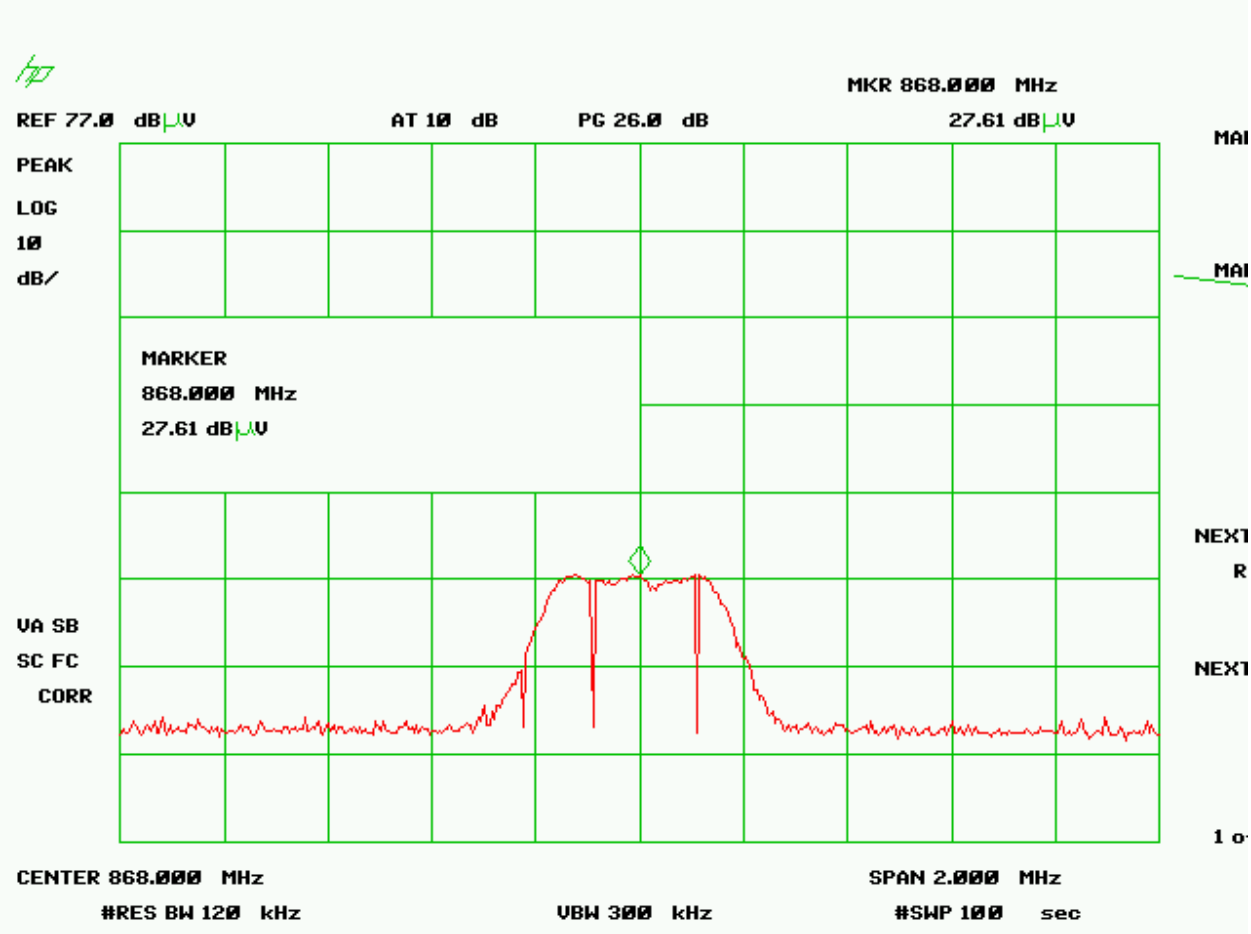

Figure 7. Peak Radiated Spurious Emission 2nd Harmonic

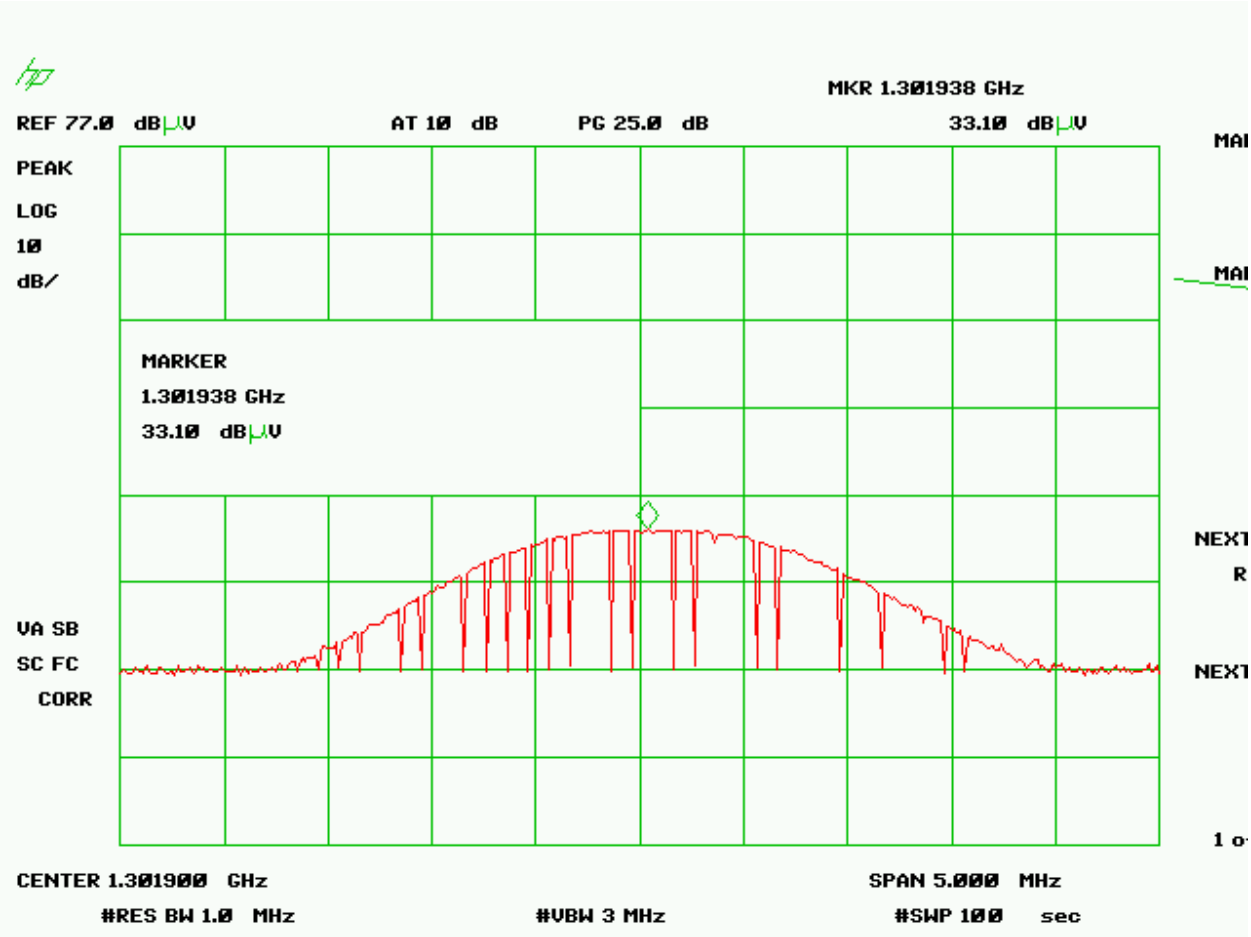

Figure 8. Peak Value of 3rd Harmonic.

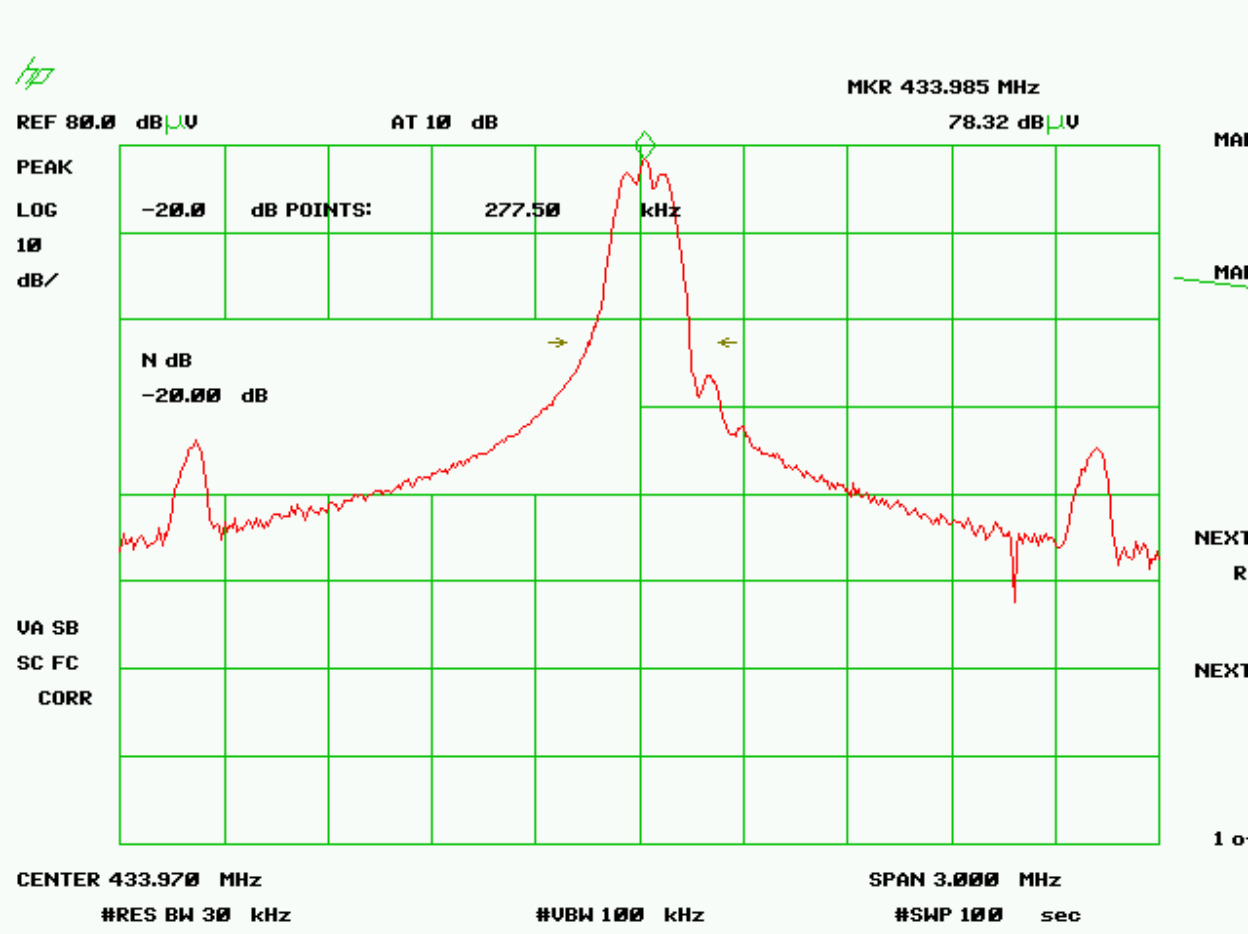

Figure 9. EUT -20 dB Bandwidth

2.12 Power Line Conducted Emissions for Transmitter and Receiver/Digital Apparatus (47 CFR 15.107&15.207)

The transmitter and Receiver/Digital apparatus are powered from batteries, therefore this test is not valid and was not performed.

2.13 Unintentional Radiator Radiated Emissions (47 CFR 15.109(a))

Radiated emissions were evaluated from 30 MHz to 2 GHz. Measurements were made with the analyzer's bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made at 1 GHz and higher. Interconnect cables were positioned in various locations in an attempt to maximize the interference. The EUT was oriented in the three mutually orthogonal planes in an attempt to maximize the interference emissions. Results are shown in Table 6. The EUT transmitter was ignored for this test.

Table 6. Unintentional Radiator Radiated Emissions Data for Digital Device, Class B.

Unintentional Radiator Radiated Emissions							
Test By: D.A.	Test: Part 15B, Para 15.109			Client: CoolTrax Asia Pacific Pty Ltd.			
	Project: 09-0017	Class: B		EUT: Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless UMD			
Frequency (MHz)	Test Data Peak (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Average Limits (dBuV/m)	Application Test Distance/ Polarization	Margin (dB)	Detector Used
Measurements were made over the frequency range of 30 MHz – 2 GHz							
137.6600	14.20	14.96	29.16	40.0	3m./VERT	10.8	**PK**
211.3500	16.20	14.09	30.29	43.5	3m./VERT	13.2	**PK**
221.1800	12.50	14.18	26.68	46.0	3m./HORZ	19.3	**PK**
443.5200	9.70	20.69	30.39	46.0	3m./VERT	15.6	**PK**
No other emissions seen within 20 dB of the FCC Part 15, Subpart B, Class B Limits							

SAMPLE CALCULATIONS: at 137.66 MHz (14.20 dBuV + 14.96 dB/m) = 29.16 dBuV/m

Test Date: October 21, 2008

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**