LS Research, LLC
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ENGINEERING TEST REPORT # 308305 TX v5
LSR Job #: C-383

Compliance Testing of:
Christmas Tree Safety System, Angel Transmitter
Model # 8001

Test Date(s):
July 7, - August 29, 2008

Prepared For:
Ulta-Lit Tree Company
Attn Howard Frank
1989 Johns Drive
Glenview, IL 60025

In accordance with:
Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.231(a)(3) and (b)
Operating in the
Frequency Band 260 MHz - 470 MHz

This Test Report is issued under the Authority of:
Brian E. Petted, VP of Engineering

Signature:  Date: August 29, 2008

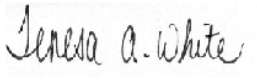
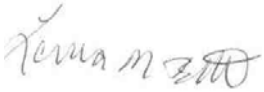
Test Report Reviewed by:	**Tested by:**
Teresa A. White, Quality Manager	Laura Bott, EMC Engineer
Signature: 	Signature: 
Date: Aug. 29, 2008	Date: Aug. 29, 2008

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EXHIBIT 1. INTRODUCTION

1.1 SCOPE

References:	FCC Part 15, Subpart C, Section 15.231(a)(3) and (b)
Title:	Telecommunication – Code of Federal Regulations, CFR 47, Part 15
Purpose of Test:	To gain FCC Certification Authorization for Transmitters operating in the Frequency Band of 260 MHz – 470 MHz
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Environmental Classification:	• Commercial, Industrial or Business • Residential

1.2 NORMATIVE REFERENCES

Publication	Year	Title
47 CFR, Parts 0-15 (FCC)	2007	Code of Federal Regulations - Telecommunications
RSS-Gen RSS-210, Issue 7	2007	Requirements for License-exempt Radio Communication Devices
ANSI C63.4	2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
CISPR 22 EN 55022	2005 A1: 2006 2004, 10-14 2003	Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement
CISPR 16-1-1	2006 A2: 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus.
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 201: Conducted disturbance measurement.
FCC Public Notice DA 00-1407	2000	Part 15 Unlicensed Modular Transmitter Approval

1.3 LS Research, LLC TEST FACILITY

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025, 2005 "General Requirements for the Competence of Calibration and Testing Laboratories".

LS Research, LLC's scope of accreditation includes all test methods listed herein, unless otherwise noted. A copy of the accreditation may be accessed on our web site: www.lsr.com. Accreditation status can be verified at A2LA's web site: www.a2la2.net.

1.4 LOCATION OF TESTING

All testing was performed at LS Research, LLC, W66 N220 Commerce Court, Cedarburg, Wisconsin, 53012 USA, utilizing the facilities listed below, unless otherwise noted.

List of Facilities Located at LS Research, LLC:

- Compact Chamber
- Semi-Anechoic Chamber
- Open Area Test Site (OATS)

1.5 TEST EQUIPMENT UTILIZED

A complete list of equipment utilized in testing is provided in Appendix A of this test report. Calibration dates are indicated in Appendix A. All test equipment is calibrated in accordance with A2LA standards.

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1 CLIENT INFORMATION

Manufacturer Name:	**Ulta-Lit Tree Company**
Address:	**1989 Johns Drive** **Glenview, IL 60025**
Contact Person:	**Howard Frank** **847.729.4004 x 105** **howardf@lightkeeperpro.com**

2.2 EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information has been supplied by the applicant.

Product Name:	Christmas Tree Safety System , Angel Transmitter
Model Number:	8001
Serial Number:	54

2.3 ASSOCIATED ANTENNA DESCRIPTION

On board loop antenna with -20 dBi gain.

2.4 EUT'S TECHNICAL SPECIFICATIONS

Additional Information:

Frequency Range (in MHz)	433.92 MHz
RF Power in Watts	N/A
Field Strength (and at what distance)	70.87 dBµV/m at 3 meters
Occupied Bandwidth (99% BW) in kHz	250 kHz
Type of Modulation	FSK
Emission Designator	150KF1D
Transmitter Spurious (worst case)	64.11 dBµV/m at 3 meters (1735 MHz)
Frequency Tolerance %, Hz, ppm	N/A
Microprocessor Model # (if applicable)	M430f2131
EUT will be operated under FCC Rule Part(s)	15.231
Antenna Information	
Detachable/non-detachable	Non-detachable
Type	Loop
Gain (in dBi)	N/A
Portable/Mobile	☐ Portable ☒ Mobile
Modular Filing	☐ Yes ☒ No

*Note: Due to the fundamental frequency of operation, conducted measurements were not required in FCC 15.231, rendering all related measurements not applicable.

RF Technical Information:

Type of Evaluation (check one)		SAR Evaluation: Device Used in the Vicinity of the Human Head
		SAR Evaluation: Body-worn Device
	X	RF Evaluation

If RF Evaluation checked above, test engineer to complete the following:

- Evaluated against exposure limits: ☒ General Public Use ☐ Controlled Use
- Duty Cycle used in evaluation: 100%
- Standard used for evaluation : OET 65
- Measurement Distance: 3 m
- RF Value: 0.013335 ☒ V/m ☐ A/m ☐ W/m^2
  ☐ Measured ☐ Computed ☐ Calculated

2.5 PRODUCT DESCRIPTION

The Christmas Tree Safety System is comprised of a sensor subsystem – transmitter unit, hereafter called the "Angel" and a base station receiver – alarm unit, hereafter called the "Alarm". The Angel is powered by two AAA batteries and is comprised of a water level sensor and a thermal sensor. The water level sensor requires a wired probe which attaches to the Angel with a 2.5mm phono plug (Angel has the jack) . The water sensor probe is a plastic wand which has two metal rods separated from one another with each rod connected to one of two wires. In a non-conducting medium, the circuit resistance between the two metal rods is sufficiently high that the circuit threshold is not breached. When the wand is semi-immersed in a conducting liquid (H2O with ions in aqueous solution), the circuit resistance changes and a voltage comparator circuit in the Angel notes the difference. It should be noted that the maximum voltage applied to the wands probes is 3 volts through a series impedance of 243K Ohms to one rod. The opposite rod has a 243 K Ohm impedance to the Angel battery return node. The water sensor threshold is chosen to alarm on a high impedance condition matching the phenomena of no water. The temperature sensor circuit is comprised of an on-board thermistor. The electronics are adjusted in concert with threshold levels in software such that a nominal 150 degrees Fahrenheit is an alarm threshold. That is, if the ambient air temperature at the Angel rises to or above 150 deg F, then an alarm threshold is exceeded. The status of the Angel is communicated to the Alarm by means of a 433.92 MHz single chip FSK transmitter. This transmitter is a single channel transmitter whose operating frequency is a integral multiple of a crystal reference oscillator. The integer is 32. Thus, a nominal 13.56 MHz crystal allows the Angel to operate at a nominal 433.92 MHz. FSK deviation of the transmitted data is set by switching padding capacitance on the crystal by means of an internal switch transistor in the transmitter IC. Thus, on–board capacitors set the nominal mark and space tone frequencies and are set in the design process. The transmitter has an on-board printed loop antenna. Nominal expected gains of this antenna are in the rough value of – 20 dBi. Actual peak field levels are controlled by setting the matching components to the antenna. Once set, these values are never varied. The Angel has an on-board microcontroller that monitors the sensors and controls the operation of the transmitter. This CPU has its own 32.768 KHz reference oscillator. The Angel as a subsystem operates in a wake – sleep cycle so as to conserve battery power.

The system operates on a nominal center frequency of 433.92 MHz with a nominal 45 KHz peak deviation. The Modulation is FSK, Manchester encoded at 1.637 Kbps. Both transmit frequencies and modulation data rates are controlled by crystal referenced oscillators. The transmit frequencies are set by a PLL referenced to a 13.56 MHz crystal. FSK deviation is controlled by 'pulling' the reference crystal. The data rate is a divided sub-multiple of the 32,768 Hz reference crystal on the CPU

In normal operation, once every 5 minutes a status message is transmitted. This message contains the measurements of all the sensors. This low duty cycle assures that the on-air time cannot exceed 2 seconds in any one hour.

The water sensor wand is connected to the angel board through a 2.5 mm thick plug and jack.

The transmit antenna is a printed loop with on-board impedance matching components direct connected to the transmitter IC. No user adjustments are possible.

PHOTO

EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 CLIMATE TEST CONDITIONS

Condition	Normal Conditions
Temperature:	20 – 25 °C
Relative Humidity:	30 – 60%
Atmospheric Pressure:	86 kPa – 106 kPa

3.2 APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Paragraph	Test Requirements	Compliance (yes/no)
15.207	Power Line Conducted Emissions Measurements	n/a
15.231(a)	Periodic operation of low-power transmitters	Yes
15.231(b), 15.209 & 15.205	Transmitter Radiated Emissions	Yes
15.231(c)	Occupied Operational Bandwidth	Yes
15.231(d)	Stability with temperature and voltage variations	n/a
15.231(e) 15.209 & 15.205	Transmitter Radiated Emissions	Yes
1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	Yes
The digital circuit portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class B Digital Devices and the associated Radio Receiver has also been tested and found to comply with Part 15, Subpart B – Radio Receivers. The Receiver Test Report is available upon request.		

3.3 MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

☒ None ☐ Yes (explain below)

3.4 DEVIATIONS & EXCLUSIONS FROM TEST SPECIFICATIONS

☒ None ☐ Yes (explain below)

EXHIBIT 4. DECLARATION OF CONFORMITY

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.231, and Industry Canada RSS-210, Issue 7, 2007 (Annex 1.1).

If some emissions are seen to be within 3 dB of their respective limits:
As these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

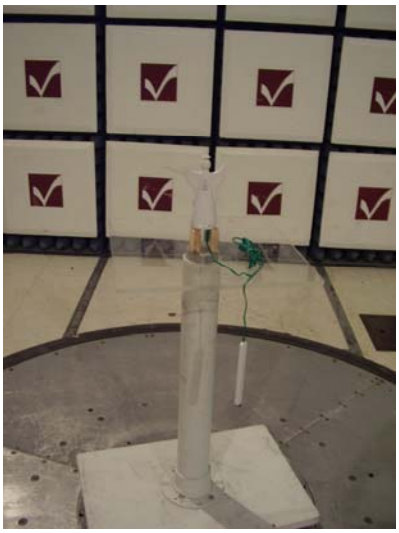
LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

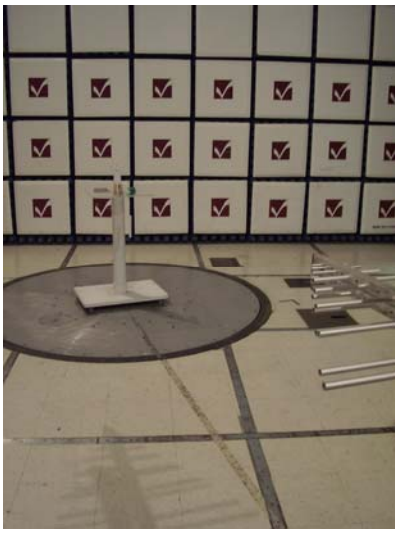
EXHIBIT 5. RADIATED EMISSIONS TEST

5.1 Test Setup

The EUT was placed on an 80cm high, non-conductive pedestal, which was centered on a flush-mounted 2m diameter metal turntable. The EUT was configured to run in a continuous CW transmit mode during the 15.231(a) and 15.231(b) measurements. A Peak Detector was used on the receiver for the reported measurements. The EUT was then returned to normal operation for measurements of the data packet length and occupied bandwidth.

5.2 Test Setup Photo(s)





5.3 Test Procedure

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to FCC Title 47 CFR Part 15.231(b) limits for periodic transmitting devices under the provision of 15.231 (a)(3).

The EUT was tested from the lowest frequency generated by the transmitter (without going below 9 kHz) to the 10th harmonic of the fundamental frequency generated by the device. The appropriate limits were also observed when the fundamental or spurious signals were located within any of the restricted bands as described in FCC Part 15.205(a).

When a reading is taken using the Peak Detector, a duty cycle correction factor may be applied for conversion to an average reading. This operation can be used when measuring short-duration bursts of data transmission, under FCC Part 15.231. Please refer to later sections in this report for a formal justification of the requested relaxation factor.

The resultant average reading can then be compared to the appropriate limit in order to determine compliance with the limits. The HP 8546A EMI Receiver was operated with a resolution bandwidth of 120 kHz for measurements below 1 GHz (video bandwidth of 300 kHz), and a bandwidth of 1 MHz for measurements above 1 GHz (video bandwidth of 1 MHz).

The battery was checked and replaced as necessary during the course of the investigations.

5.4 Test Equipment Utilized

A list of the test equipment and antennas utilized for the Radiated Emissions test can be found in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All calibrations of the antennas used were performed at an N.I.S.T. traceable site. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and a HP 8546A EMI Receiver. The resulting correction factors and the cable loss factors from these calibrations were entered into the HP 8546A EMI Receiver database. As a result, the data taken from the HP 8546A EMI Receiver accounts for the antenna correction factor as well as cable loss or other corrections, and can therefore be entered into the database as a corrected meter reading. The HP 8546A EMI Receiver was operated with a resolution bandwidth of 120 kHz for measurements below 1 GHz (video bandwidth of 300 kHz), and a bandwidth of 1 MHz for measurements above 1 GHz (video bandwidth of 1 MHz.

Test Equipment	Manufacturer	Model No.	Serial No.
EMI Receiver	HP	8546A	3617A00320
EMI Receiver Pre-Select.	HP	85460A	3448A00296
Spectrum Analyzer	Agilent	E4446A	US45300564
Log Periodic Antenna	EMCO	93146	9701-4855
Horn Antenna	EMCO	3115	6907
Bicon Antenna	EMCO	93110B	9702-2918
Pre-Amp	Adv. Microwave	WLA612	1145A04094
Horn Antenna – Std. Gain	EMCO	3160-09	9809-1120

5.5 Test Results

The EUT was found to meet the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.231(b) for a momentary low power transmitter [Canada RSS-210, Issue 7 (2007), Annex 1]. The frequencies with significant RF signal strength were recorded and plotted as shown in the Data Charts and Graphs.

5.6 CALCULATION OF RADIATED EMISSIONS LIMITS

FIELD STRENGTH OF FUNDAMENTAL FREQUENCIES:
The calculation involves a linear interpolation of 3750 to 12500 µV/m over 260-470 MHz, where field strength of the fundamental frequency (f_0) when $260 \leq f_0 \leq 470$ MHz, can be found by: $16.6667*(f_0)-2833.3333$, where f_0 is in MHz.

FIELD STRENGTH OF SPURIOUS/HARMONIC FREQUENCIES:
The spurious and harmonic emissions are subject to the limits expressed in FCC Parts 15.205 and 15.209, if within the restricted bands and dictated by the following calculation elsewhere.

The calculation involves a linear interpolation of 375 to 1250 µV/m over 260 to 470 MHz, where field strength of the harmonic frequencies (2 f_0, 3 f_0…) when $260 \leq f_0 \leq 470$ MHz, can be found by: $1.6667*(f_0)-283.3333$, where f_0 is in MHz.

At fundamental frequency f_0 = 433.92 MHz
Fundamental Limit: $41.6667*(f_0)-7083.3333$ = µV/m @ 3m
Harmonic Limit: $4.16667*(f_0)-708.3333$ = µV/m @ 3m
Above 470 MHz, the limit on the spurious and harmonic emissions is 438.34 µV/m @ 3m.

Frequency (MHz)	*Fundamental Limit (µV/m @ 3m)*	*Fundamental Limit (dBµV/m @ 3m)*	*Harmonic Limit (µV/m @3m)*	*Harmonic Limit (dBµV/m @ 3m)*
433.92	***10991.68***	***80.82***	***1099.17***	***60.82***

Spurious RF emissions limits as described in 47CFR 15.209 and 15.205

Frequency (MHz)	3 m Limit µV/m	3 m Limit (dBµV/m)	1 m Limit (dBµV/m)
30-88	100	40.0	-
88-216	150	43.5	-
216-960	200	46.0	-
960-24,000	500	54.0	63.5

Sample conversion from field strength µV/m to dBµV/m:
$dB\mu V/m = 20 \log_{10} (100)$
= 40 dBµV/m (from 30-88 MHz)

For measurements made at 1.0 meter, a 9.5 dB correction has been invoked.

960 MHz to 10,000 MHz
500µV/m or 54.0 dB/µV/m at 3 meters
54.0 + 9.5 = 63.5 dB/µV/m at 1 meter

5.7 RADIATED EMISSIONS DATA CHART

3 Meter Measurements of Electromagnetic Radiated Emissions
Test Standard: 47CFR, Part 15.231(b)
Frequency Range Inspected: 30 MHz to 5000 MHz

Manufacturer:	Ulta-Lit Tree Company					
Date(s) of Test:	July 7, 8, 23, 2008					
Test Engineer(s):	Laura Bott					
Voltage:	3.0 VDC					
Operation Mode:	Normal, continuous transmit, modulated mode					
Environmental Conditions in the Lab:	Temperature: 20 – 25° C Relative Humidity: 30 – 60 %					
EUT Power:		Single Phase ___VAC		3 Phase ___VAC		
	x	Battery		Other:		
EUT Placement:	x	80cm non-conductive table		10cm Spacers		
EUT Test Location:	x	3 Meter Semi-Anechoic FCC Listed Chamber		3/10m OATS		
Measurements:		Pre-Compliance		Preliminary	x	Final
Detectors Used:	x	Peak		Quasi-Peak		Average

The table depicts the level of significant radiated emissions found:

***Fundamental Measurements**:*

Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak with Relaxation (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Antenna Polarity
1.00	348	77.1	65.47	80.82	15.35	Horizontal
1.23	84	84.0	72.37	80.82	8.45	Vertical

Radiated Harmonic Measurements:

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading with Relaxation	Limit (dBµV/m)	Margin (dB)	Antenna Polarity
867.6	1.51	333	53.20	41.57	60.82	19.25	Horizontal
1301.4	1.07	227	59.80	48.17	54.00	5.83	Horizontal
1735.2	1.23	201	64.11	52.48	60.82	8.34	Horizontal
2169	1.17	149	61.20	49.57	60.82	11.25	Horizontal
2602.8	1.12	0	45.80	34.17	60.82	26.65	Horizontal
3036.6	1.84	190	52.50	40.87	60.82	19.95	Horizontal
3470.4	1.18	153	51.00	39.37	60.82	21.45	Horizontal
3904.2	2.11	226	52.50	40.87	54.00	13.13	Horizontal
4338	1.60	229	53.40	41.77	54.00	12.23	Horizontal

Radiated Emissions Data Cont.

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading with Relaxation	Limit (dBµV/m)	Margin (dB)	Antenna Polarity
867.6	1.21	268	57.20	45.57	60.82	15.25	Vertical
1301.4	1.62	153	57.42	45.79	54.00	8.21	Vertical
1735.2	1.00	240	61.41	49.78	60.82	11.04	Vertical
2169	1.34	254	56.20	44.57	60.82	16.25	Vertical
2602.8	1.00	112	47.00	35.37	60.82	25.45	Vertical
3036.6	1.04	272	52.70	41.07	60.82	19.75	Vertical
3470.4	1.00	308	51.30	39.67	60.82	21.15	Vertical
3904.2	1.00	0	47.80	36.17	54.00	17.83	Vertical
4338	1.00	71	50.30	38.67	54.00	15.33	Vertical

Notes:

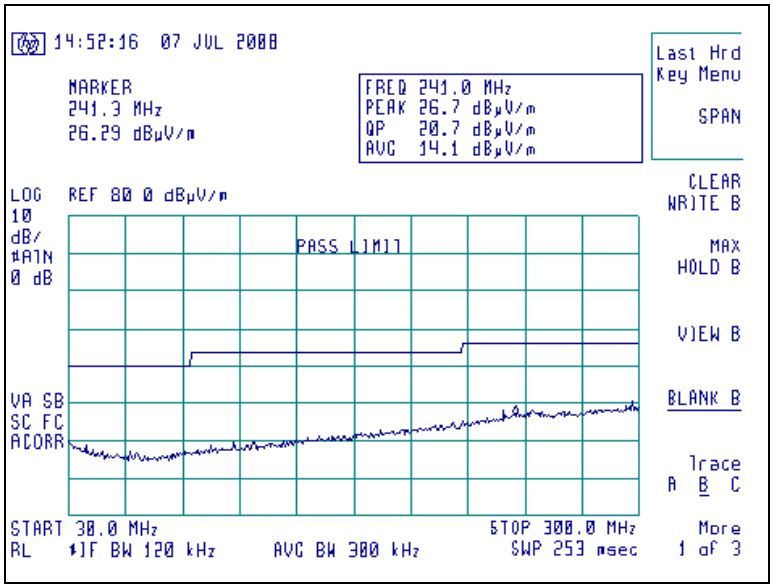
1) A Peak Detector was used in measurements of the fundamental and harmonics below 1 GHz, and a Peak as well as an Average Detector was used in measurements above 1 GHz.

2) A relaxation of the Peak EFI measurements by 11.63 dB is requested based on the average duty factor of the transmitter on-air-time. Justification for this request appears in the appendix section of this report, and is supported by measurements as documented in the body of this report..

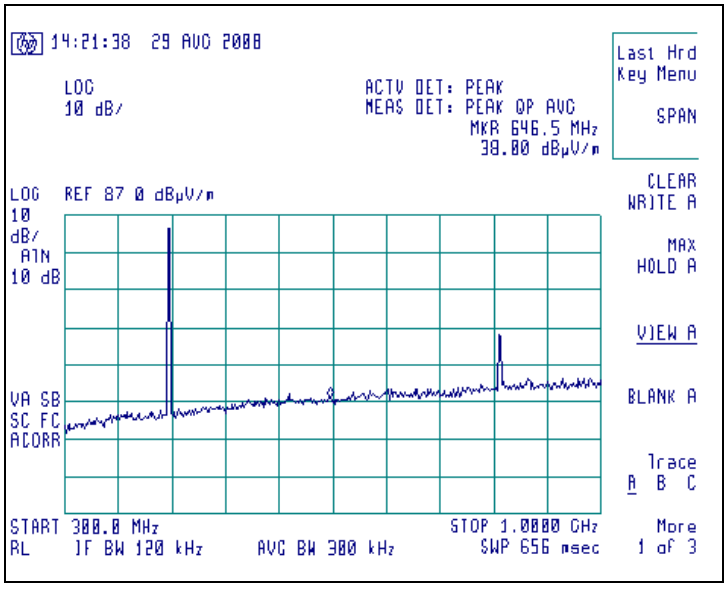
5.8 Screen Captures - Radiated Emissions Testing

The signature scans shown here are from worst-case emissions, as measured with the sense antennas both in vertical and horizontal polarity for worst case presentations.

30-300 MHz, Horizontal Polarity



300-1000 MHz, Vertical Polarity



1000- 5000 MHz Horizontal Polarity

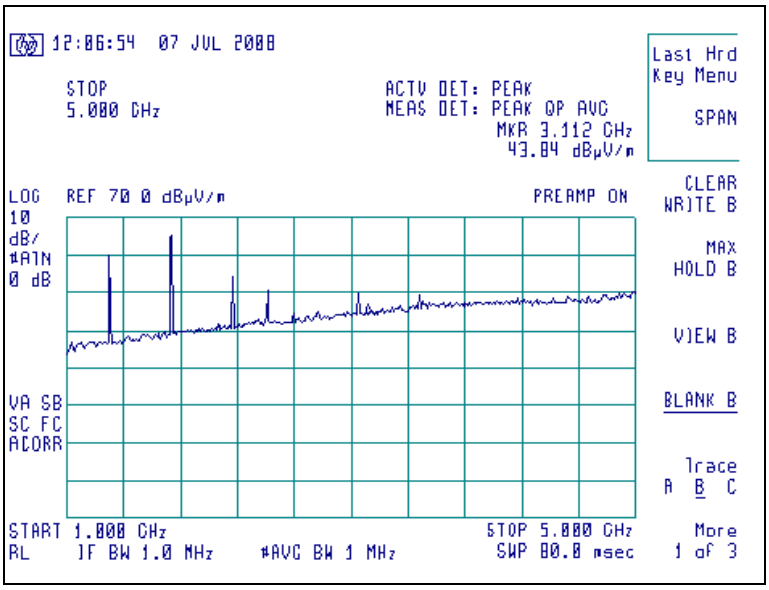


EXHIBIT 6. OCCUPIED BANDWIDTH: 15.231(c)

6.1 Test Procedure

In addition to measuring the levels of Radiated Emissions, the Occupied Bandwidth of the transmitter was measured. In accordance with FCC Part 15.231(c), the -20 dB_C bandwidth of the transmitted signal should be within a window of 0.25% of the center carrier frequency. The resolution bandwidth was set to the closest available filter setting on the HP 8546A EMI Receiver, then corresponded to 5% of the allowable bandwidth determined in the calculation mentioned above, without going below the resolution bandwidth of 10 kHz, as dictated in ANSI C63.4.

6.2 Test Equipment Utilized

The connecting cables used were also measured for loss using a calibrated Signal Generator and the HP 8546A EMI Receiver. The resulting loss factors were entered into the HP 8546A EMI Receiver database. This allowed for automatic change in the antenna correction factor. The resulting data taken from the HP 8546A EMI Receiver is an actual measurement and can be entered into the database as a corrected measurement.

Test Equipment	Manufacturer	Model No.	Serial No.
Spectrum Analyzer	Agilent	E4407B	US39160256
Spectrum Analyzer	Agilent	E4446A	US45300564

6.3 Occupied Bandwidth Calculations

FCC Part 15.231(c) states that the bandwidth of a manually operated device shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz and 900 MHz.

Said bandwidth is determined at the -20 dB reference to peak carrier points.

Refer to the set of screen captures in this report, which show the actual Occupied Bandwidth of the transmitter as measured.

For this device, operating at a center frequency of 433.8 MHz, the allowed Occupied Bandwidth is calculated to be:

433.8 MHz x 0.0025 = 1.0845 MHz

6.4 Test Data

Frequency (MHz)	-20 dB_C Occupied Bandwidth (MHz)	Occupied Bandwidth Limit (MHz)	Pass/Fail
433.8	0.158	1.0845	Pass

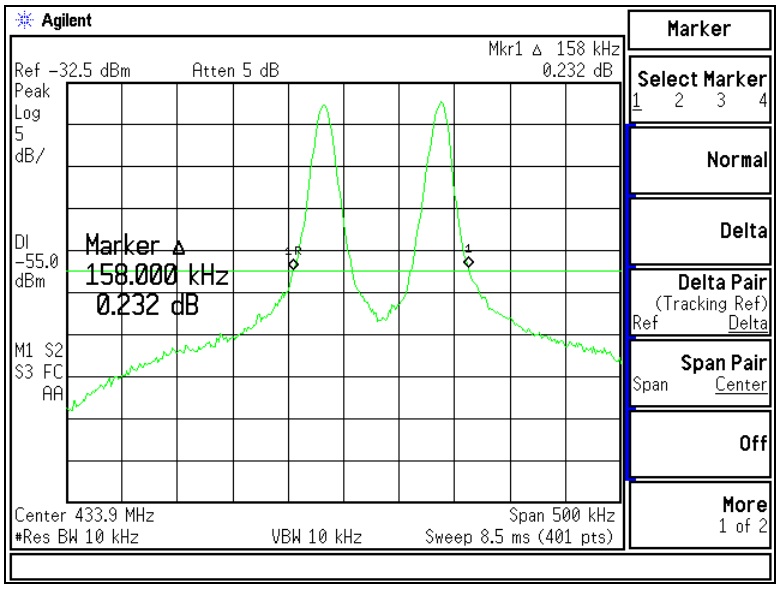


EXHIBIT 7. TRANSMITTER DUTY CYCLE AND RELAXATION FACTOR CALCULATIONS

The following calculations support the request for relaxation factor as applied to the radiated EFI measurements, based on the duty factor of the transmitter.

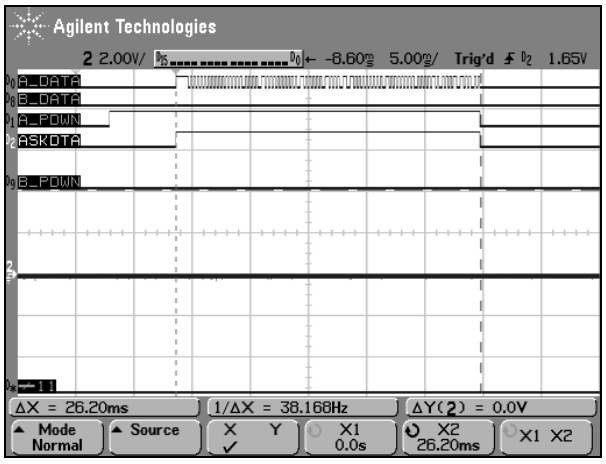
For a graphical presentation of the data packets from the transmitter, refer to the Data Packet Detail in previous sections of this report. These images were captured on an oscilloscope, while probing the data line, feeding into the transmitter. The transmitter was functioning in normal operating mode, and activated by pressing one of the transmit buttons.

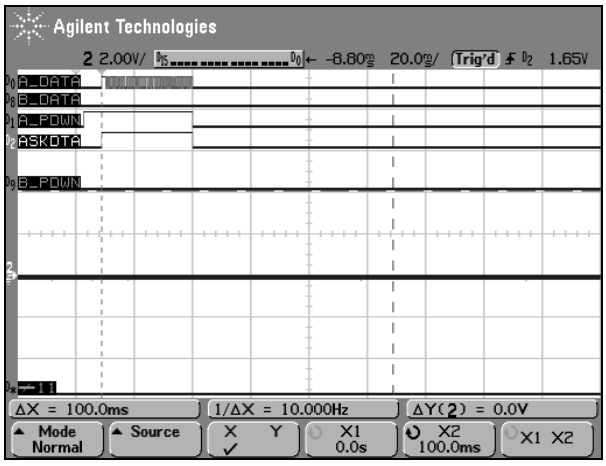
Average (Relaxation) Factor

The greatest on time for any 100 ms window in the normal, continuous transmit mode operation, is 26.2 ms.

20 * log (26.2/100) = -11.63 dB

Therefore 11.63 dB relaxation.





APPENDIX A

Test Equipment List

Asset #	Manufacturer	Model #	Serial #	Description	Date	Due
AA960008	EMCO	3816/2NM	9701-1057	Line Impedance Stabilization Network	12/6/07	12/6/08
AA960031	HP	119474A	3107A01708	Transient Limiter	Note 1	Note 1
AA960077	EMCO	93110B	9702-2918	Biconical Antenna	9/19/07	9/19/08
AA960078	EMCO	93146	9701-4855	Log-Periodic Antenna	9/19/07	9/19/08
AA960081	EMCO	3115	6907	Double Ridge Horn Antenna	12/04/07	12/04/08
CC00221C	Agilent	E4407B	US39160256	Spectrum Analyzer	1/11/07	1/11/08
EE960004	EMCO	2090	9607-1164	Device Controller	N/A	N/A
EE960013	HP	8546A	3617A00320	Receiver RF Section	9/20/07	9/20/08
EE960014	HP	85460A	3448A00296	Receiver Pre-Selector	9/20/07	9/20/08
EE960073	Agilent	E4446A	US45300564	Spectrum Analyzer	8/17/07	8/17/08
N/A	LSC	Cable	0011	3 Meter ½" Armored Cable	Note 1	Note 1
N/A	LSC	Cable	0050	10 Meter RG 214 Cable	Note 1	Note 1
N/A	Pasternack	Attenuator	N/A	10 dB Attenuator	Note 1	Note 1

Note 1 - Equipment calibrated within a traceable system.

Uncertainty Statement

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of k=2.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.8 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	1.128 Volts/Meter
Conducted Immunity	3 Volts level	1.0 V