

**DATE: 13 September 2010**

**I.T.L. (PRODUCT TESTING) LTD.**

**FCC Radio Test Report**

**for**

**HomeFree Systems Ltd.**

**(An Attenti Subsidiary)**

**Equipment under test:**

**Universal Transmitter**

**UTX-830**

Written by:



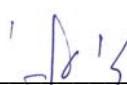
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Approved by:



A. Sharabi, Test Engineer

Approved by:



I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

## Measurement/Technical Report for HomeFree Systems Ltd.

### Universal Transmitter

UTX-830

**FCC ID: QUX-UTX-830-2**

This report concerns:                      Original Grant:            x

Class I change:

Class II change:

Equipment type:                      Part 15 Security/Remote Control Transceiver

47CFR15 Section 15231 (a-d)

Measurement procedure used is ANSI C63.4-2003.

Application for Certification:

prepared by:

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## 1. General Information

### 1.1 Administrative Information

Manufacturer: HomeFree Systems Ltd.

Manufacturer's Address: 2 Habarzel St.  
Tel-Aviv 61131  
Israel  
Tel: +972-3-647-8871  
Fax: +972-3-647-8872

Manufacturer's Representative: Shai Avigdory

Equipment Under Test (E.U.T): Universal Transmitter

Equipment Model No.: UTX-830

Equipment Serial No.: Not Designated

Date of Receipt of E.U.T: 02.08.10

Start of Test: 02.08.10

End of Test: 12.08.10

Test Laboratory Location: I.T.L (Product Testing) Ltd.  
Kfar Bin Nun,  
ISRAEL 99780

Test Specifications: FCC Part 15 Subpart C

## 1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

### **1.3 *Product Description***

The Universal Transmitter (UTX) is a small, permanently fixed transmitting device that alerts care center Staff members whenever a connected sensor is activated. The UTX830 can be connected to any sensor that can open or close a dry contact. For example, it can be connected to a door status sensor (e.g., magnetic door sensor) that is located close to a monitored door or exit (e.g., monitored door is opened). The UTX830 comes in two versions. One features an external power supply with a backup battery and the other is powered by battery only. The Universal Transmitter is not for use outside the monitored area.

### **1.4 *Test Methodology***

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

### **1.5 *Test Facility***

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 3, 2009).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

### **1.6 *Measurement Uncertainty***

#### **Conducted Emission**

The uncertainty for this test is  $\pm 2$  dB.

#### **Radiated Emission**

The Open Site complies with the  $\pm 4$  dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

## 2. System Test Configuration

### 2.1 ***Justification***

Radiated emission screening was performed in 3 orthogonal orientations. Since installation can be in different orientations.

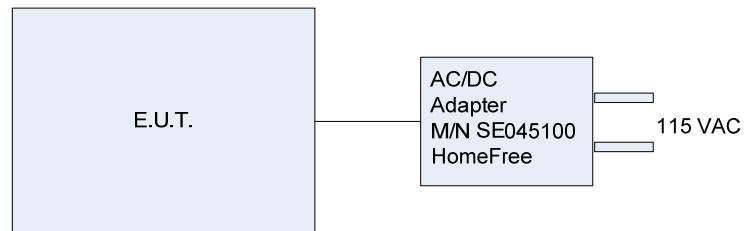
### 2.2 ***Special Accessories***

No special accessories were needed.

### 2.3 ***Equipment Modifications***

No modifications were needed in order to achieve compliance

### 2.4 ***Configuration of Tested System***



**Figure 1. Configuration of Tested System**

### 3. Conducted and Radiated Measurement Test Set-up Photos



Figure 2. Conducted Emission Test



Figure 3. Radiated Emission Test 9 kHz – 30 MHz



**Figure 4. Radiated Emission Test 30 MHz – 4330 MHz**

## 4. Conducted Emission Data

### 4.1 Test Specification

F.C.C., Part 15, Subpart C

### 4.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via a 50 Ohm / 50  $\mu$ Hn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

### 4.3 Measured Data

JUDGEMENT: Passed by 22.3 dB

The margin between the emission levels and the specification limit is, in the worst case, 22.5 dB for the phase line at 0.58 MHz and 22.3 dB at 0.58 MHz for the neutral line.

The EUT met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 5* to *Figure 8*.

TEST PERSONNEL:

Tester Signature:  \_\_\_\_\_

Date: 13.09.10

Typed/Printed Name: A. Sharabi

## Conducted Emission

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C

Lead:                      Phase

Detectors:                Peak, Quasi-peak, Average

| Signal Number | Frequency (MHz) | Peak (dBuV) | QP (dBuV) | QP Delta L 1 (dB) | Avg (dBuV) | Av Delta L 2 (dB) | Corr (dB) |
|---------------|-----------------|-------------|-----------|-------------------|------------|-------------------|-----------|
| 1             | 0.308751        | 36.9        | 32.7      | -27.4             | 15.9       | -34.1             | 0.0       |
| 2             | 0.578096        | 37.8        | 33.5      | -22.5             | 14.7       | -31.3             | 0.0       |
| 3             | 0.944116        | 33.2        | 29.2      | -26.8             | 10.9       | -35.1             | 0.0       |
| 4             | 2.085938        | 30.8        | 24.8      | -31.2             | 6.7        | -39.3             | 0.0       |
| 5             | 5.118977        | 26.1        | 19.7      | -40.3             | 3.2        | -46.8             | 0.0       |
| 6             | 9.706401        | 19.6        | 15.2      | -44.8             | 0.2        | -49.8             | 0.0       |

**Figure 5. Detectors: Peak, Quasi-peak, AVERAGE .**

*Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.*

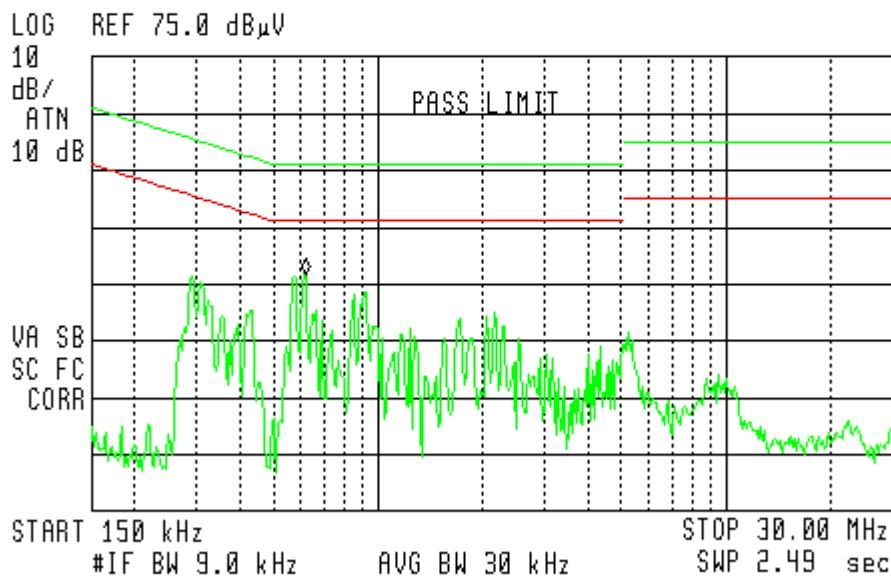
## Conducted Emission

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification:      F.C.C., Part 15, Subpart C  
 Lead:                      Phase  
 Detectors:              Peak, Quasi-peak, Average



ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 620 kHz  
 36.73 dB $\mu$ V



**Figure 6. Detectors: Peak, Quasi-peak, Average**

## Conducted Emission

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C

Lead:                      Neutral

Detectors:                Peak, Quasi-peak, Average

| Signal Number | Frequency (MHz) | Peak (dBuV) | QP (dBuV) | QP Delta L 1 (dB) | Avg (dBuV) | Av Delta L 2 (dB) | Corr (dB) |
|---------------|-----------------|-------------|-----------|-------------------|------------|-------------------|-----------|
| 1             | 0.294855        | 36.1        | 31.6      | -28.9             | 15.0       | -35.4             | 0.0       |
| 2             | 0.576947        | 37.7        | 33.7      | -22.3             | 14.9       | -31.1             | 0.0       |
| 3             | 0.932756        | 31.8        | 27.9      | -28.1             | 8.7        | -37.3             | 0.0       |
| 4             | 2.082918        | 33.0        | 27.7      | -28.3             | 8.1        | -37.9             | 0.0       |
| 5             | 5.242168        | 22.0        | 17.9      | -42.1             | 4.2        | -45.8             | 0.0       |
| 6             | 9.888310        | 20.8        | 13.7      | -46.3             | -0.6       | -50.5             | 0.0       |

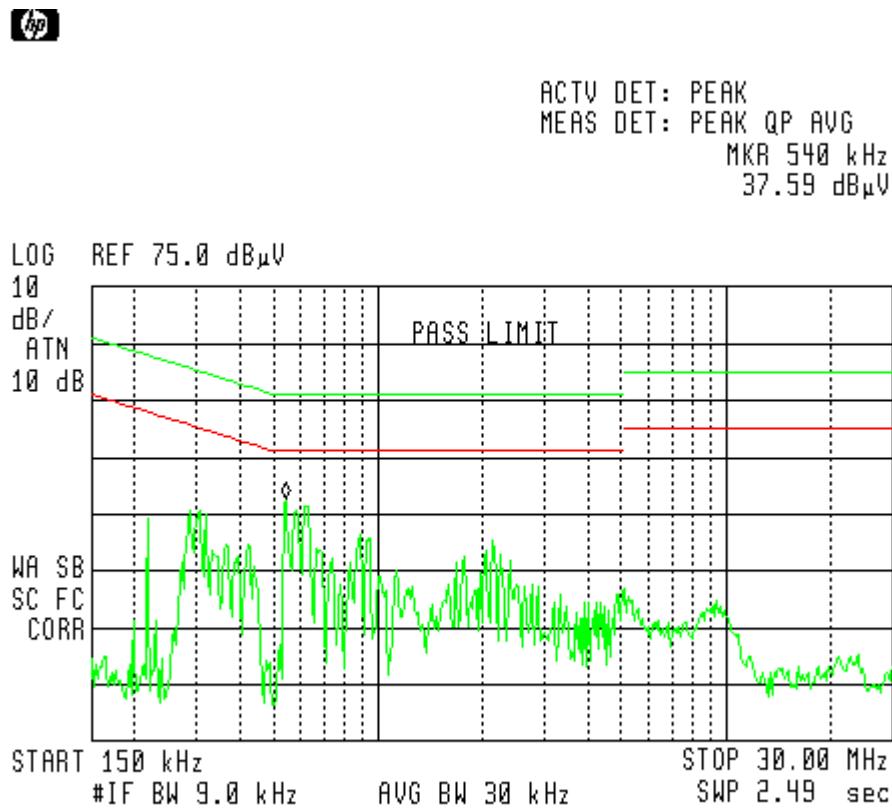
**Figure 7. Detectors: Peak, Quasi-peak, AVERAGE**

*Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.*

## Conducted Emission

E.U.T Description      Universal Transmitter  
Type                      UTX-830  
Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C  
Lead: Neutral  
Detectors: Peak, Quasi-peak, Average



**Figure 8 Conducted Emission: NEUTRAL  
Detectors: Peak, Quasi-peak, Average**

#### **4.4 Test Instrumentation Used, Conducted Measurement**

| <b>Instrument</b> | <b>Manufacturer</b> | <b>Model</b>  | <b>Serial No.</b> | <b>Last Calibration Date</b> | <b>Period</b> |
|-------------------|---------------------|---------------|-------------------|------------------------------|---------------|
| LISN              | Fischer             | FCC-LISN-2A   | 127               | March 3, 2010                | 1 Year        |
| LISN              | Fischer             | FCC-LISN-2A   | 128               | March 3, 2010                | 1 Year        |
| EMI Receiver      | HP                  | 85422E        | 3906A00276        | November 10, 2009            | 1 Year        |
| RF Filter Section | HP                  | 85420E        | 3705A00248        | November 10, 2009            | 1 Year        |
| Printer           | HP                  | LaserJet 2200 | JPKGC19982        | N/A                          | N/A           |

## 5. Average Factor Calculation

1. Burst duration = 6.25msec
2. Time between bursts = 287.5msec, >100ms

3. Average Factor =  $20 \log \left[ \frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of burst within 100msec} \right]$

Note Pulse duration and pulse period was considered worst case always ON  
cines unit transmits randomly.

$$\text{Average Factor} = 20 \log \left[ 1 \times \frac{6.25}{100} \times 1 \right] = -24.08 \text{dB}$$

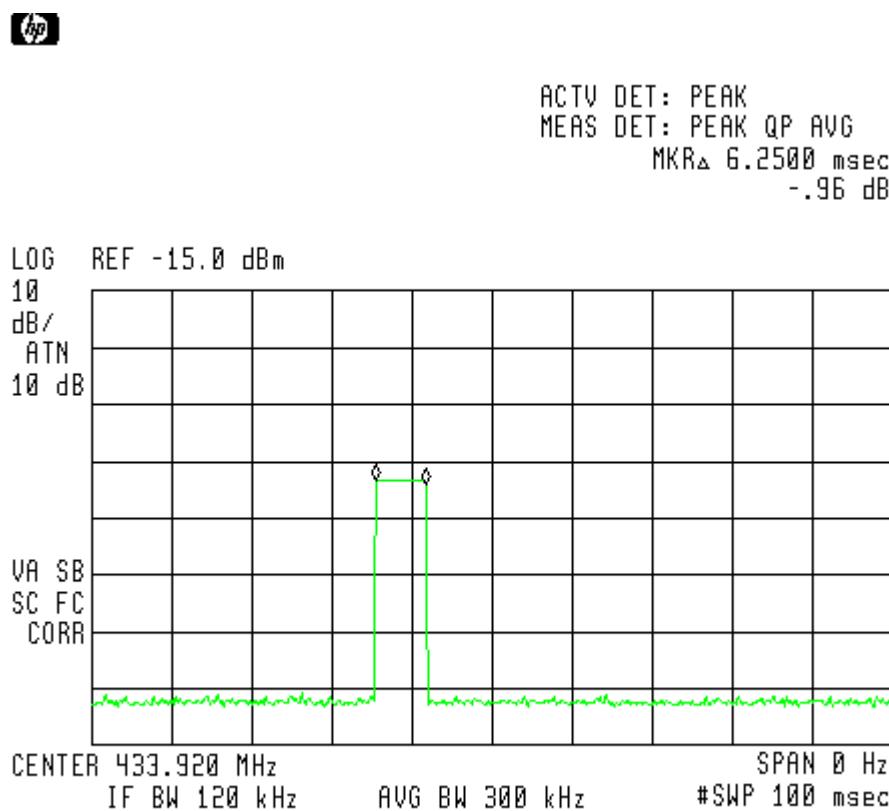
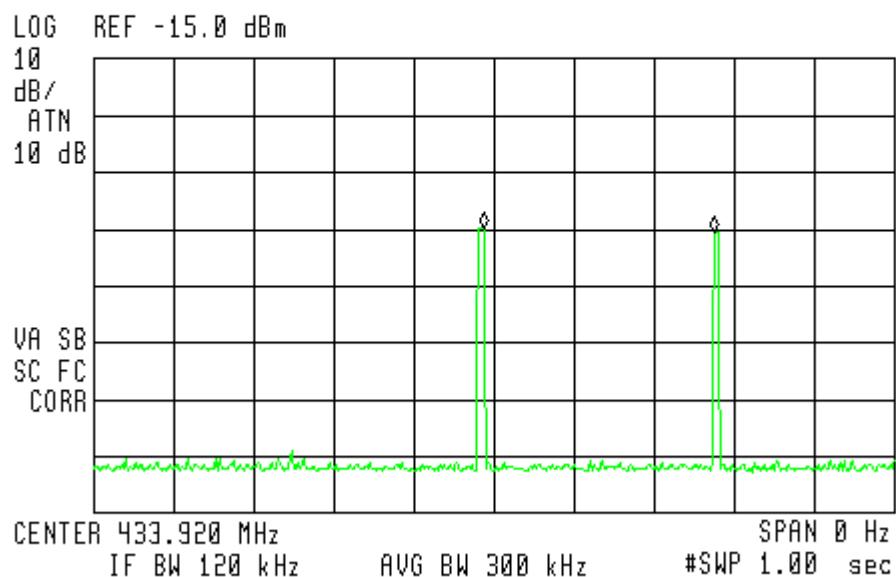


Figure 9. Burst Duration = 6.25msec



ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR<sub>A</sub> 287.50 msec  
-.48 dB



**Figure 10. Time Between Bursts (Worst Case) = 287msec , >100ms**

### 5.1 Test Instrumentation Used

| Instrument                 | Manufacturer | Model       | Serial Number | Calibration       | Period |
|----------------------------|--------------|-------------|---------------|-------------------|--------|
| EMI Receiver               | HP           | 85422E      | 3906A00276    | November 10, 2009 | 1 Year |
| RF Section                 | HP           | 85420E      | 3705A00248    | November 10, 2009 | 1 Year |
| Antenna<br>Bioconical      | ARA          | BCD 235/B   | 1041          | August 1, 2010    | 1 year |
| Antenna<br>Log Periodic    | ARA          | LPD-2010/A  | 1038          | March 24, 2010    | 1 year |
| Antenna-Log<br>Periodic    | A.H.System   | SAS-200/511 | 253           | January 29, 2009  | 2 year |
| Antenna Mast               | ARA          | AAM-4A      | 1001          | N/A               | N/A    |
| Turntable                  | ARA          | ART-1001/4  | 1001          | N/A               | N/A    |
| Mast & Table<br>Controller | ARA          | ACU-2/5     | 1001          | N/A               | N/A    |

## 6. Periodic Operation

### 6.1 Specification

F.C.C., Part 15, Subpart C, Section 15.231(a)

### 6.2 Requirements

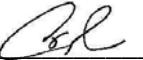
| Requirement                                                                                                                                                             | Rationale                   | Verdict  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------|
| Continuous transmissions are not permitted.                                                                                                                             | N/A                         | Complies |
| A manually operated transmitter shall be deactivated within not more than 5 seconds after releasing the switch.                                                         | N/A                         | Complies |
| An automatically operated transmitter shall cease operation within 5 seconds after activation.                                                                          | See Figure 11 to Figure 13. | Complies |
| Periodic transmissions at regular predetermined intervals are not permitted.                                                                                            | N/A                         | Complies |
| Polling or supervised transmissions to determine system integrity of transmitter used in security or safety applications shall not exceed more than 2 seconds per hour. | See Figure 14.              | Complies |

### 6.3 Results

JUDGEMENT: Passed

The EUT met the FCC Part 15, Subpart C, Section 15.231(a) specification requirements.

TEST PERSONNEL:

Tester Signature: 

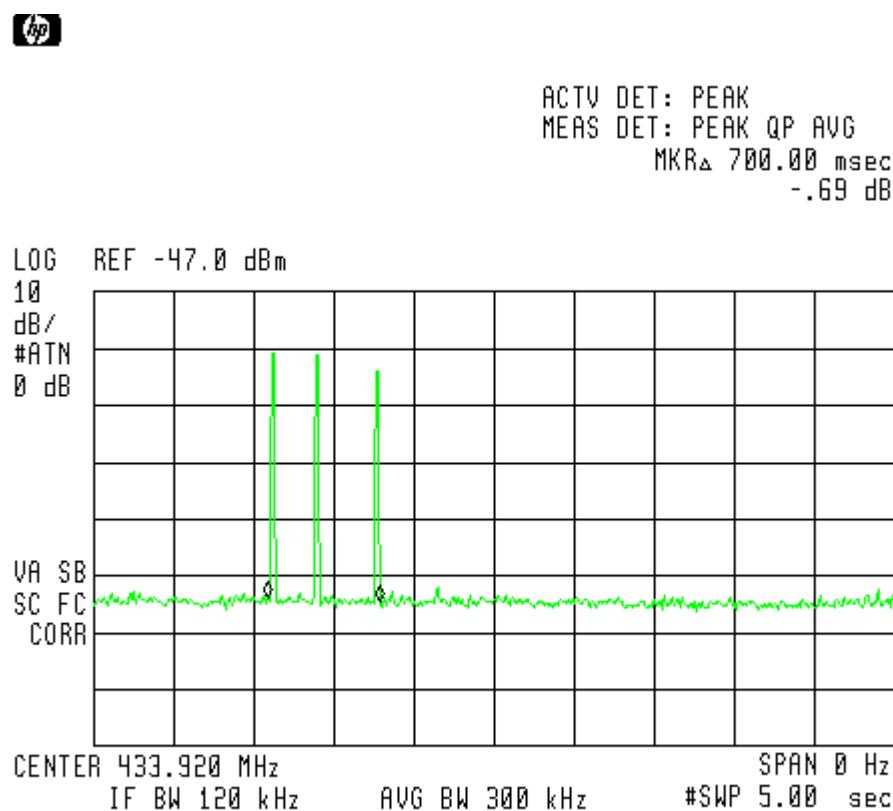
Date: 13.09.10

Typed/Printed Name: A. Sharabi

## Periodic Operation

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(a)



**Figure 11. Automatic Operated Transmitter Close Door Situation**

## Periodic Operation

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(a)

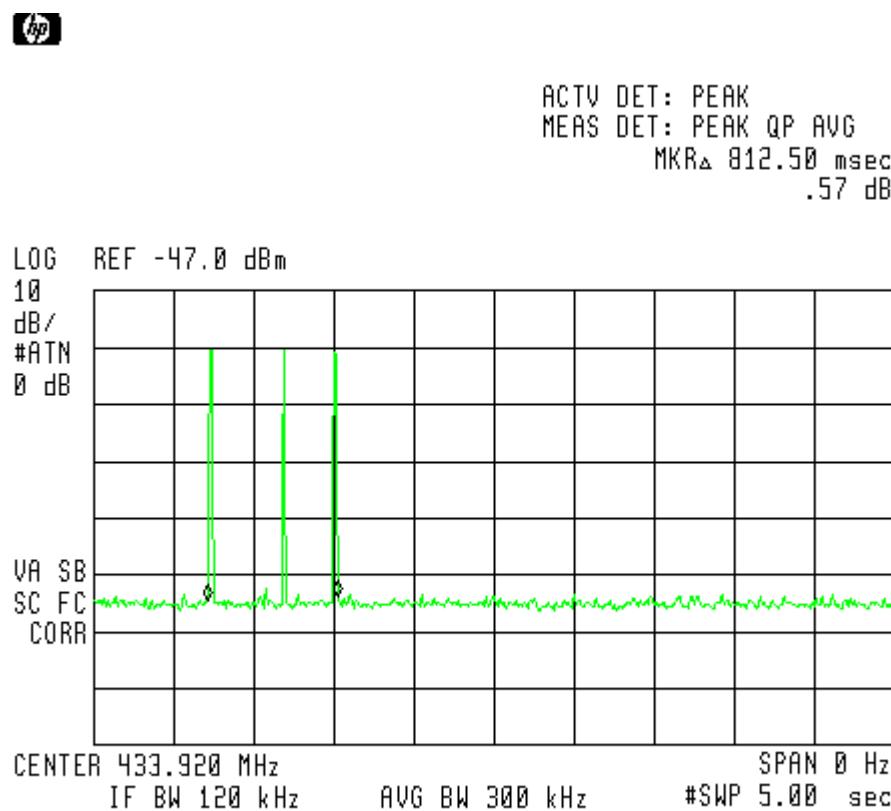
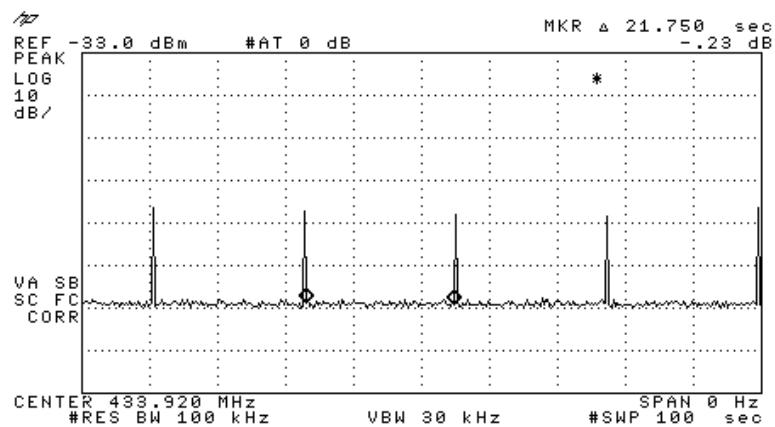


Figure 12. Automatic Operated Transmitter Open Door Situation

## Periodic Operation

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(a)

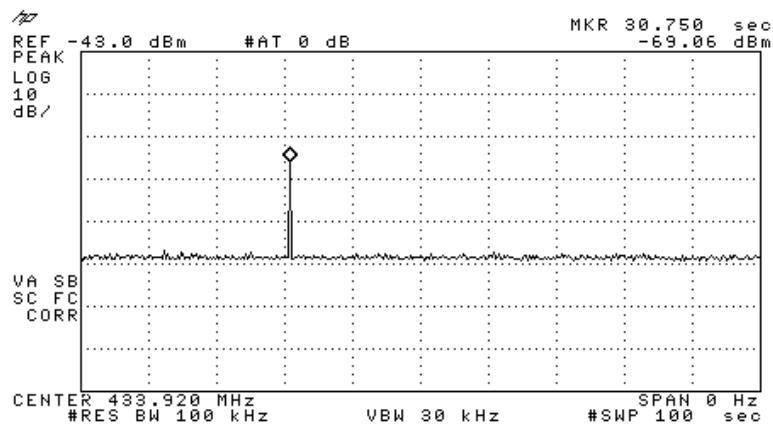


**Figure 13. Alarm Signal Transmitted While Door is Open**  
**Once every 21.75sec (6.25msec single burst)**

## Periodic Operation

E.U.T Description      Universal Transmitter  
Type                      UTX-830  
Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(a)



**Figure 14. Supervision Signal Once Every One Hour (6.25msec Single Burst)**

#### 6.4 ***Test Instrumentation Used***

| Instrument        | Manufacturer | Model  | Serial Number | Calibration       | Period |
|-------------------|--------------|--------|---------------|-------------------|--------|
| EMI Receiver      | HP           | 85422E | 3906A00276    | November 10, 2009 | 1 Year |
| RF Section        | HP           | 85420E | 3705A00248    | November 10, 2009 | 1 year |
| Spectrum Analyzer | HP           | 8592L  | 3826A01204    | March 14, 2010    | 1 Year |

## 7. Field Strength of Fundamental

### 7.1 **Test Specification**

F.C.C., Part 15, Subpart C, Section 15.231(b)

### 7.2 **Test Procedure**

The E.U.T. operation mode and test set-up are as described in Section 3.

The E.U.T. was placed on a non-conductive table, 0.8 meters above the O.A.T.S. ground plane.

The EMI receiver was set to the E.U.T. Fundamental Frequency (433.91 MHz) and Peak Detection.

The turntable and antenna mast were adjusted for maximum level reading on the EMI receiver.

The measurement was performed for vertical and horizontal polarizations of the test antenna.

The average result is:

Peak Level(dB $\mu$ V/m) + E.U.T. Duty Cycle Factor, in 100msec time window (dB)

### 7.3 **Measured Data**

JUDGEMENT: Passed by 11.68 dB

The EUT met the FCC Part 15, Subpart C, Section 15.231(b) specification requirements.

The details of the highest emissions are given in Figure 15 to Figure 17.

TEST PERSONNEL:

Tester Signature:  Date: 13.09.10

Typed/Printed Name: A. Sharabi

## Field Strength of Fundamental

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal/Vertical

Test Distance: 3 meters

Detector: Peak

| <b>Freq.</b><br>(MHz) | <b>Pol.</b><br>V/H | <b>Peak<br/>Reading</b><br>(dB $\mu$ V/m) | <b>Average<br/>Factor</b><br>(dB) | <b>Average<br/>Result</b><br>(dB $\mu$ V/m) | <b>Average<br/>Specification</b><br>(dB $\mu$ V/m) | <b>Margin</b><br>(dB) |
|-----------------------|--------------------|-------------------------------------------|-----------------------------------|---------------------------------------------|----------------------------------------------------|-----------------------|
| 433.91                | H                  | 93.23                                     | -24.08                            | 69.15                                       | 80.83                                              | -11.68                |
| 433.91                | V                  | 90.97                                     | -24.08                            | 66.89                                       | 80.83                                              | -13.94                |

**Figure 15. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL/VERTICAL.**

Notes:

1. Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
2. “Peak Reading.” (dB $\mu$ V/m) included the “Correction Factors”.
3. “Correction Factors” (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. “Average Result” (dB $\mu$ V/m) = Peak Reading (dB $\mu$ V/m) + Average Factor (dB).

## Field Strength of Fundamental

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal

Test Distance: 3 meters

Detector: Peak



ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 433.870 MHz  
 93.23 dB $\mu$ V/m

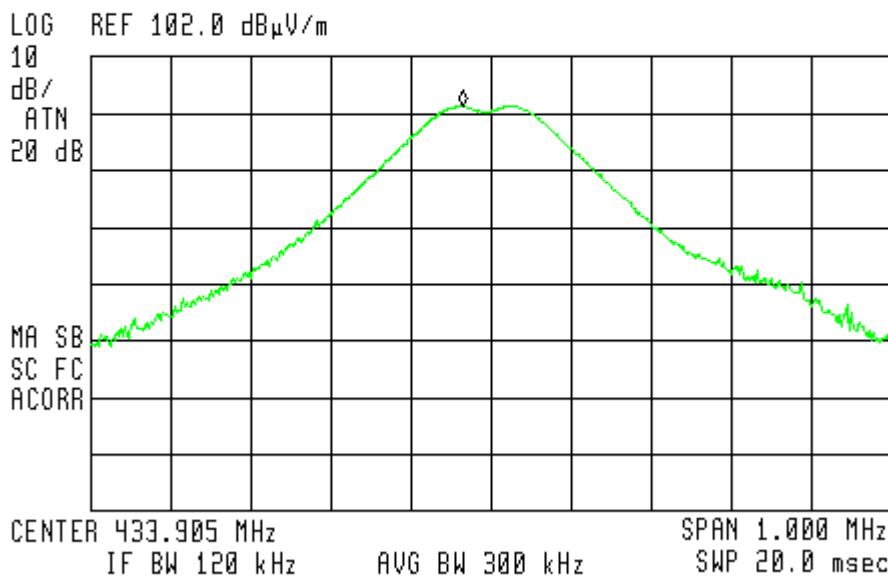


Figure 16. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL.

## Field Strength of Fundamental

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Vertical

Test Distance: 3 meters

Detector: Peak

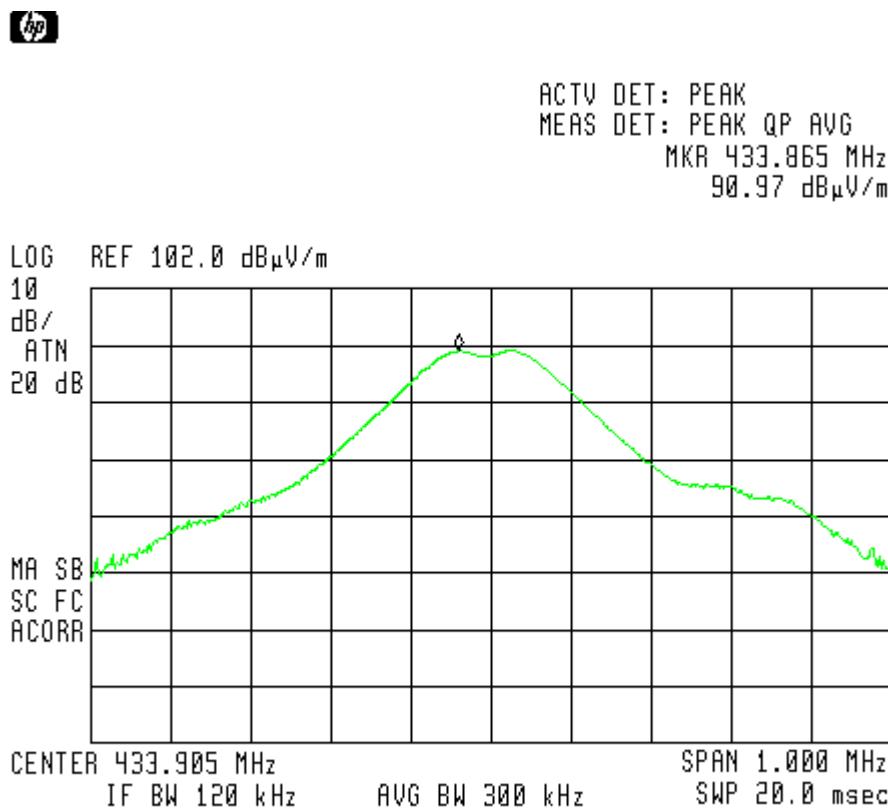


Figure 17. Field Strength of Fundamental. Antenna Polarization: VERTICAL.

#### 7.4 **Test Instrumentation Used, Field Strength of Fundamental**

| Instrument                 | Manufacturer | Model         | Serial Number | Calibration       | Period |
|----------------------------|--------------|---------------|---------------|-------------------|--------|
| EMI Receiver               | HP           | 85422E        | 3906A00276    | November 10, 2009 | 1 year |
| RF Section                 | HP           | 85420E        | 3705A00248    | November 10, 2009 | 1 year |
| Antenna<br>Log Periodic    | ARA          | LPD-2010/A    | 1038          | March 24, 2010    | 1 year |
| Antenna Mast               | ARA          | AAM-4A        | 1001          | N/A               | N/A    |
| Turntable                  | ARA          | ART-1001/4    | 1001          | N/A               | N/A    |
| Mast & Table<br>Controller | ARA          | ACU-2/5       | 1001          | N/A               | N/A    |
| Printer                    | HP           | LaserJet 2200 | JPKGC19982    | N/A               | N/A    |

## 8. Radiated Emission, 9 kHz – 30 MHz

### 8.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

### 8.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 2.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 10 meters.

The E.U.T. was operated at the frequency of kHz. This frequency was measured using a peak detector.

### 8.3 Measured Data

JUDGEMENT: Passed

The EUT was tested and it met the requirements of the FCC Part 15, Subpart C, specification.

No signals were detected in the frequency range of 9 kHz – 30 MHz.

TEST PERSONNEL:

Tester Signature:  Date: 13.09.10

Typed/Printed Name: A. Sharabi

#### **8.4 Test Instrumentation Used, Radiated Measurements**

| <b>Instrument</b>       | <b>Manufacturer</b> | <b>Model</b> | <b>Serial Number</b> | <b>Calibration</b> | <b>Period</b> |
|-------------------------|---------------------|--------------|----------------------|--------------------|---------------|
| EMI Receiver            | HP                  | 85422E       | 3906A00276           | November 10, 2009  | 1 Year        |
| RF Section              | HP                  | 85420E       | 3705A00248           | November 10, 2009  | 1 Year        |
| Active Loop Antenna     | EMCO                | 6502         | 9506-2950            | October 19, 2009   | 1 Year        |
| Antenna Mast            | ARA                 | AAM-4A       | 1001                 | N/A                | N/A           |
| Turntable               | ARA                 | ART-1001/4   | 1001                 | N/A                | N/A           |
| Mast & Table Controller | ARA                 | ACU-2/5      | 1001                 | N/A                | N/A           |

#### **8.5 Field Strength Calculation**

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS: Field Strength [dB $\mu$ v/m]  
 RA: Receiver Amplitude [dB $\mu$ v]  
 AF: Receiving Antenna Correction Factor [dB/m]  
 CF: Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

## 9. Spurious Radiated Emission, 30 -4330 MHz

### 9.1 ***Test Specification***

30 - 4330 MHz, F.C.C., Part 15, Subpart C

### 9.2 ***Test Procedure***

The E.U.T. operation mode and test set-up are as described in Section 2. See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1. The signals from the list of the highest emissions were verified and the list was updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 2.9 –4.33 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The emissions were measured at a distance of 3 meters.

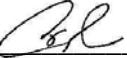
### 9.3 **Test Data**

JUDGEMENT: Passed by 16.01 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, specification.

The margin between the emission level and the specification limit was 16.01 dB in the worst case at the frequency of 1301.80 MHz, vertical polarization.

TEST PERSONNEL:

Tester Signature:  Date: 13.09.10

Typed/Printed Name: A. Sharabi

## Radiated Emission

E.U.T Description      Universal Transmitter  
 Type                      UTX-830  
 Serial Number:           Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical      Frequency range: 30 MHz to 4330 MHz  
 Antenna: 3 meters distance      Detectors: Peak

| Frequency<br>(MHz) | Peak<br>Reading<br>(dB $\mu$ V/m) | Average<br>Factor<br>(dB) | Average<br>Result<br>(dB $\mu$ V/m) | Antenna<br>Polarity<br>(H/V) | Specification<br>(dB $\mu$ V/m) | Margin<br>(dB) |
|--------------------|-----------------------------------|---------------------------|-------------------------------------|------------------------------|---------------------------------|----------------|
| 1301.80            | 62.07                             | -24.08                    | 37.99                               | V                            | 54.00                           | -16.01         |
| 1301.80            | 53.04                             | -24.08                    | 28.96                               | H                            | 54.00                           | -25.04         |
| 1737.50            | 52.72                             | -24.08                    | 28.64                               | V                            | 60.83                           | -32.19         |
| 1737.50            | 51.40                             | -24.08                    | 27.32                               | H                            | 60.83                           | -33.51         |
| 2169.40            | 62.30                             | -24.08                    | 38.22                               | V                            | 60.83                           | -22.61         |
| 2169.40            | 58.83                             | -24.08                    | 34.75                               | H                            | 60.83                           | -26.08         |

**Figure 18. Radiated Emission. Antenna Polarization: VERTICAL.**

Notes:

1. Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
2. “Peak Reading.” (dB $\mu$ V/m) included the “Correction Factors”.
3. “Correction Factors” (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. “Average Result” (dB $\mu$ V/m) = Peak Reading (dB $\mu$ V/m) + Average Factor (dB).

#### 9.4 **Test Instrumentation Used, Radiated Measurements**

| Instrument              | Manufacturer  | Model            | Serial Number | Calibration       | Period |
|-------------------------|---------------|------------------|---------------|-------------------|--------|
| EMI Receiver            | HP            | 85422E           | 3906A00276    | November 10, 2009 | 1 year |
| RF Section              | HP            | 85420E           | 3705A00248    | November 10, 2009 | 1 year |
| Low Noise Amplifier     | DBS MICROWAVE | LNA-DBS-0411N313 | 013           | January 13, 2010  | 1 Year |
| Spectrum Analyzer       | HP            | 8592L            | 3826A01204    | March 14, 2010    | 1 Year |
| Antenna Bioconical      | ARA           | BCD 235/B        | 1041          | August 1, 2010    | 1 year |
| Antenna Log Periodic    | ARA           | LPD-2010/A       | 1038          | March 24, 2010    | 1 year |
| Antenna-Log Periodic    | A.H.System    | SAS-200/511      | 253           | January 29, 2009  | 2 year |
| Antenna Mast            | ARA           | AAM-4A           | 1001          | N/A               | N/A    |
| Turntable               | ARA           | ART-1001/4       | 1001          | N/A               | N/A    |
| Mast & Table Controller | ARA           | ACU-2/5          | 1001          | N/A               | N/A    |
| Printer                 | HP            | LaserJet 2200    | JPKGC19982    | N/A               | N/A    |

## 10. Bandwidth

### 10.1 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 120 kHz resolution BW and center frequency of the transmitter fundamental. The spectrum bandwidth of the transmitter unit was measured and recorded. The BW was measured at 20Bc points.

The EUT was set up as shown in Figure 1, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on the modulation envelope.

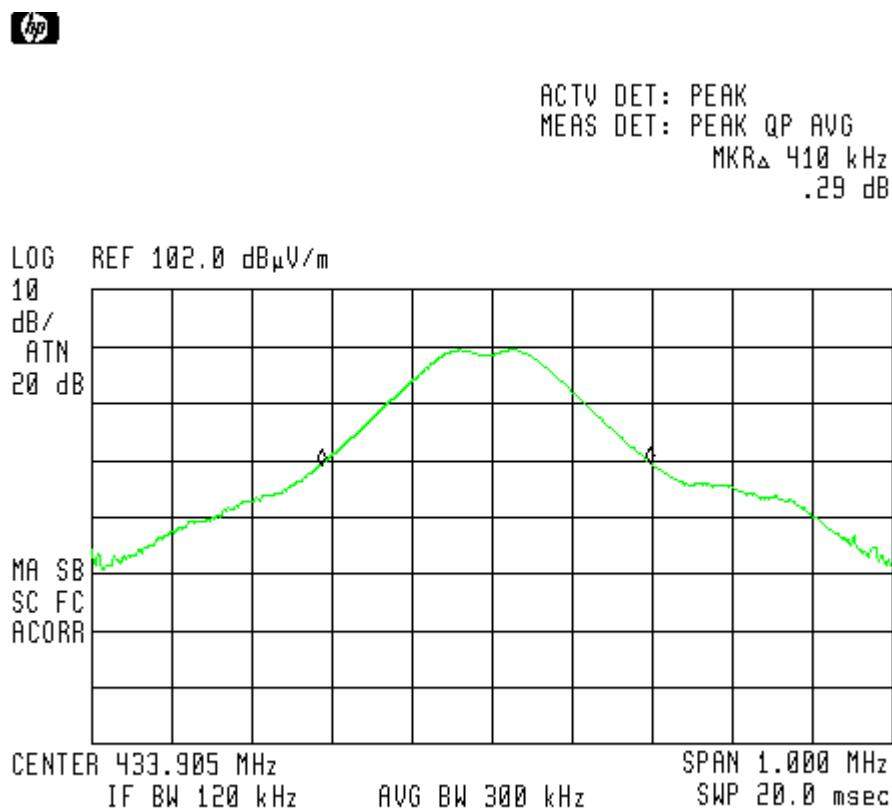


Figure 19

## 10.2 Results table

E.U.T Description: Universal Transmitter

Model: UTX-830

Serial Number: Not Designated

Specification: F.C.C. Part 15, Subpart C: (15.231(c))

| Bandwidth<br>Reading | Specification<br>(kHz) | Margin<br>(kHz) |
|----------------------|------------------------|-----------------|
| 410                  | 1084.76                | -674.76         |

**Figure 20 Bandwidth**

JUDGEMENT:

Passed by 674.76 kHz

TEST PERSONNEL:

Tester Signature: 

Date: 13.09.10

Typed/Printed Name: A. Sharabi

(1) 0.25% of the E.U.T. fundamental frequency, Section 15.231(c).

### 10.3 Test Equipment Used.

#### Bandwidth

| Instrument                 | Manufacturer | Model         | Serial Number | Calibration       | Period |
|----------------------------|--------------|---------------|---------------|-------------------|--------|
| EMI Receiver               | HP           | 85422E        | 3906A00276    | November 10, 2009 | 1 year |
| RF Section                 | HP           | 85420E        | 3705A00248    | November 10, 2009 | 1 year |
| Antenna<br>Log Periodic    | ARA          | LPD-2010/A    | 1038          | March 24, 2010    | 1 year |
| Antenna Mast               | ARA          | AAM-4A        | 1001          | N/A               | N/A    |
| Turntable                  | ARA          | ART-1001/4    | 1001          | N/A               | N/A    |
| Mast & Table<br>Controller | ARA          | ACU-2/5       | 1001          | N/A               | N/A    |
| Printer                    | HP           | LaserJet 2200 | JPKGC19982    | N/A               | N/A    |

**Figure 21 Test Equipment Used**

## 11. APPENDIX A - CORRECTION FACTORS

### 11.1 Correction factors for

### CABLE

from EMI receiver  
to test antenna  
at 3 meter range.

| FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(MHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|--------------------|------------------------------|
| 10.0               | 0.3                          | 1200.0             | 7.3                          |
| 20.0               | 0.6                          | 1400.0             | 7.8                          |
| 30.0               | 0.8                          | 1600.0             | 8.4                          |
| 40.0               | 0.9                          | 1800.0             | 9.1                          |
| 50.0               | 1.1                          | 2000.0             | 9.9                          |
| 60.0               | 1.2                          | 2300.0             | 11.2                         |
| 70.0               | 1.3                          | 2600.0             | 12.2                         |
| 80.0               | 1.4                          | 2900.0             | 13.0                         |
| 90.0               | 1.6                          |                    |                              |
| 100.0              | 1.7                          |                    |                              |
| 150.0              | 2.0                          |                    |                              |
| 200.0              | 2.3                          |                    |                              |
| 250.0              | 2.7                          |                    |                              |
| 300.0              | 3.1                          |                    |                              |
| 350.0              | 3.4                          |                    |                              |
| 400.0              | 3.7                          |                    |                              |
| 450.0              | 4.0                          |                    |                              |
| 500.0              | 4.3                          |                    |                              |
| 600.0              | 4.7                          |                    |                              |
| 700.0              | 5.3                          |                    |                              |
| 800.0              | 5.9                          |                    |                              |
| 900.0              | 6.3                          |                    |                              |
| 1000.0             | 6.7                          |                    |                              |

#### NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

## 11.2 Correction factors for

## CABLE

from EMI receiver  
to test antenna  
at 3 meter range.

| FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|
| 1.0                | 1.2                          |
| 2.0                | 1.6                          |
| 3.0                | 2.0                          |
| 4.0                | 2.4                          |
| 5.0                | 3.0                          |
| 6.0                | 3.4                          |
| 7.0                | 3.8                          |
| 8.0                | 4.2                          |
| 9.0                | 4.6                          |
| 10.0               | 5.0                          |
| 12.0               | 5.8                          |

### NOTES:

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.

### 11.3 Correction factors for

### CABLE from spectrum analyzer to test antenna above 2.9 GHz

| FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(dB) | FREQUENCY<br>(GHz) | CORRECTION<br>FACTOR<br>(dB) |
|--------------------|------------------------------|--------------------|------------------------------|
| 1.0                | 1.9                          | 14.0               | 9.1                          |
| 2.0                | 2.7                          | 15.0               | 9.5                          |
| 3.0                | 3.5                          | 16.0               | 9.9                          |
| 4.0                | 4.2                          | 17.0               | 10.2                         |
| 5.0                | 4.9                          | 18.0               | 10.4                         |
| 6.0                | 5.5                          | 19.0               | 10.7                         |
| 7.0                | 6.0                          | 20.0               | 10.9                         |
| 8.0                | 6.5                          | 21.0               | 11.2                         |
| 9.0                | 7.0                          | 22.0               | 11.6                         |
| 10.0               | 7.5                          | 23.0               | 11.9                         |
| 11.0               | 7.9                          | 24.0               | 12.3                         |
| 12.0               | 8.3                          | 25.0               | 12.6                         |
| 13.0               | 8.7                          | 26.0               | 13.0                         |

#### NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.
2. The cable is used for measurements above 2.9 GHz.
3. The overall length of the cable is 10 meters.

## 11.4 Correction factors for LOG PERIODIC ANTENNA

Type LPD 2010/A  
at 3 and 10 meter ranges.

### Distance of 3 meters

| FREQUENCY<br>(MHz) | AFE<br>(dB/m) |
|--------------------|---------------|
| 200.0              | 9.1           |
| 250.0              | 10.2          |
| 300.0              | 12.5          |
| 400.0              | 15.4          |
| 500.0              | 16.1          |
| 600.0              | 19.2          |
| 700.0              | 19.4          |
| 800.0              | 19.9          |
| 900.0              | 21.2          |
| 1000.0             | 23.5          |

### Distance of 10 meters

| FREQUENCY<br>(MHz) | AFE<br>(dB/m) |
|--------------------|---------------|
| 200.0              | 9.0           |
| 250.0              | 10.1          |
| 300.0              | 11.8          |
| 400.0              | 15.3          |
| 500.0              | 15.6          |
| 600.0              | 18.7          |
| 700.0              | 19.1          |
| 800.0              | 20.2          |
| 900.0              | 21.1          |
| 1000.0             | 23.2          |

#### NOTES:

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".

## 11.5 Correction factors for

## LOG PERIODIC ANTENNA

Type SAS-200/511  
at 3 meter range.

| FREQUENCY<br>(GHz) | ANTENNA<br>FACTOR<br>(dB) |
|--------------------|---------------------------|
| 1.0                | 24.9                      |
| 1.5                | 27.8                      |
| 2.0                | 29.9                      |
| 2.5                | 31.2                      |
| 3.0                | 32.8                      |
| 3.5                | 33.6                      |
| 4.0                | 34.3                      |
| 4.5                | 35.2                      |
| 5.0                | 36.2                      |
| 5.5                | 36.7                      |
| 6.0                | 37.2                      |
| 6.5                | 38.1                      |

| FREQUENCY<br>(GHz) | ANTENNA<br>FACTOR<br>(dB) |
|--------------------|---------------------------|
| 7.0                | 38.6                      |
| 7.5                | 39.2                      |
| 8.0                | 39.9                      |
| 8.5                | 40.4                      |
| 9.0                | 40.8                      |
| 9.5                | 41.1                      |
| 10.0               | 41.7                      |
| 10.5               | 42.4                      |
| 11.0               | 42.5                      |
| 11.5               | 43.1                      |
| 12.0               | 43.4                      |
| 12.5               | 44.4                      |
| 13.0               | 44.6                      |

### NOTES:

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".

**11.6 Correction factors for**

**BICONICAL ANTENNA**

**Type BCD-235/B,  
at 3 meter range**

| FREQUENCY<br>(MHz) | AFE<br>(dB/m) |
|--------------------|---------------|
| 20.0               | 19.4          |
| 30.0               | 14.8          |
| 40.0               | 11.9          |
| 50.0               | 10.2          |
| 60.0               | 9.1           |
| 70.0               | 8.5           |
| 80.0               | 8.9           |
| 90.0               | 9.6           |
| 100.0              | 10.3          |
| 110.0              | 11.0          |
| 120.0              | 11.5          |
| 130.0              | 11.7          |
| 140.0              | 12.1          |
| 150.0              | 12.6          |
| 160.0              | 12.8          |
| 170.0              | 13.0          |
| 180.0              | 13.5          |
| 190.0              | 14.0          |
| 200.0              | 14.8          |
| 210.0              | 15.3          |
| 220.0              | 15.8          |
| 230.0              | 16.2          |
| 240.0              | 16.6          |
| 250.0              | 17.6          |
| 260.0              | 18.2          |
| 270.0              | 18.4          |
| 280.0              | 18.7          |
| 290.0              | 19.2          |
| 300.0              | 19.9          |
| 310                | 20.7          |
| 320                | 21.9          |
| 330                | 23.4          |
| 340                | 25.1          |
| 350                | 27.0          |

**NOTES:**

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

**11.7 Correction factors for ACTIVE LOOP ANTENNA**

**Model 6502  
S/N 9506-2950**

| FREQUENCY<br>(MHz) | Magnetic<br>Antenna<br>Factor<br>(dB) | Electric<br>Antenna<br>Factor<br>(dB) |
|--------------------|---------------------------------------|---------------------------------------|
| .009               | -35.1                                 | 16.4                                  |
| .010               | -35.7                                 | 15.8                                  |
| .020               | -38.5                                 | 13.0                                  |
| .050               | -39.6                                 | 11.9                                  |
| .075               | -39.8                                 | 11.8                                  |
| .100               | -40.0                                 | 11.6                                  |
| .150               | -40.0                                 | 11.5                                  |
| .250               | -40.0                                 | 11.6                                  |
| .500               | -40.0                                 | 11.5                                  |
| .750               | -40.1                                 | 11.5                                  |
| 1.000              | -39.9                                 | 11.7                                  |
| 2.000              | -39.5                                 | 12.0                                  |
| 3.000              | -39.4                                 | 12.1                                  |
| 4.000              | -39.7                                 | 11.9                                  |
| 5.000              | -39.7                                 | 11.8                                  |
| 10.000             | 40.2                                  | 11.3                                  |
| 15.000             | -40.7                                 | 10.8                                  |
| 20.000             | -40.5                                 | 11.0                                  |
| 25.000             | -41.3                                 | 10.2                                  |
| 30.000             | 42.3                                  | 9.2                                   |