Testing Tomorrow's Technology

November 25, 2008

Mr. Michael White
CoolTrax Asia Pacific Pty. Ltd.
2475 Northwinds Pkwy., Suite 200
Alpharetta, GA 3004

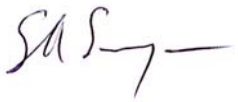
Dear Mr. White:

Enclosed please find CoolTrax Asia Pacific Pty Ltd.'s file copy of the FCC Subpart C, Part 15.231 Certification Report and Application for the CoolTrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Temperature Datalogger RF TAG.

CoolTrax Asia Pacific Pty Ltd. should expect to receive a certification grant for this product within the next 8-12 weeks.

If you have any questions, please don't hesitate to call. Thank you for your business.

Sincerely,



Steve Sawyer
Chief Compliance Engineer

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

**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 Temperature Datalogger RF TAG**

**Dated: January 23, 2009**

**Number of Pages in this report: 39**

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# MEASUREMENT/TECHNICAL REPORT

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

MODEL: **Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Datalogger RF TAG**

FCC ID: **WSB-CTRX-UB-T2**

DATE: **January 23, 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

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## 1. General Information

The information contained in this report is presented for the FCC Equipment Authorization of Certification of the Equipment Under Test (EUT).

### 1.1 Product Description

The EUT is the CoolTrax Asia Pacific Pty Ltd., Model CoolTrax Fresh In Transit System Model: Universal Monitoring Device, UMD, V2.0 GSM RFID, Wireless Temperature Reporting RF TAG, hereinafter called the RF TAG. The EUT is a Low Power RFID Transceiver operating at 433.98 MHz. The RF Tag comes in two versions: 1) Wireless Temperature Reporter and 2) Wireless Magnetic Door Guard. The door guard works with a small magnet and transmits an alarm when the door is opened (magnetic field is interrupted).

The temperature tag is programmed to transmit temperature data every 16 to 24 seconds. This is called the “data” mode. There is another mode called the “consignment” mode wherein the data is transmitted as described above along with door activation alarms The Universal Monitoring Device (UMD) acknowledges receipt of the door activation alarm only. The UMD transmission will be described in a separate report similar to this report.

The temperature message length is 3.6 milliseconds. It consists of six (6) each 16 bit words all compressed together in the 3.6 mSec period. The six words contain such information as Tag ID, Tag time-stamp, temperature, and three status words such as battery condition and installation date. The UMD does not transmit acknowledgements to the RF Tag in the data mode.

In a 1 hour period, the EUT can transmit 225 messages of 3.6 mSec duration per transmission. This amounts to a total transmission time of 0.81 seconds within a 1 hour period which is less than the 2 seconds per hour allowance of paragraph 15.231 (a)(3). Also, Figure 5, herein shows the automatically activated transmitter pulse shutting down after 3.6 milliseconds and will not be activated again for an additional 15 plus seconds which is well within the 5 second time specified by paragraph (a)(2). A separate plot cannot be shown because of the time scale (3.6 milliseconds every 16 seconds does not show on the graph).

The door activation tag (consignment mode) transmits an alarm signal of constant magnitude at any time that the door is opened. The alarm signal is 0.5 mSec duration, but only rarely occurs. The UMD acknowledges receipt of the door-open signal.

Because the periodic transmit rate does not contain a polling request the requirement of paragraph 15.231(e) is invoked. It is noted that the timing of the pulse duration is less than the 1 second duration allowed by paragraph (e). Also, with a 16 second data rate, the silent period mentioned by paragraph (e) is greater than the minimum of 10 seconds required (more than 30 times 3.6 milliseconds).

1.2 Related Submittal(s)/Grant(s)

The EUT will be used as a part of a system to send/receive either temperature data or door-open data. The UMD (Universal Monitoring Device) V2.0 transmitter mentioned in this report will be used to acknowledge the receipt of the remotely located RF TAG door alarms and to process the temperature data that the temperature RF TAG sends to it. The UMD V2.0 will be presented for Certification by the FCC in a separate submittal under FCC ID: WSB-CTRZ-UB-01.

1.3 The RF TAG is subject to the following authorizations:

a) Certification of the transmitter part of the RF TAG transceiver.
b) Verification of the non-transmitter part of the transceiver 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).* Radiated emissions data were taken according to paragraph 8.0 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. There were no interconnecting cables to manipulate in an attempt to maximize emissions, however, the physical position of the EUT was varied through the three mutually exclusive orthogonal planes in an attempt to maximize the emissions. The final setup description is found in the test section of this report. A block diagram of the tested system is shown in Figure 1. A test configuration photograph of fundamental and harmonic emissions measurement is 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 15.209, 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 of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992) paragraph 8 for radiated emissions. Conducted emissions were not required to be measured because the RF TAG is battery powered with no provision for re-charging the battery. Radiated emissions data were taken with the EMI 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.

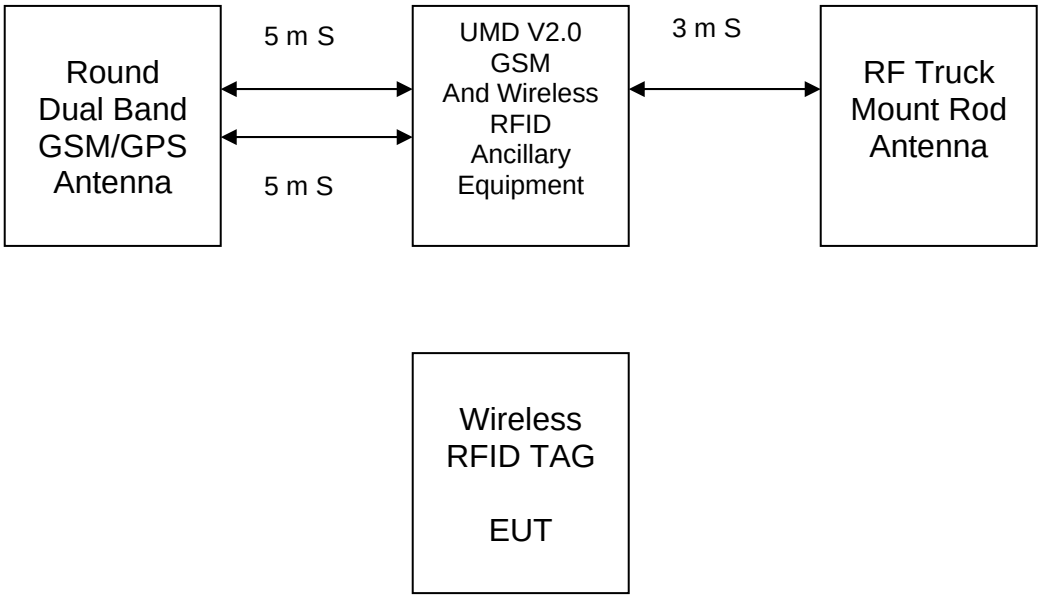


**Figure 1. Test Configuration**

**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 GSM RFID, Wireless Temperature RF TAG | None | WSB-CTRX-UB-T2 (for RF Tag) | Note1 2 @ 5m S 3m S |
| 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. Universal Monitoring Device (UMD) | UMD V2.0 | None | **WSB-CTRZ-UB-01 For UMD** | None |

**P = Power D = data S = Shielded U = Unshielded**
Note 1. These data cables are not a part of the EUT test setup.

## Table 2. Test Instruments

| TYPE | MANUFACTURER | MODEL | SN. | Cal Date. |
|---|---|---|---|---|
| SPECTRUM ANALYZER | HEWLETT-PACKARD | 8593E | 3205A00124 | 9/9/08 |
| RF PREAMP 10 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 | 11/15/07 |
| 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 RFID Tag System incorporates the following antennas only.

**Table 3. Antenna description for Model Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Temperature RF TAG**

| MANUFACTURER | TYPE | MODEL | GAIN $dB_i$ |
|---|---|---|---|
| CoolTrax Asia Pacific PTY Ltd | Small Tuned Loop Antenna on RFID Tag | Door Tag or Wireless Temperature Datalogger (EUT) | 0 |

## 2.7 Duty Cycle

The duty cycle for this transmitter consists of an ON time of 3.6 mS over a 100 mSec period. Therefore, its duty cycle correction factor is (see Figure 5 below):

d.c. = time on in milliseconds/100 millisec = 3.6/100 =0.036 = 3.6%, or
= 20 log (0.036) = - 28.9 dB.

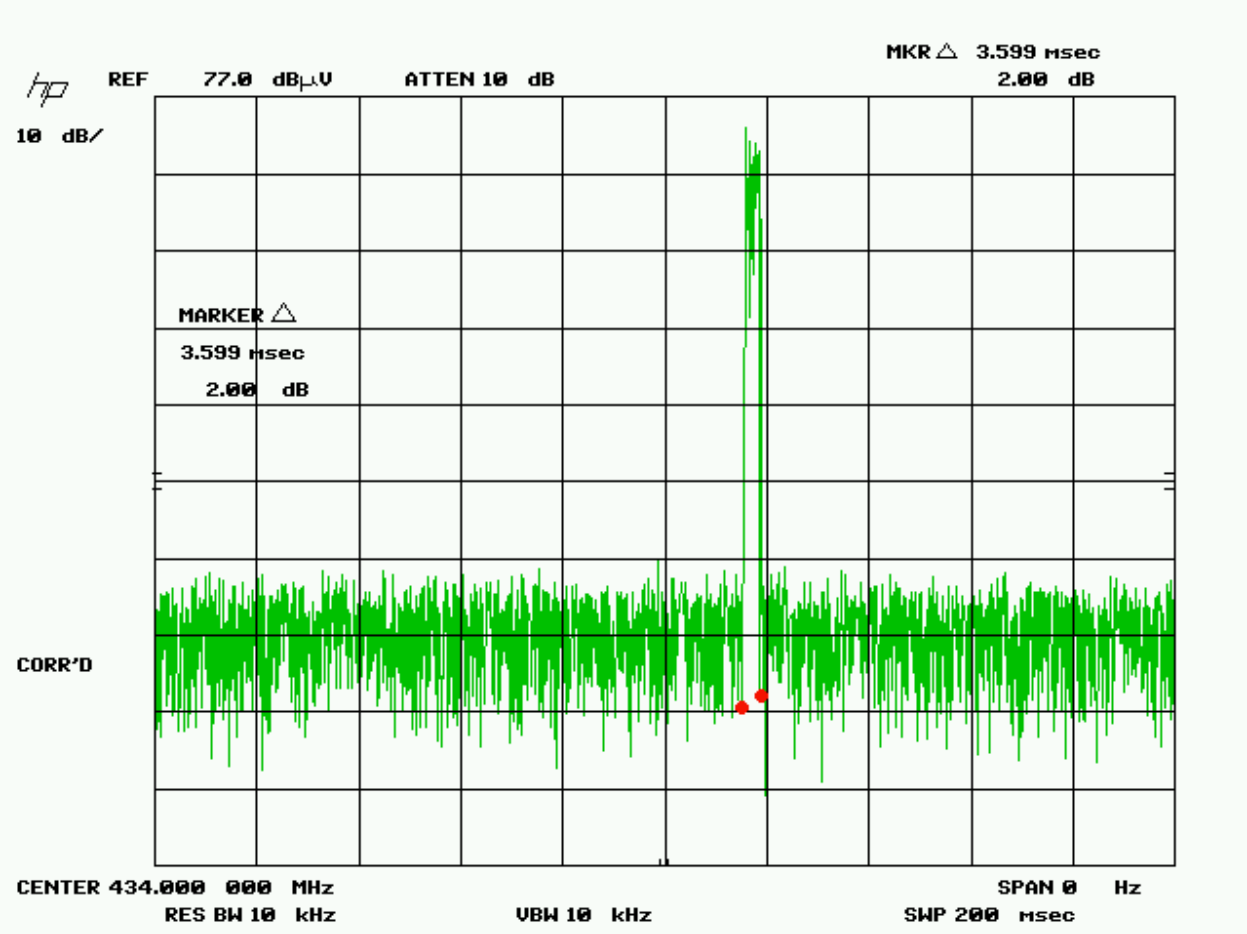


Figure 5. RF Tag ON time per 100 millisecond period.

## 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.

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

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.

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

This limit versus frequency table is as follows (test distance = 3.0 meters):

| Fundamental Frequency (MHz) | Limit Fundamental (Average ) uV/m | Limit Harmonics and other spurious (Average) uV/m |
|---|---|---|
| 260 to 470 | 1500 to 5000*, 1 | 150 to 500*,2 |

* Linear Interpolation

formula 1: $limit_1 = 40.4 \log(f_{MHz}) - 34$, dB
formula 2: $limit_2 = 40.4 \log(f_{MHz}) - 54$, dB

The frequency spectrum above the fundamental to its $10^{th}$ harmonic shall be examined and measured for signals falling into the restricted bands of 15.205. Spurious and harmonics shall meet the requirements of the above table or the requirements of 15.209, whichever requirement permits a higher field strength. Peak signal limits are modified by paragraph 15.35 (b).

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

The average and peak radiated spurious emissions were measured over the frequency range of 30 MHz to 4.4 GHz. Only two emissions, both harmonically related to the fundamental, were found in that frequency range. All others were at least 20 dB below the specification limit. Test data are obtained by the process described in paragraph 2.8 above. Test limits are from paragraph 2.9 above as modified by paragraph 15.35. Test data are found in Tables 6 and 7 and Figures 7 and 8 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 those frequencies that are at least 20 dB down on either side of the center frequency of the pulse.

0.0025 x 433,980,000.00 = 1.085 MHz

The measured bandwidth is 612.50 kHz, well within the limit. See Figure 8, below.

## Table 4. Field Strength of Fundamental Emission, Average Value

| Average Radiated Emissions of Fundamental | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Test By:** DA | **Test:** FCC Part 15.231(e) | | | **Client:** CoolTrax Asia Pacific Pty. Ltd. | | | |
| | **Project:** 08-0217 | | | **Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Datalogger RF TAG | | | |
| **Frequency (MHz)** | **Peak Test Data @ 3 m (dBuV)** | **AF+CL-PA-DC (dB)** | **AVG Corrected Results (dBuV/m)** | **Average Limits @ 3 m (dBuV/m)** | **Tested Distance/ Polarization** | **Margin (dB)** | **Detector Type** |
| 433.98 | 65.91 | 20.90-28.9 | 57.91 | 72.55 | 3m/HORZ | 14.64 | **Peak** |

Note: Duty Cycle, DC = - 28.9 dB, see para 2.7.

**SAMPLE CALCULATIONS:**

**RESULTS @ 433.98 MHz = 65.91 + (20.90-28.9) = 57.91 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, Peak Value

| Peak Radiated Emissions of Fundamental | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Test By:** DA | **Test:** FCC Part 15.231(e) modified by 15. 35 (b) | | | **Client:** CoolTrax Asia Pacific Pty. Ltd. | | | |
| | **Project:** 08-0217 | | | **Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Datalogger RF TAG | | | |
| **Frequency (MHz)** | **Peak Test Data @ 3 m (dBuV)** | **AF+CL-PA (dB)** | **Peak Corrected Results (dBuV/m)** | **Peak Limits @ 3 m (dBuV/m)** | **Tested Distance/ Polarization** | **Margin (dB)** | **Detector Type** |
| 433.98 | 65.91 | 20.90 | 86.81 | 92.55 | 3m/HORZ | 5.74 | **Peak** |

**SAMPLE CALCULATIONS:**

**RESULTS @ 433.98 MHz = 65.91 + (20.90) = 86.81 dBuV/m @ 3 m**

**Test Date: November 12, 2008**

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

**Table 6. 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:** 08-0217 | | Part 15.231(e) Average Limits | **Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Temperature RF TAG | | | |
| **Frequency (MHz)** | **Peak Test Data (dBuV)** | **AF+CL-PA-DC (dB/m)** | **AVG Corrected Results (dBuV/m)** | **Average Limits (dBuV/m)** | **Tested Distance** | **Margin (dB)** | **Detector Type** |
| **Tested over the Frequency Range of 30 MHz to 4.4 GHz** | | | | | | | |
| 866.105 2nd | 37.69 | 29.01-28.9 | 37.80 | 54.0 | 3m/HORZ | 16.2 | **PEAK** |
| 1301.975 3rd | 41.88 | -0.39 | 41.49 | 54.0 | 3m/HORZ | 12.5 | **PEAK** |

Duty Cycle = - 28.9 dB

**SAMPLE CALCULATIONS:**

**RESULTS @ 866.1 MHz = 37.69 + (29.01-28.9) = 37.8 dBuV/m @ 3 m**

**Re-Test Date: January 23, 2009**

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

**Table 7. Peak Field Strength of Spurious Emissions.**

| **Peak Radiated Spurious Emissions** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Test By:** DA | **Test:** FCC Part 15.231(e) modified by 15.35 (b) | | | **Client:** CoolTrax Asia Pacific Pty. Ltd. | | | |
| | **Project:** 08-0217 | | Part 15.231(e) Peak Limits | **Model:** Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Temperature RF TAG | | | |
| **Frequency (MHz)** | **Peak Test Data (dBuV)** | **AF+CL-PA (dB/m)** | **Corrected Results (dBuV/m)** | **Peak Limits (dBuV/m)** | **Tested Distance** | **Margin (dB)** | **Detector Type** |
| **Tested over the Frequency Range of 30 MHz to 4.4 GHz** | | | | | | | |
| 866.105 2nd | 37.69 | 29.01 | 66.7 | 74.0 | 3m/HORZ | 7.3 | **PEAK** |
| 1301.975 3rd | 41.88 | 28.51 | 70.39 | 74.0 | 3m/HORZ | 3.6 | **PEAK** |

**SAMPLE CALCULATIONS:**

**RESULTS @ 866.1 MHz = 37.69 +29.01 = 66.7 dBuV/m @ 3 m**

**Re-Test Date: January 23, 2009**

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

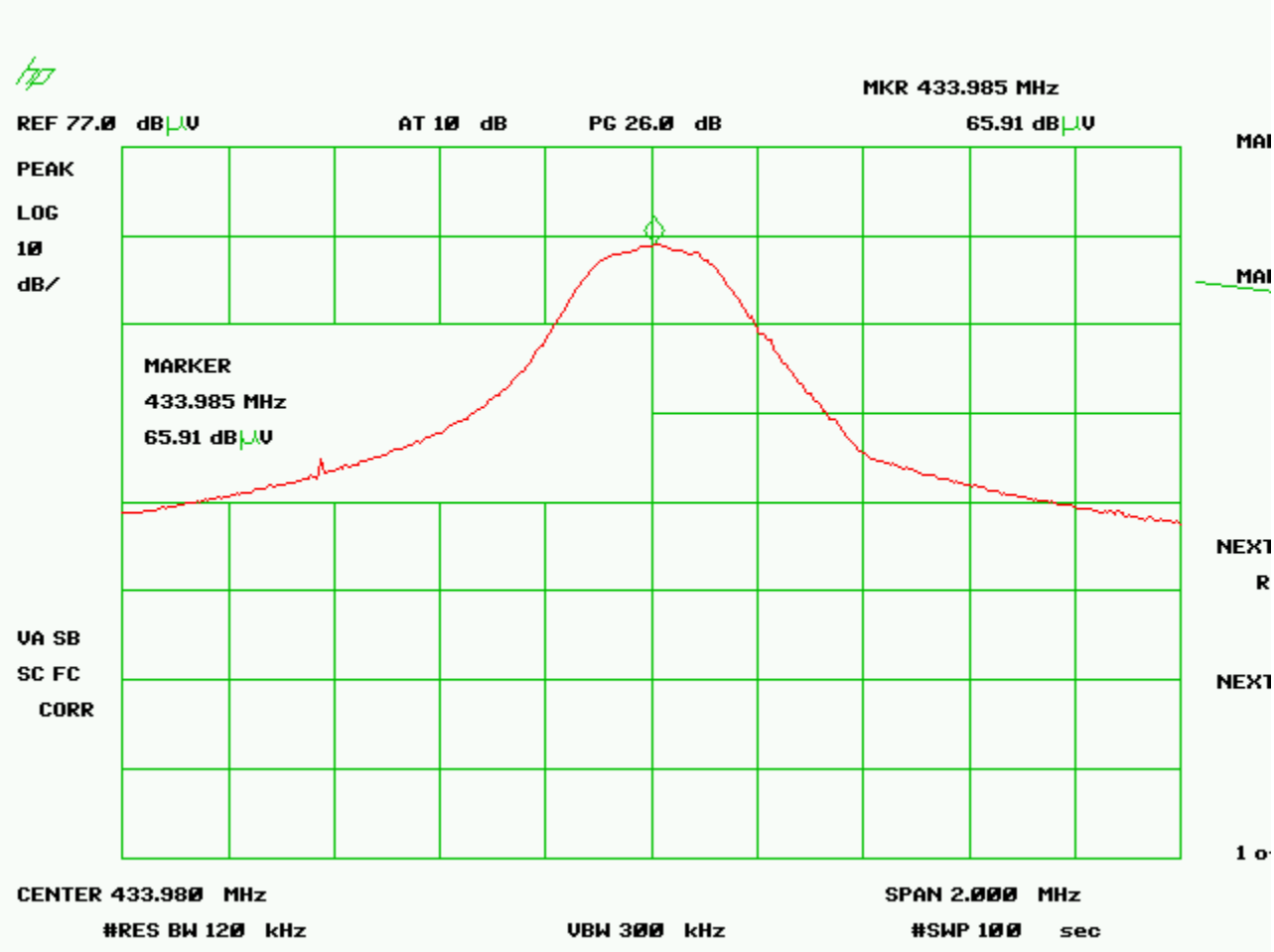


**Figure 6. Peak Value of Fundamental.**

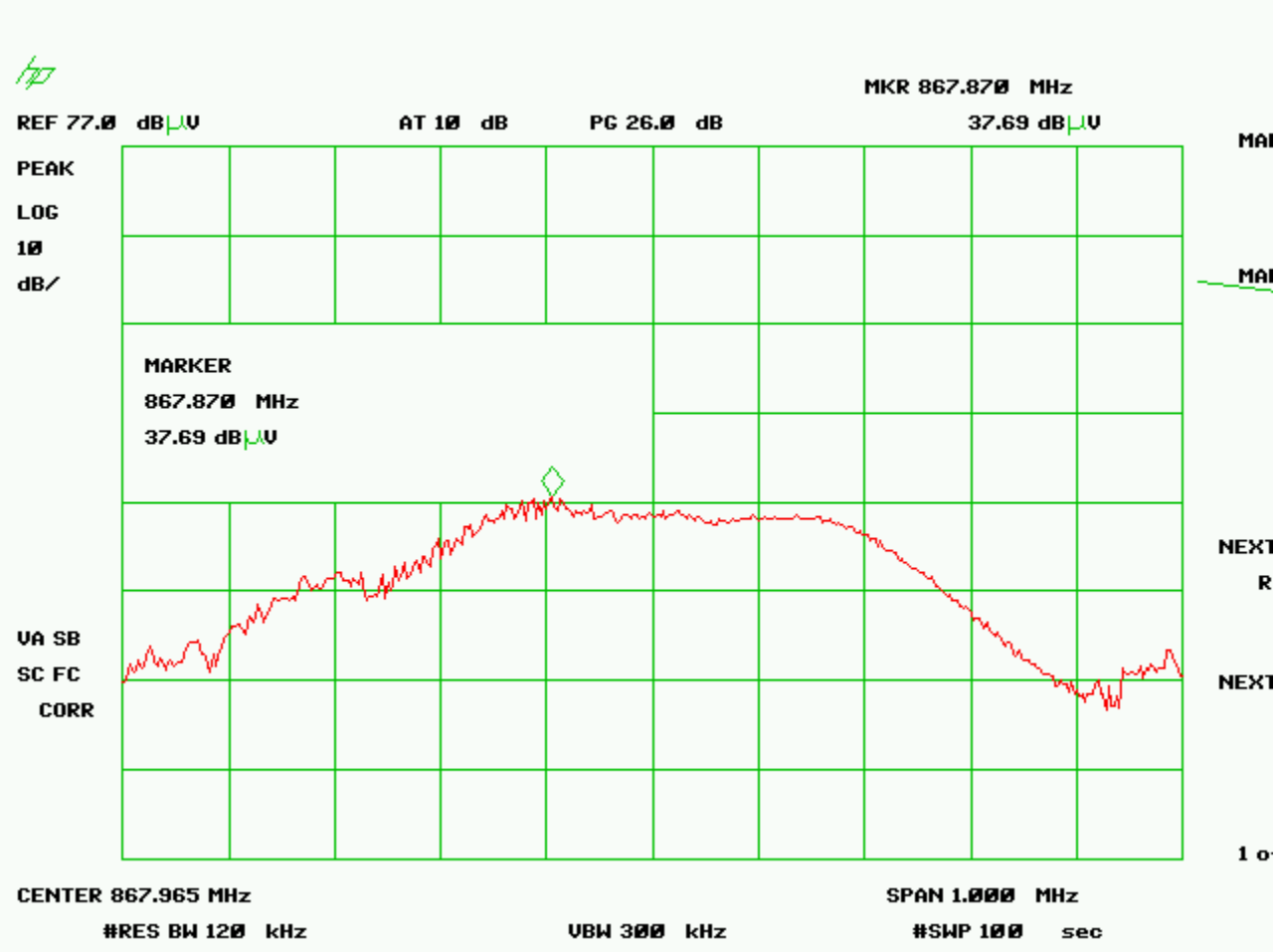


**Figure 7. Peak Value of 2nd harmonic.**

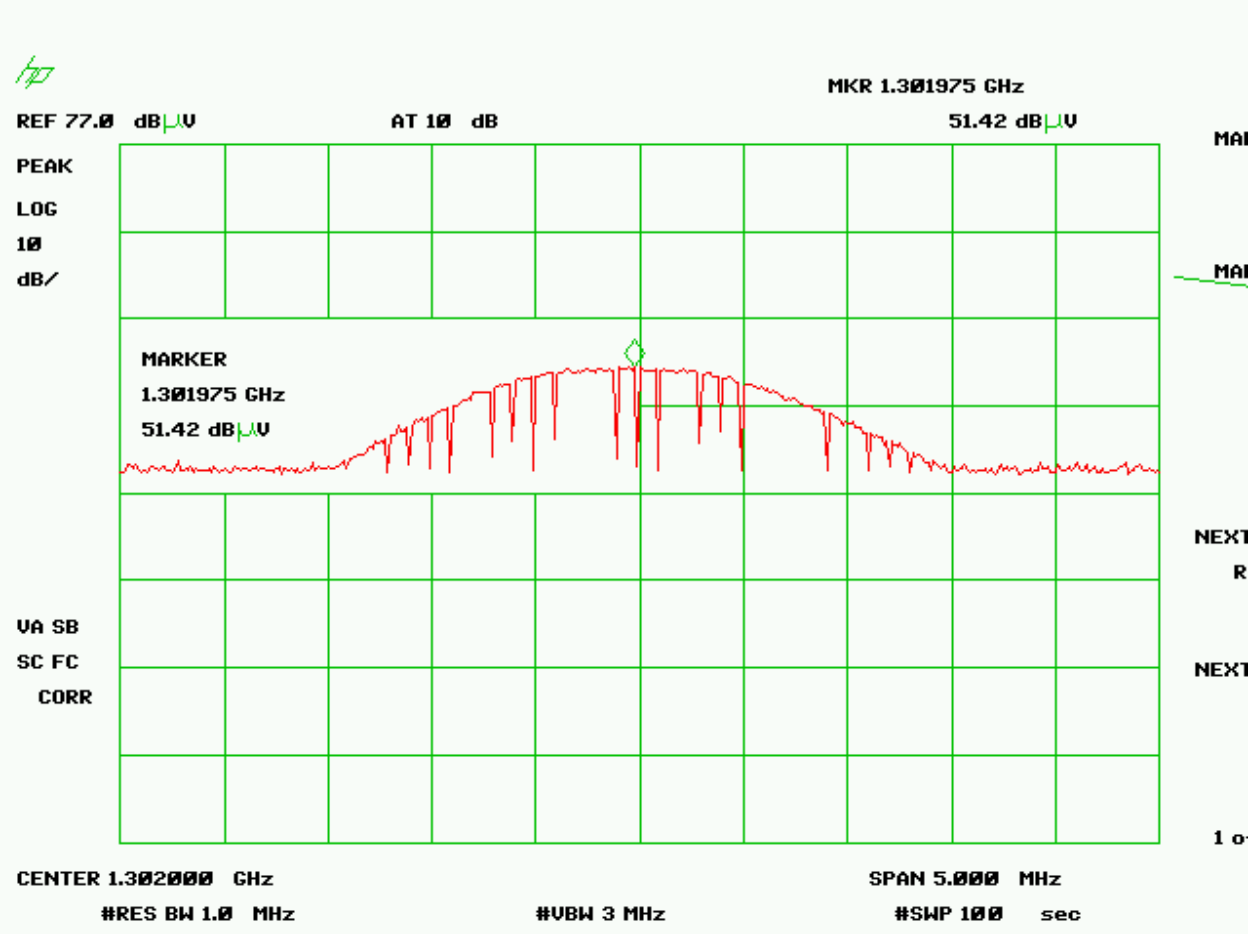


**Figure 8. Peak Value of 3rd harmonic.**

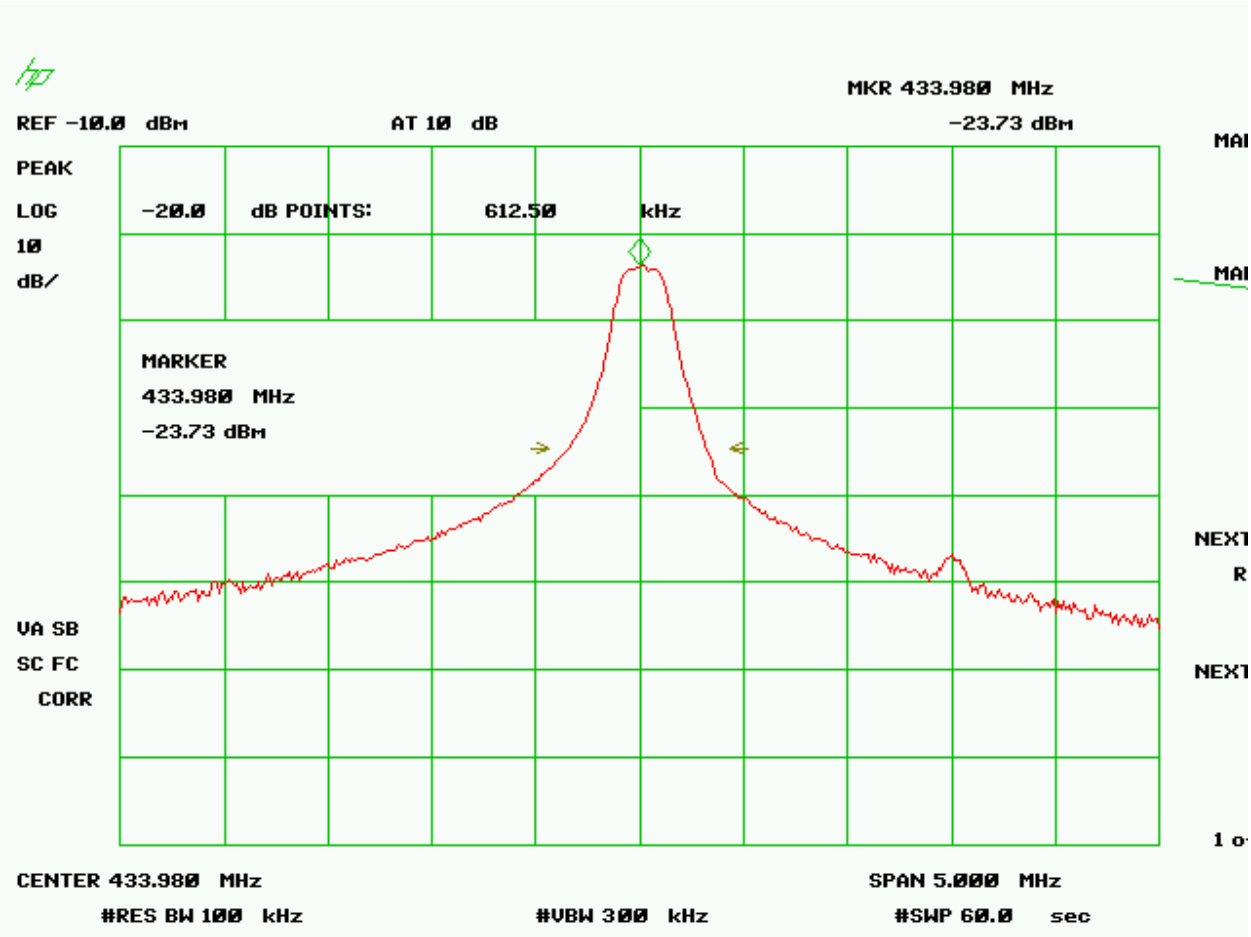


**Figure 9. Occupied Bandwidth (-20 dB) of Fundamental.**

Bandwidth = 612.5 kHz

## 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))

Unintentional radiator 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. No Interconnect cables were involved in this test. The EUT was oriented in the three mutually exclusive orthogonal planes as described in paragraph 2.8 above in an attempt to maximize the interference emissions. Results are shown in Table 6. The EUT transmitter signals (fundamental and harmonics) were ignored for this test.

Table 8. 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: 08-0217 | Class: B | | EUT: Cooltrax Fresh In Transit System Model: UMD V2.0 GSM RFID, Wireless Datalogger RF TAG | | | |
| Frequency (MHz) | Peak Test Data (dBuV) | AF+CL-PA (dB/m) | Peak 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, Para 15.109 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**