LS Research, LLC

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ENGINEERING TEST REPORT # 307261 TX TCB Rev. 2

Compliance Testing of:
Sol·A·Ray

Test Date(s):
November 2, 5-8, 2007

Prepared For:
Superb Industries, Inc.
Attn: Daniel Miller
330 Third Street NW
Sugarcreek, Ohio 44681

In accordance with:
Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.231(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: January 16, 2008

Test Report Prepared by:	**Tested by:**
Teresa A. White, Document Coordinator	Laura Bott, EMC Engineer
Signature: Teresa A. White	Signature:
Date: January 16, 2008	Date: January 16, 2008

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EXHIBIT 1. INTRODUCTION

1.1 SCOPE

References:	FCC Part 15, Subpart C, Section 15.231(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)	2005	Code of Federal Regulations - Telecommunications
RSS-Gen RSS-210, Issue 6	2005	Requirements for License-exempt Radio Communication Devices
ANSI C63.4	2004	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 CISPR 22 +A1 EN 55022	2003, 04-10 2004, 10-14 2003	Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement
CISPR 16-1-1	2003	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:	**Superb Industries, Inc.**
Address:	**330 Third Street NW** **Sugarcreek, OH 44681**
Contact Person:	**Daniel Miller**

2.2 EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information has been supplied by the applicant.

Product Name:	Sol·A·Ray Low-power wireless locking system
Model Number:	S28419-2000
Serial Number:	N/A

2.3 ASSOCIATED ANTENNA DESCRIPTION

PCB Loop Antenna

2.4 EUT'S TECHNICAL SPECIFICATIONS

Additional Information:

Frequency Range (in MHz)	315 MHz
RF Power in Watts	<1 mW
Field Strength (and at what distance)	64.8 dBµV/m at 3 meters
Occupied Bandwidth (99% BW) in kHz	104 kHz
Type of Modulation	ASK
Emission Designator	104KA1D
Transmitter Spurious (worst case)	1260 MHz, 60.6 dBµV/m
Frequency Tolerance %, Hz, ppm	< 100 ppm
Microprocessor Model # (if applicable)	TI MSP430 Series #MSP430F2011TPW
EUT will be operated under FCC Rule Part(s)	15.231

Antenna Information	PCB loop
Detachable/non-detachable	Non-detachable
Type	PCB loop
Gain (in dBi)	-20 dBi
Portable/Mobile	☒ Portable ☐ Mobile
Modular Filing	☐ Yes ☒ No

RF Technical Information:

Type of Evaluation (check one)		SAR Evaluation: Device Used in the Vicinity of the Human Head
		SAR Evaluation: Body-worn Device
	√	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: 42 %
- Standard used for evaluation: FCC 15.231
- Measurement Distance: 3 m
- RF Value: .0017378 ☒ V/m ☐ A/m ☐ W/m^2
  ☐ Measured ☐ Computed ☒ Calculated

2.5 PRODUCT DESCRIPTION

Sol·A·Ray is a solar powered, remote keyless entry system featuring ultra-low power wireless communication and LED interior lighting.

The transmitter is powered by a 3V lithium coin cell battery; the power output is less than 1 mW.

Transmissions are ASK modulated, with a transmission rate of 2kbps and is Manchester encoded.

PHOTO (Optional)

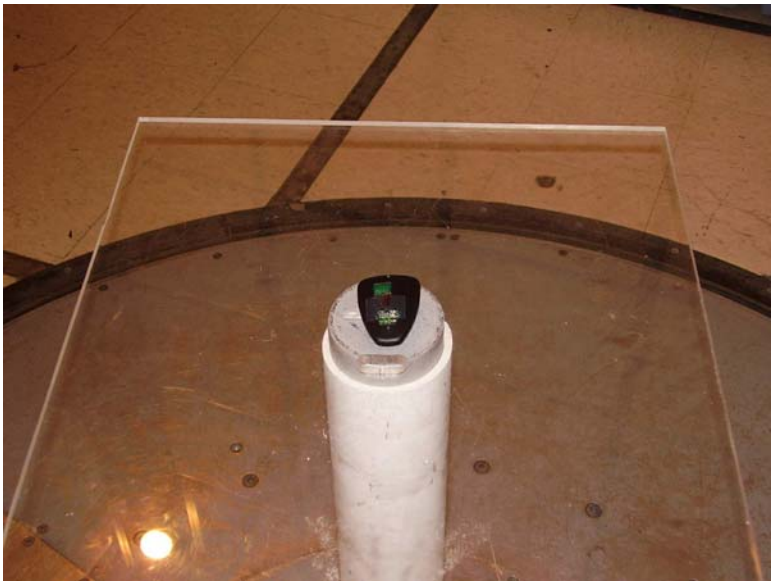


EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

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	Yes
1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	n/a
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)

In an effort to bring the fundamental frequency and harmonic emissions within the limits in FCC 15.231, a 2.0 kΩ resistor was placed in R4.

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 (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.

5.2 Test Setup Photo(s)

Vertical Orientation

Side Orientation

Flat Orientation

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 manually operated periodic devices.

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 can 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 section 8.1 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 device was investigated in three orthogonal orientations for maximum emissions.
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 (2006), 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 ≤ f_0 ≤ 470 MHz, can be found by: 41.6667*(f_0)-7083.3333, 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 ≤ f_0 ≤ 470 MHz, can be found by: 4.1667*(f_0)-708.3333, 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: 4.1667*(f_0)-708.3333 = µV/m @ 3m
Above 470 MHz, the limit on the spurious and harmonic emissions is 1,250 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)*
315	***6041.68***	***75.62***	***604.201***	***55.62***

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:
dBµV/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:	Superb Industries						
Date(s) of Test:	November 1&5, 2007						
Test Engineer(s):	Laura Bott						
Voltage:	3 VDC						
Operation Mode:	Normal, continuous transmit, modulated C.W. mode						
Environmental Conditions in the Lab:	Temperature: 20 – 25° C Relative Humidity: 30 – 60 %						
EUT Power:		Single Phase ___VAC		3 Phase ___VAC			
	√	Battery		Other:			
EUT Placement:	√	80cm non-conductive table		10cm Spacers			
EUT Test Location:	√	3 Meter Semi-Anechoic FCC Listed Chamber		3/10m OATS			
Measurements:		Pre-Compliance		Preliminary	√	Final	
Detectors Used:	√	Peak	√	Quasi-Peak	√	Average	

The table depicts the level of significant radiated emissions found:

Frequency (MHz)	Height (m)	Azimuth (degree)	Q-Peak Reading (dBµV/m)	Q-Peak Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
315	1.00	153	58.1	75.62	17.52	Horizontal	Vertical
630	1.00	252	44.1	55.62	11.52	Vertical	Vertical
315	1.25	26	51.8	75.62	23.82	Vertical	Flat
952	1.25	26	36.6	46.02	9.42	Vertical	Flat
315	1.00	268	65.8	75.62	9.82	Horizontal	Flat
945	1.00	263	46.0	55.62	9.62	Horizontal	Flat
630	1.09	92	40.8	55.62	14.82	Horizontal	Side
315	1.98	178	62.4	75.62	13.22	Vertical	Side
630	1.73	35.6	42.8	55.62	12.82	Vertical	Side
289	1.00	360	32.4	46.02	13.62	Vertical	Side
250.2	1.00	0	31.1	46.02	14.92	Vertical	Vertical
287.6	1.00	0	32.3	46.02	13.72	Vertical	Flat
282.4	1.03	0	32.0	46.02	21.12	Horizontal	Flat

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Avg Reading (dBµV/m)	Avg Limit (dBµV/m)	Margin (dB)	Antenna Polarity	EUT orientation
1260	1.13	31	60.9	53.8 *Note 2	55.62	1.82	Horizontal	Flat
1890	1.07	128	59.7	52.6 * Note 2	55.62	3.02	Vertical	Flat
1260	1	66	58.8	51.7 * Note 2	55.62	3.92	Vertical	Flat
1260	1	333	59.8	52.7 * Note 2	55.62	2.92	Vertical	Side
1260	1	34	56.7	49.6 * Note 2	55.62	6.02	Horizontal	Side
1260	1	206	57.9	50.8 * Note 2	55.62	4.82	Vertical	Vertical
1260	1.07	0	61.4	54.3 * Note 2	55.62	1.32	Horizontal	Vertical

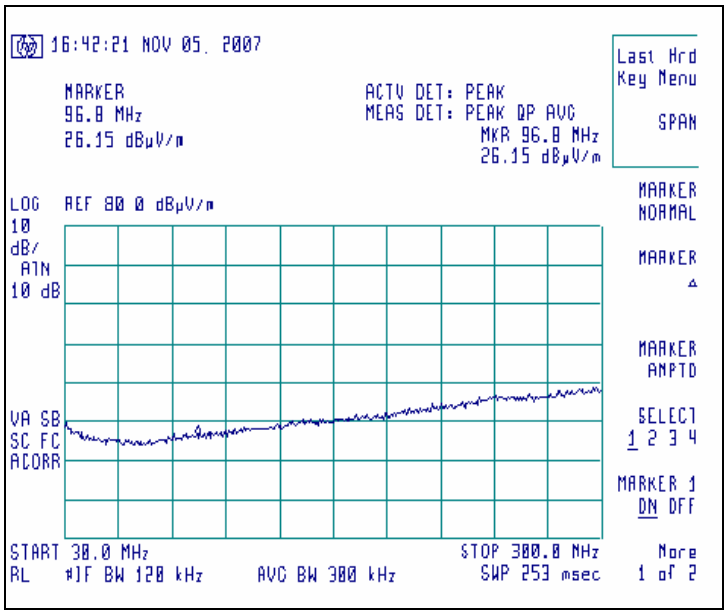
Notes:

1) A Quasi-Peak Detector was used in measurements of the fundamental and harmonics below 1 GHz, and a Peak Detector was used in measurements above 1 GHz.
2) A relaxation of the Peak EFI measurements by 7.1 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.
3) Measurement of the fundamental and all harmonics were made with the EUT in CW mode.

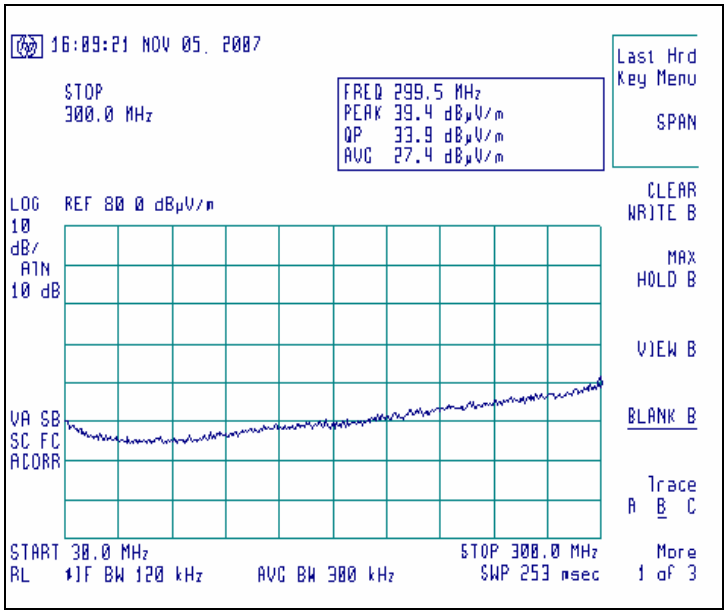
5.8 Screen Captures - Radiated Emissions Testing

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.

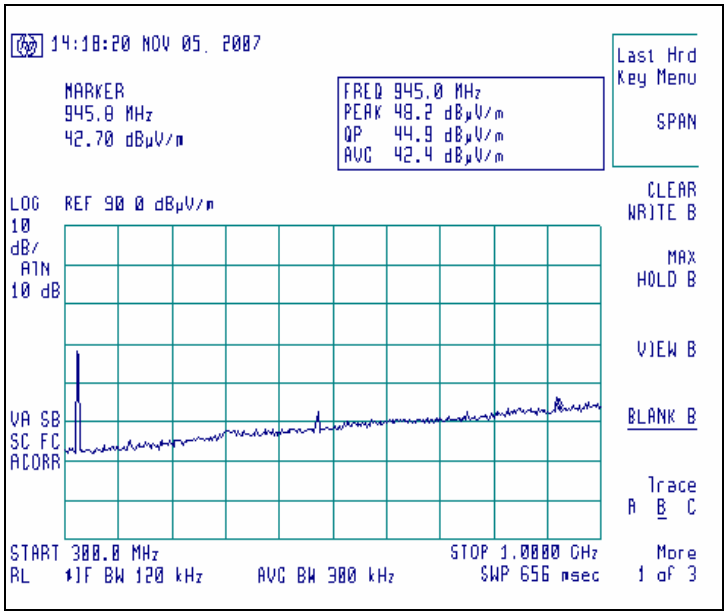
Vertical Orientation
30-300 MHz, Vertical Antenna



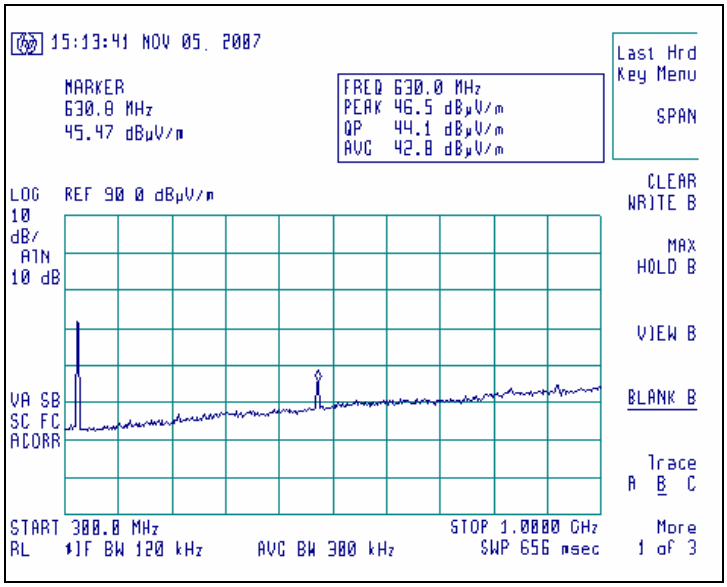
Vertical Orientation
30-300 MHz, Horizontal Antenna



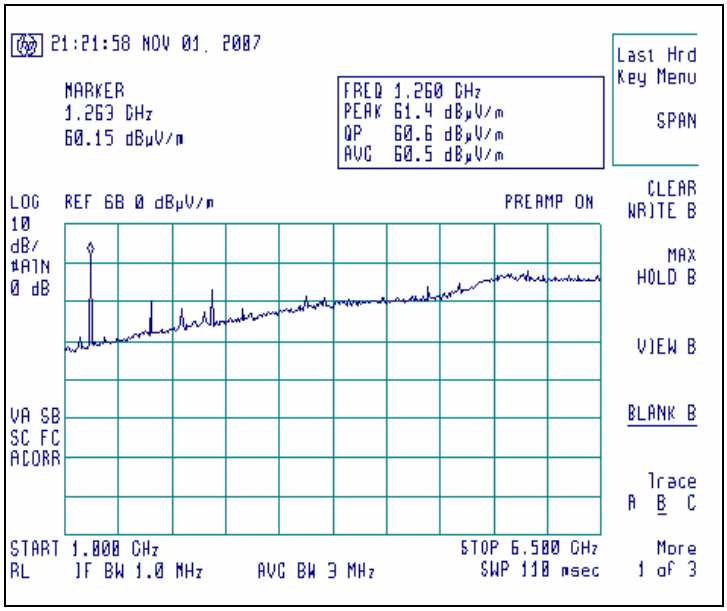
Vertical Orientation
300-1000 MHz, Horizontal Antenna



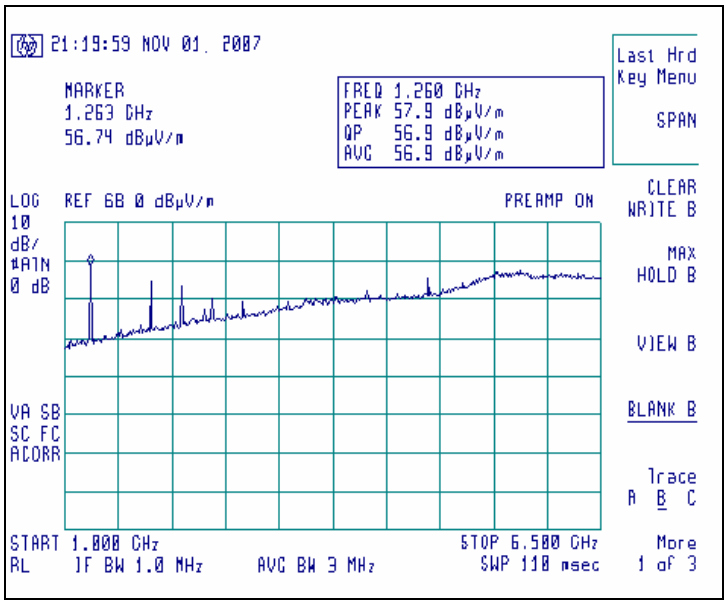
Vertical Orientation
300-1000 MHz, Horizontal Antenna



Vertical Orientation
1000-5000 MHz, Horizontal Antenna

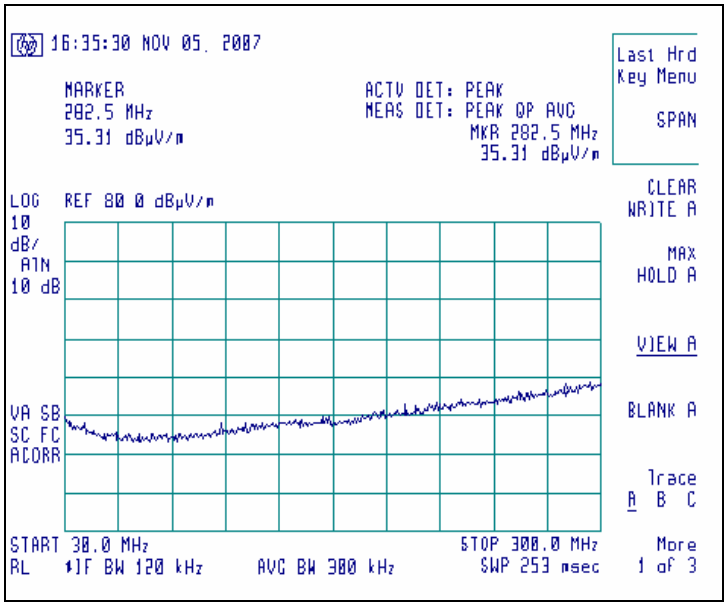


Vertical Orientation
1000-5000 MHz, Vertical Antenna

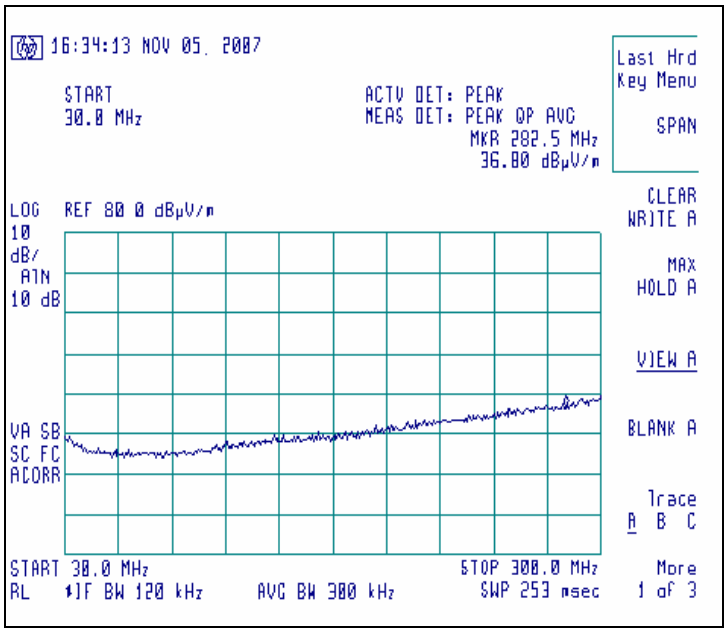


Screen Captures - Radiated Emissions Testing *(continued)*

Flat Orientation
30-300 MHz, Vertical Antenna

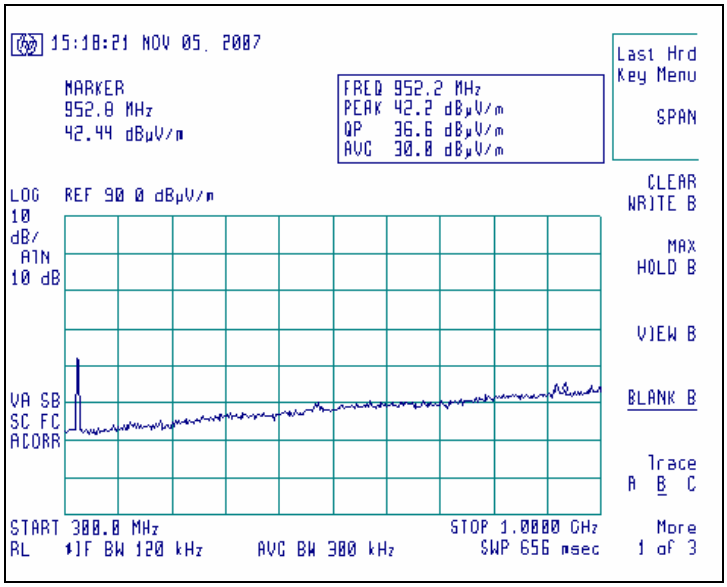


Flat Orientation
30-300 MHz, Horizontal Antenna



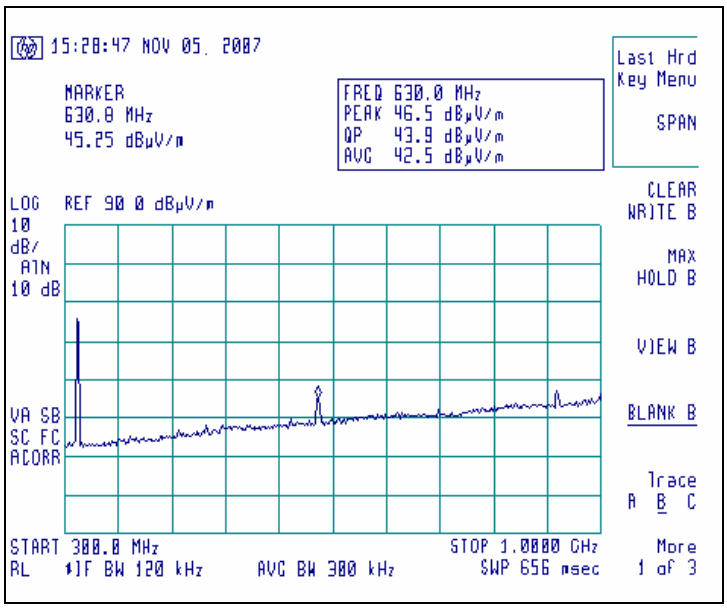
Flat Orientation

300-1000 MHz, Vertical Antenna

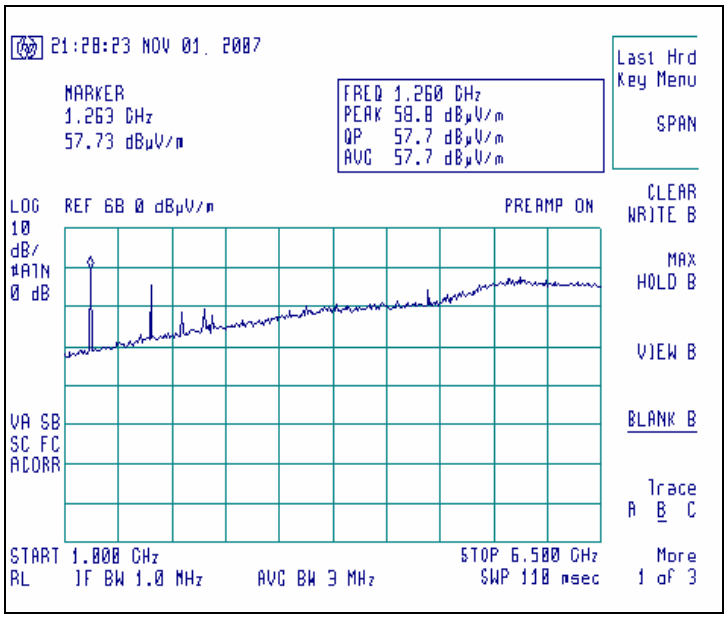


Flat Orientation

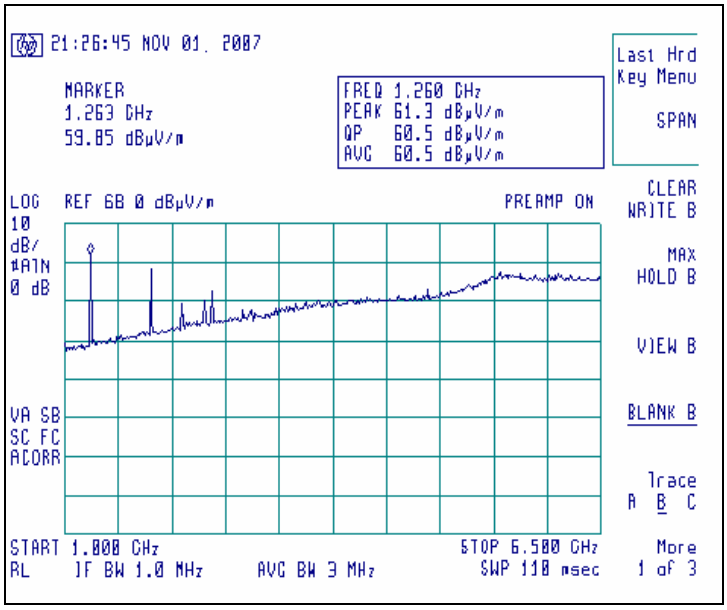
300-1000 MHz, Horizontal Antenna



Flat Orientation
1000-5000 MHz, Vertical Antenna

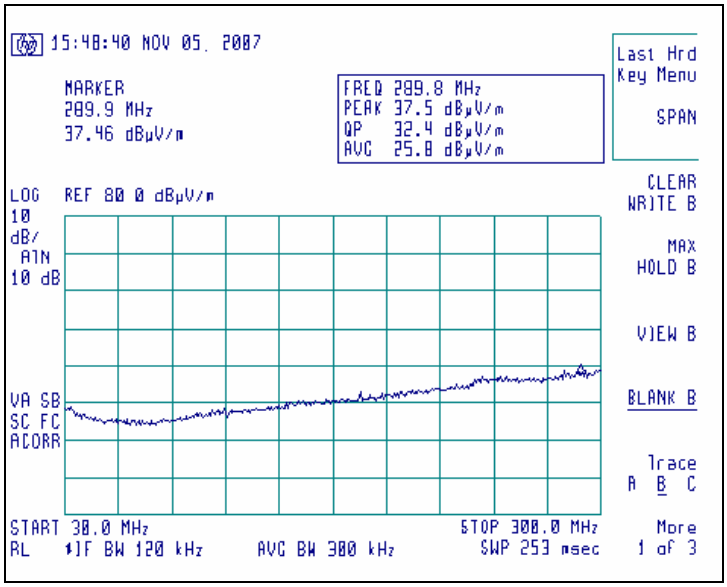


Flat Orientation
1000-5000 MHz, Horizontal Antenna



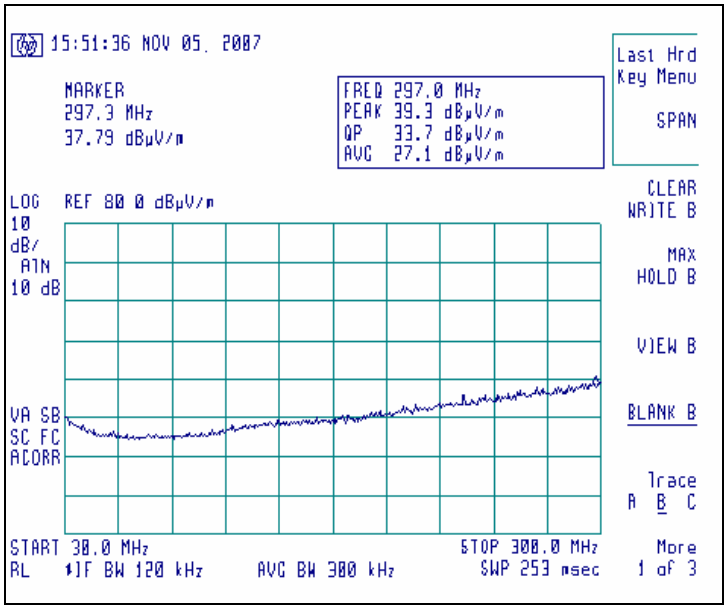
Side Orientation

30-300 MHz, Vertical Antenna

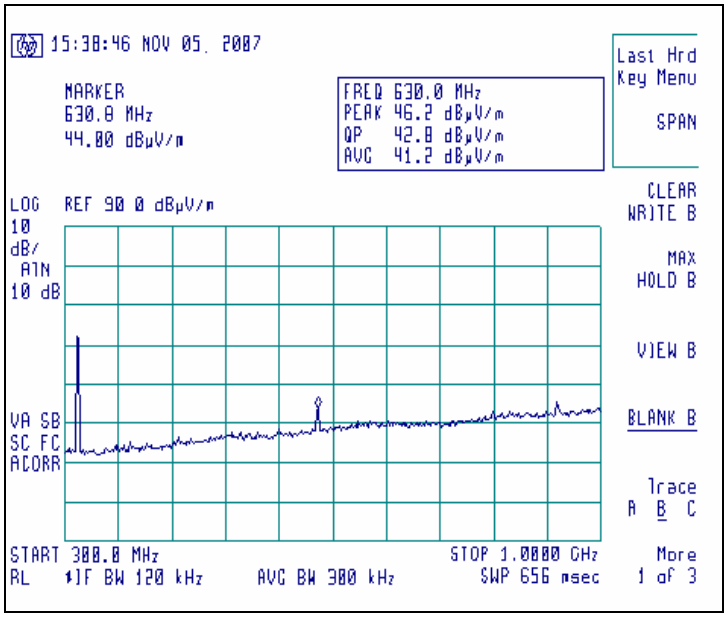


Side Orientation

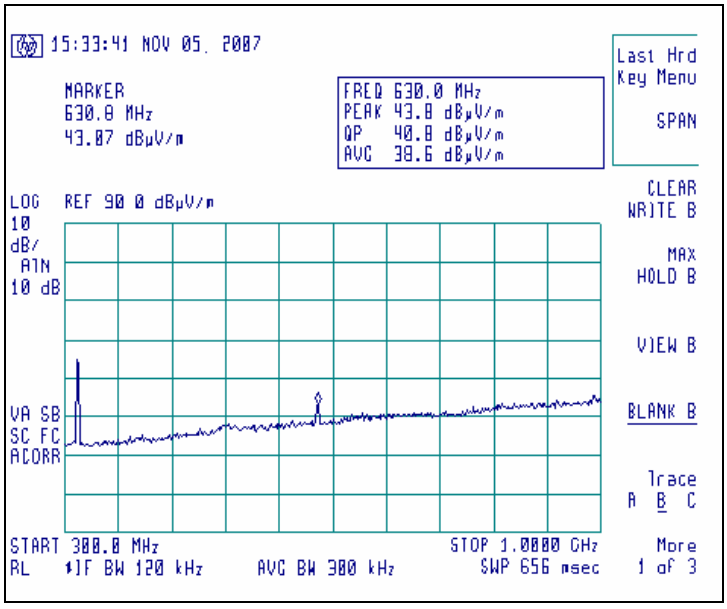
30-300 MHz, Horizontal Antenna



Side Orientation
300-1000 MHz, Vertical Antenna

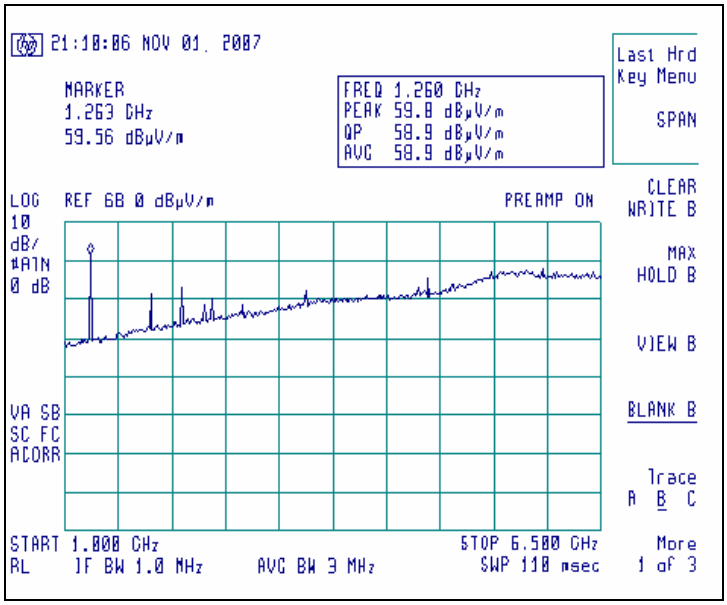


Side Orientation
300-1000 MHz, Horizontal Antenna



Side Orientation

1000-5000 MHz, Vertical Antenna



Side Orientation

1000-5000 MHz, Horizontal Antenna

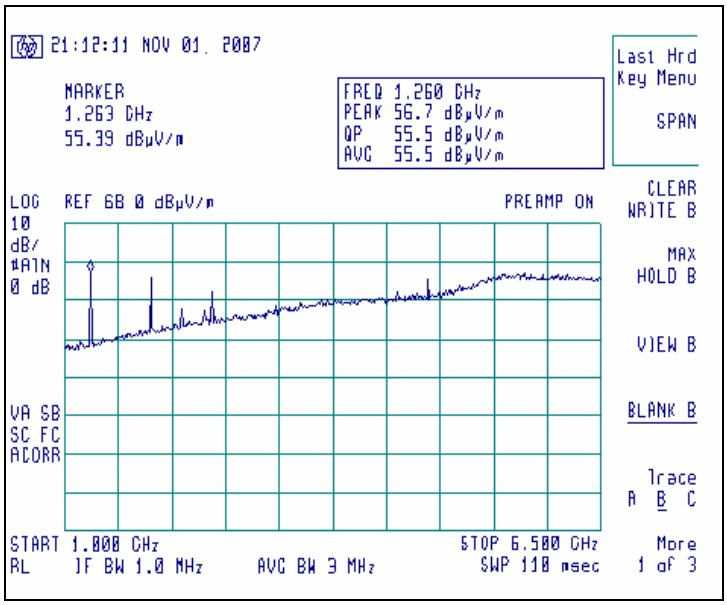


EXHIBIT 7. OCCUPIED BANDWIDTH: 15.231(c)

7.1 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.

7.2 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

7.3 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 315 MHz, the allowed Occupied Bandwidth is calculated to be:

315 MHz x 0.0025 = 787.5 kHz

7.4 Test Data

Frequency (MHz)	-20 dB_C Occupied Bandwidth (kHz)	Occupied Bandwidth Limit (MHz)	Pass/Fail
315	104	787.5	Pass

7.5 Screen Captures – OCCUPIED BANDWIDTH

Occupied Bandwidth

Measurement of the Occupied Bandwidth was made with the EUT in continuous transmit mode, with typical modulation as applied by the EUT circuitry.

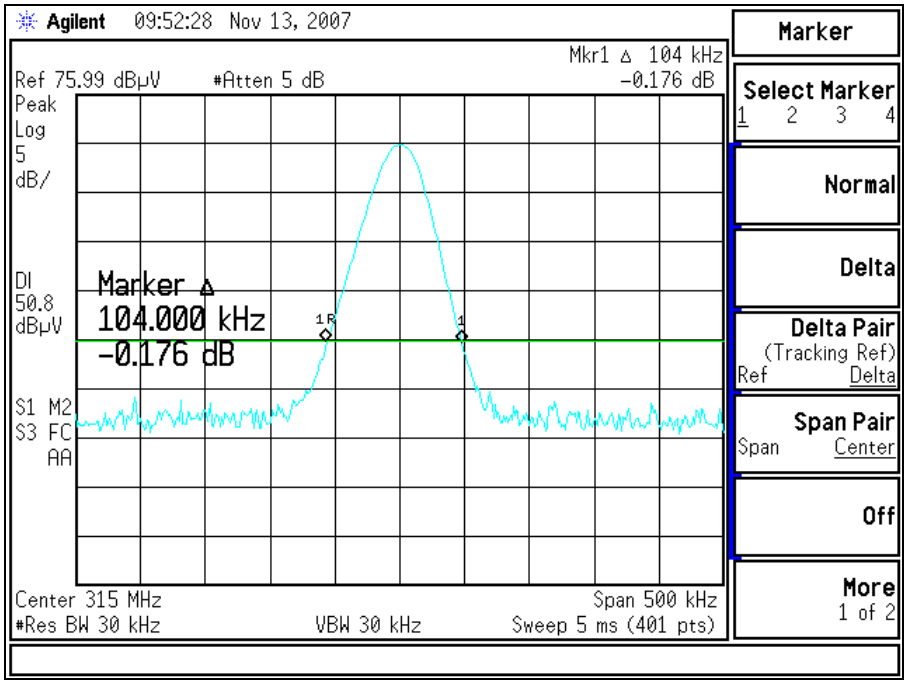
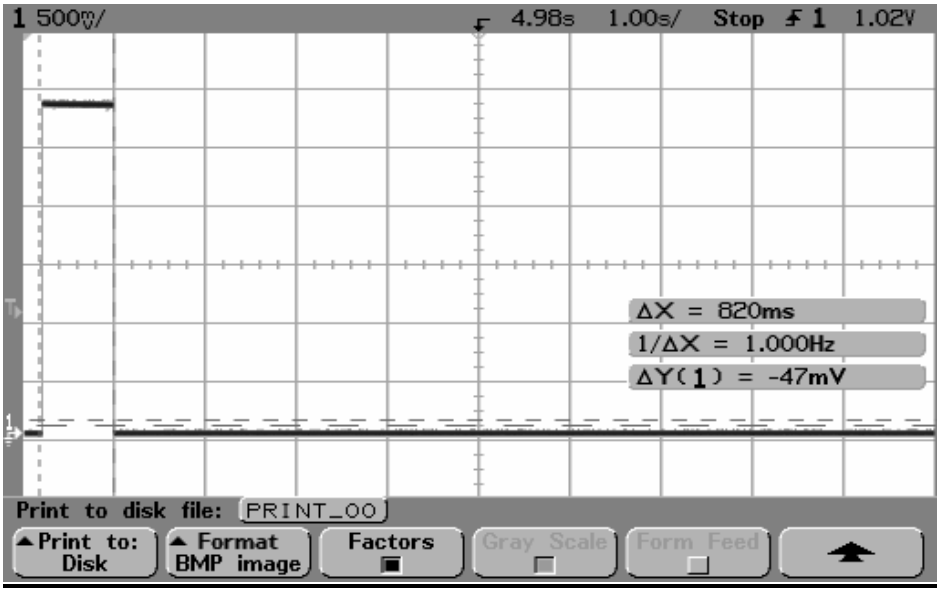


EXHIBIT 8. TRANSMITTER DUTY CYCLE AND RELAXATION FACTOR CALCULATIONS

8.1 Total On Time in 10 second window

In accordance with Section 15.231 (a)(1), the following plot shows that this manually operated transmitter automatically deactivates in 820 ms after being released.



8.2 Relaxation Factor

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.

In the modulated transmit (normal) mode, a 100 ms capture was taken with an oscilloscope. In this capture, there are two transmissions, each starting with an 8 pulse preamble, followed by a series of 7 wide and 19 narrow pulses.

The preamble pulses are 530 µs wide and the large and small pulses in the larger packet are 1.04 ms and 540 µs wide respectively.

Average (Relaxation) Factor

Average Factor = 20 * Log_{10} (Worst Case EUT On-time over 100 ms time window)
For this product, multiple transmit packets can fit within any 100 ms window. As shown in the next sub-section of this report, up to two full packets, each with an on time of 22 ms.

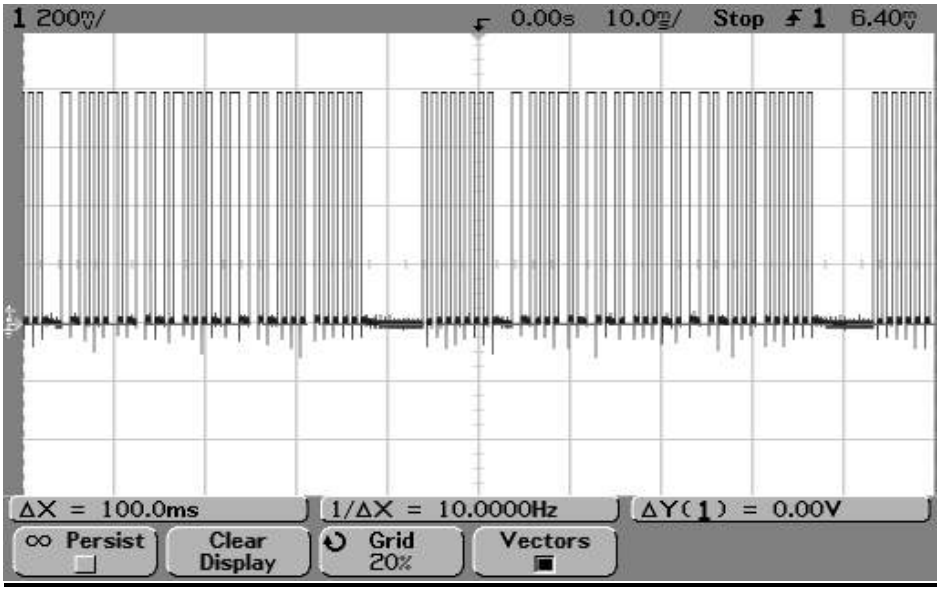
In each packet the on time is calculated as:
8 * 530 µs + 7 * 1.04 ms + 19 * 540 µs = .02178 seconds

At most, two whole packets can fit in a 100 ms window, for a total on time of .04356 seconds = 43.56 ms, rounded up to 44 ms.

Relaxation Factor = 20 * Log_{10} (44.0 ms / 100.0 ms) = -7.1 dB

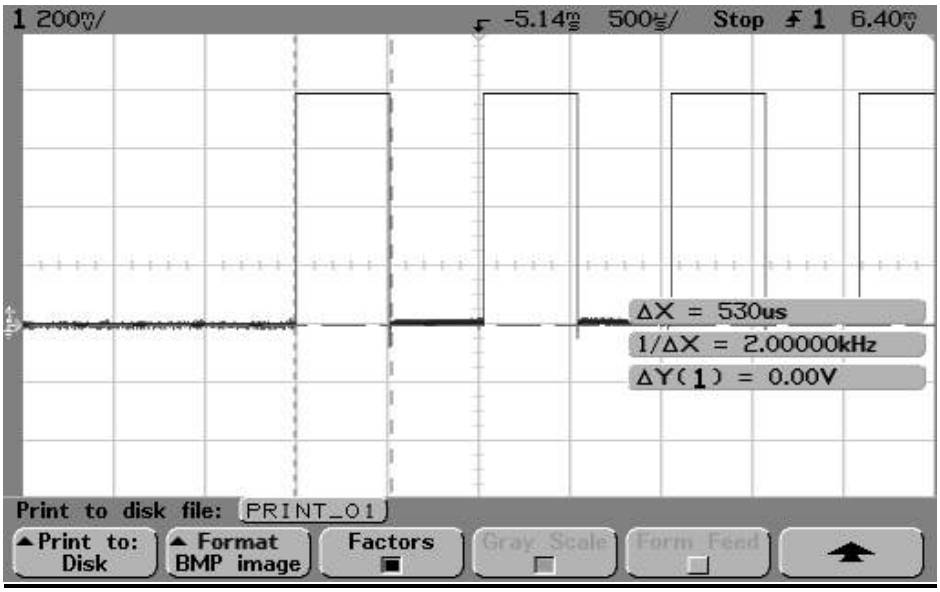
A relaxation factor of 7.1 dB would be allowable for this product.

8.3 Data Packet Detail – Conducted Emissions, 100ms Window

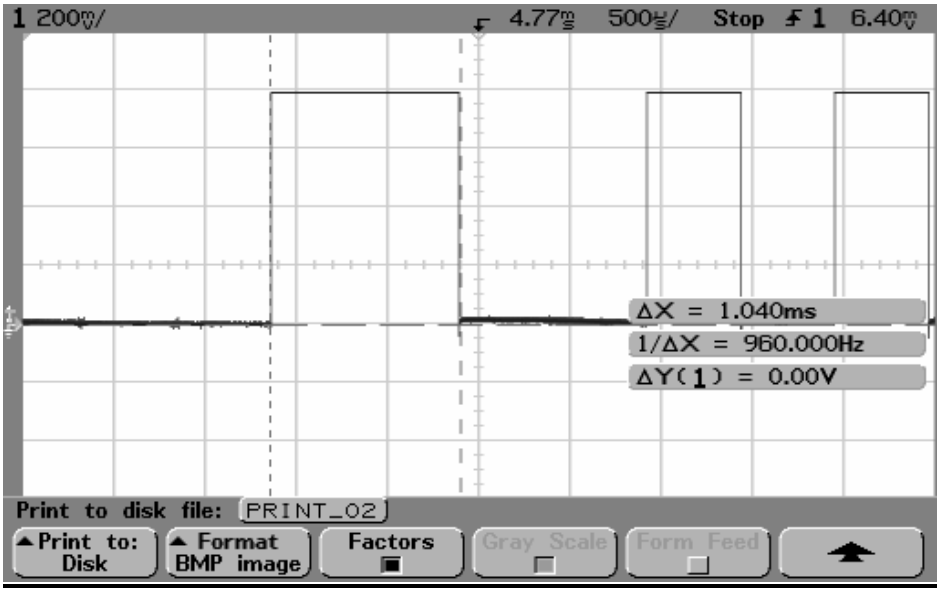


8.4 Individual Data Packet Detail

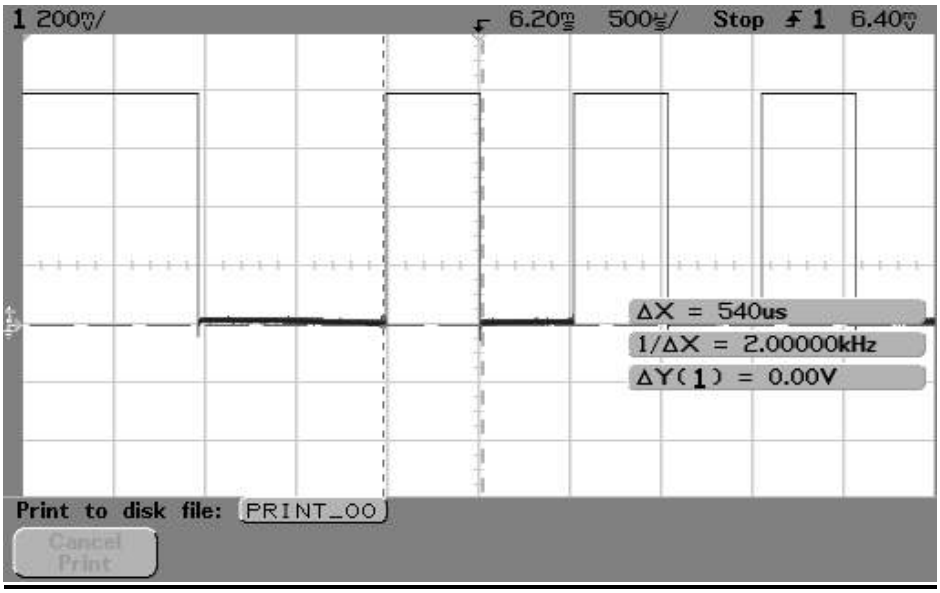
Preamble Pulses



Wide Packet Pulses



Narrow Packet Pulses



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