Strategic Technologies, Inc.

DualTrak PID

Compliance Test Report and Report of Measurements

per

FCC CFR47 Part 15.203; 15.205; 15.207; 15.231

Revision 1.1

April 29, 2004

Approved by		
Checked by	**Robert Stirling, P.Eng.**	**Date**

Protocol Labs, Abbotsford B.C., Canada
FCC Registration Number 96437
Industry Canada Registration Number IC3384

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FCC CFR47 Part 15/C Report of Measurements

Testing Details

TESTED BY: Rob Stirling / David Johanson

TEST CONDITIONS: Temperature and Humidity: 7.9°C 55%

TEST VOLTAGE: 120 Vac 60 Hz

Test Facilities

Protocol Labs
28945 McTavish Rd.
Abbotsford BC, Canada, V4X 2E7

FCC Registration Number 96437
Industry Canada Registration Number IC3384

Test Equipment List:

EMISSIONS:

Device	Model Number	Serial No.	Last Cal.	Next Cal
Antenna	EMCO 3141 Bilog	1127	10/27/03	10/27/04
Spectrum Analyzer	Hewlett Packard 8566B	2241A02102	11/14/03	11/14/04
RF-Preselector	Hewlett Packard 85685A	3107A01222	04/10/03	04/10/04
Quasi-Peak Adapter	Hewlett Packard 85650A	2043A00240	04/13/03	04/13/04
Tower	Rhientech Labs	Custom	N/A	N/A
Turntable	Protocol	Custom	N/A	N/A

Company Under Test

COMPANY: Strategic Technologies Inc.

ADDRESS: A102 – 17802 66th Avenue
Surrey, BC V3S 7X1

CONTACT PERSON: Mr. Steve Rosset

PHONE NUMBER: 604-576-8658

Equipment Under Test

THE TEST SYSTEM:

EUT: DualTrak Personal Identifier Device.

Manufacturer: Strategic Technologies Inc.
Part Numbers: DualTrak PID Tag

Serial Number: 19282

Auxiliary Equipment: 3VDC Regulated Power Supply.
(Note: this equipment normally uses a 3VDC Lithium Coincell. The Auxiliary power supply was required to complete the tests due to the low battery capacity)

CABLING:

Cable	Name	Ferrite	Shielded
Power	18 AWG, twisted pair – 1 m, connected to 3VDC Regulated Power Supply	No	No

MODIFICATIONS: This unit requires no modifications for it to pass.

CONCLUSION: The Dualtrak PID tag tested complies with the requirements of FCC CFR47 part 15 as outlined in sections sections 15.203, 15.205(b), 15.207, and 15.231.

FCC CFR47 Part 15 Subpart C Report of Measurements

General

Tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15 – Subpart C - Intentional Radiators. The specific section used for compliance is 15.231 – Periodic Operation above 70MHz.

The Radiated Emission tests were performed using measurement procedures outlined in the above standard.

1. Antenna Requirement

1.1 Regulation

15.203 - An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

1.2 Result

This unit meets this requirement. The antenna is a single piece of insulated wire permanently soldered to the transmitters PCB and attached to it's own custom mount inside the transmitters plastic chassis. For security purposes, the chassis of the transmitter is provided with tamper protection.

2. Conducted Emissions Tests

Test Requirement: FCC CFR47, Part 15 Subpart C.

2.1 Result

Not applicable. The EUT is DC powered via Lithium Coin cell battery.

3. Periodic Operation Exceeding 15.231(a)

3.1 Regulation

15.231(e) - Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) and may be employed for any type of operation, including operation prohibited in paragraph (a), provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this Section, except the field strength table in paragraph (b) is replaced by the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emission (microvolts/meter)
40.66 - 40.70	1,000	100
70 - 130	500	50
130 - 174	500 to 1,500**	50 to 150**
174 - 260	1,500	150
260 - 470	1,500 to 5,000**	150 to 500 **
Above 470	5,000	500

** Linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 22.72727(F) - 2454.545; for the band 260-470 MHz, uV/m at 3 meters = 16.6667(F) - 2833.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

3.2 Test Procedures

TEST STANDARD: FCC CFR47, Part 15, Subpart C

DEVICE DESCRIPTIONS: Refer to the Equipment Under Test Section, above, for EUT Descriptions.

TEST SETUP:

Freq. Range Measured	30Mhz – 5000MHz
Test Distance	3m
Test Instrumentation resolution	120KHz (30MHz to 1000MHz) 1MHz (1000MHz to 5000MHz)
Receive Ant. Scan Height	1m – 4m
Receive Ant. Polarization	Vertical and Horizontal.

The equipment was set up in a 3-meter open field test site. Emissions in both horizontal and vertical polarizations were measured while rotating the EUT on a turntable to maximize the emissions signal strength and the results recorded on the attached plots.

CABLING DETAILS: The EUT was set up using an Auxiliary 3VDC Regulated Power Supply. This equipment normally uses a 3VDC Lithium Coincell. The Auxiliary power supply was required to complete the tests due to the low battery capacity. In normal operation, there are no required cables.

CABLE DESCRIPTIONS:

Cable	Name	Ferrite	Shielded
Power	18 AWG, twisted pair – 1 m, connected to 3VDC Regulated Power Supply	No	No

3.3 Calculation of Field Strength Limits

a) Fundamental field strength limits for the 260-470MHz, uV/m at 3 meters: fs = (16.6667x(Freq. in MHz)) – 2833.3333) = 16.6667*434.545-2833.3333 = 4,409 μV; in dBμV 20xLog(fs) = 20xLog(4409) = 72.88dBμV

b) The Maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level = (78.88 – 20) = 52.88dBμV/m

3.4 Calculation of Average Correction Factor

The average correction factor is computed by analyzing the “worst case” On time in any 100mSec-time period and using the formula:

Correction Factor (dB) = 20*log (worst case on time/100mSec)

Analysis of the system transmitter worst case on time in any 100mSec period is an on time of 8.0 mSec. Therefore the correction factor is 20*Log (8.0/100) = -22.9dB.

The maximum correction factor to be applied is 20dB per section FCC section 15.35

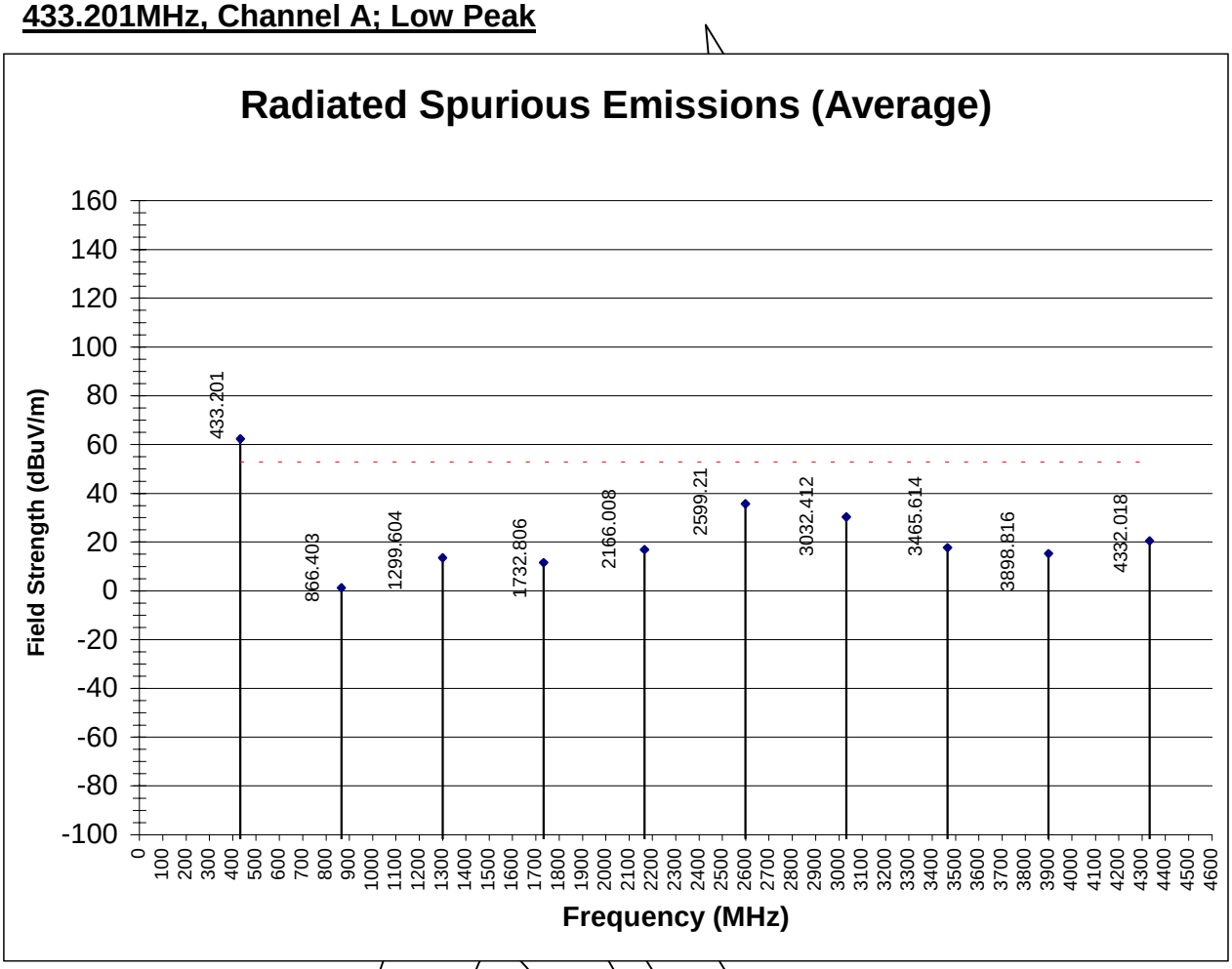
3.5 Result

The only measurable results were around the fundamental and harmonic frequencies. No other emissions were detected. Average measurements were not required for this product and so were not performed.

This transmitter broadcasts on 2 channels, Channel A centered on 433.280 MHz and Channel B centered on 434.560 MHz. Due to the modulation used on the EUT, there are 2 peaks for each channel described as the Low and High frequency peaks.

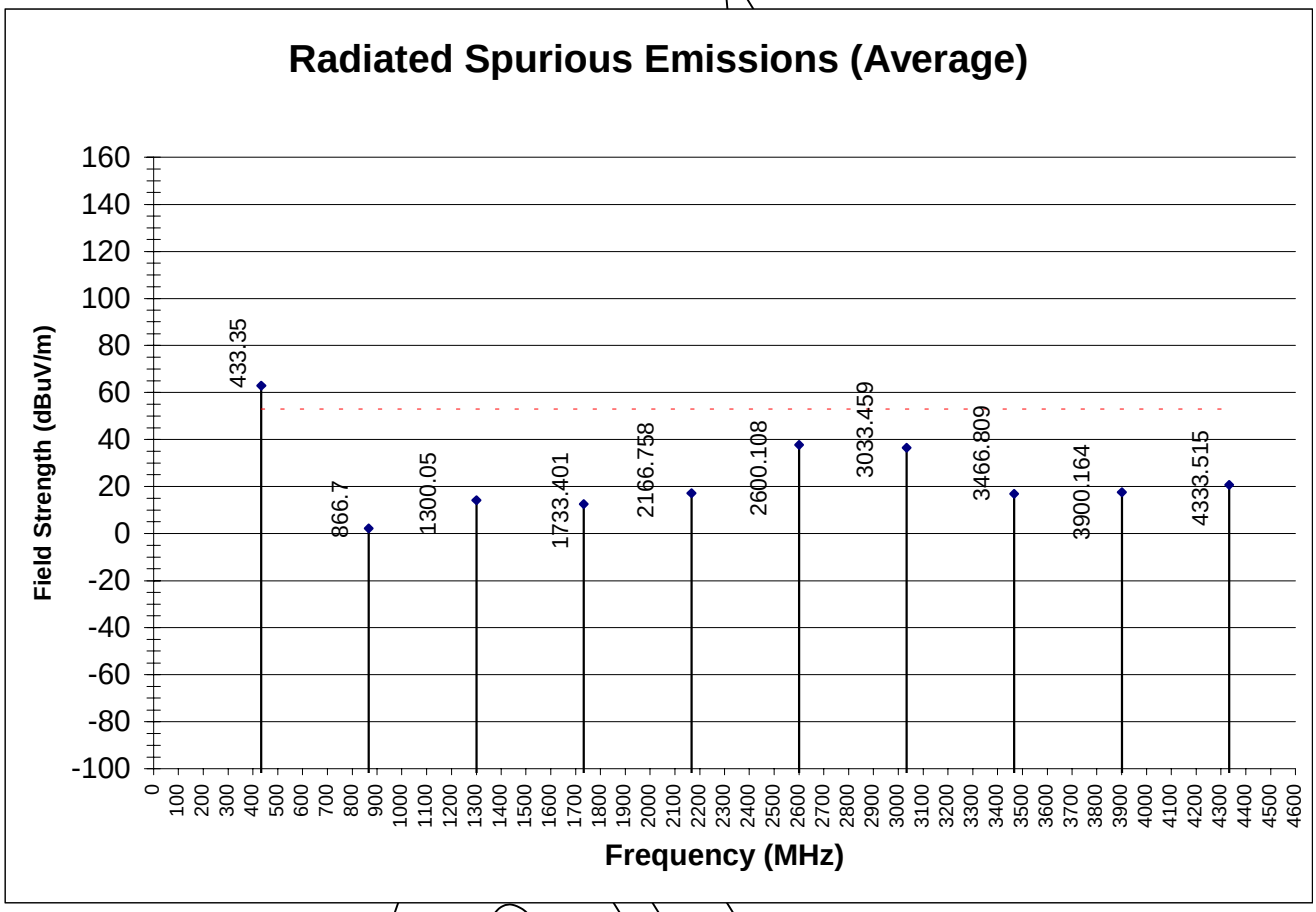
The spectrum was scanned from 0.4MHz to 5000 MHz looking for all Spurious and Harmonic emissions. The results are contained in the following tables and charts.

433.201MHz, Channel A; Low Peak



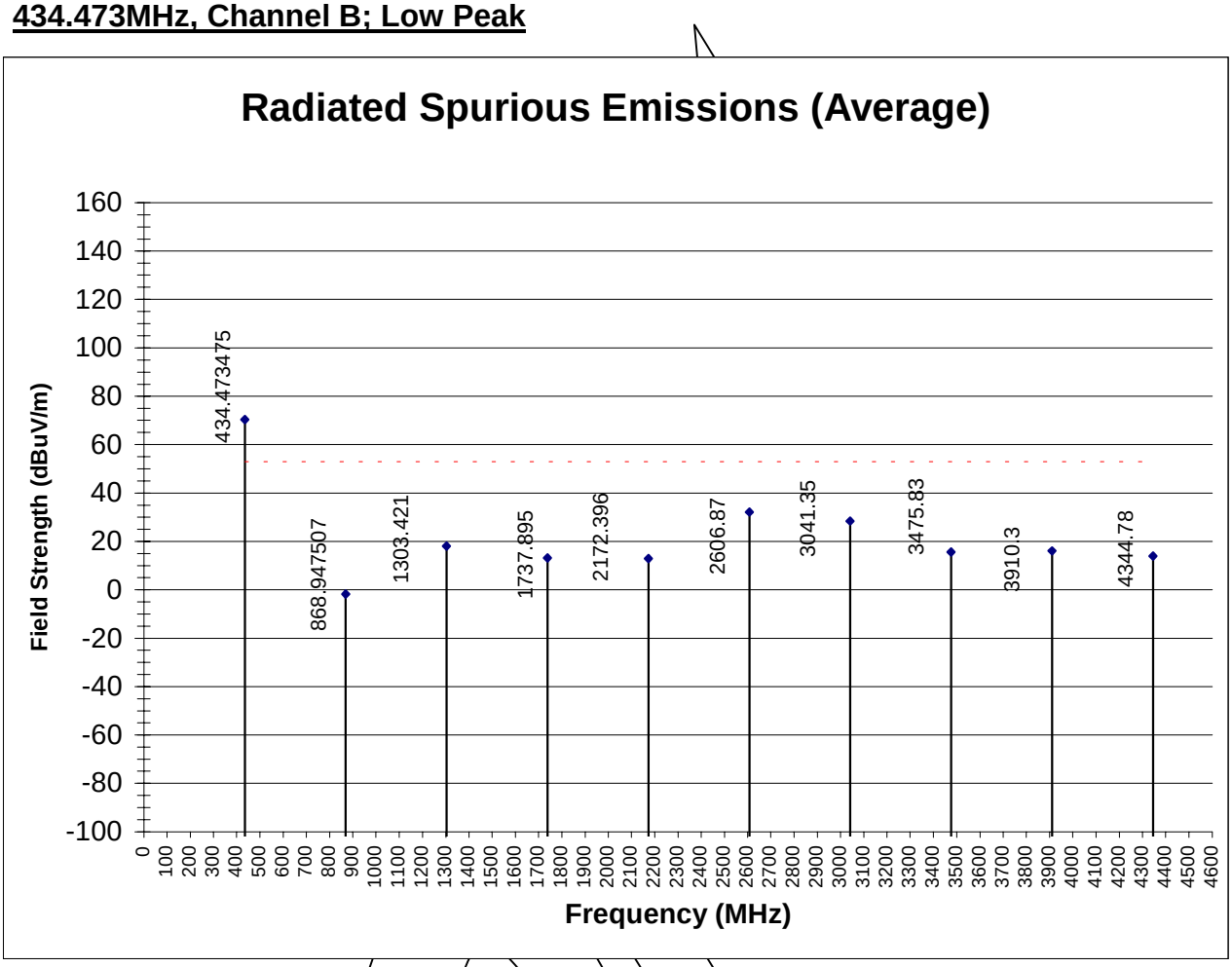
Freq. (MHz)	Harmonic	Measured Signal (dBµV)	Equipment Attenuation (dB)	Signal (dBµV)	Average Signal with Correction – 20 dB (dBµV) (* see 3.4)	Corrected Limit Line Peak (72.88 – 20dB correction) (dBµV) (* see 3.3)	Delta Limit Peak (dB)	Delta Limit Average (dB)
433.201	1st	62.3	20.0	82.3	62.3	72.88	NA	NA
866.403	2nd	-4.7	26.0	21.3	1.3	52.88	-31.6	-51.58
1299.604	3rd	1.5	32.0	33.5	13.5	52.88	-19.4	-39.38
1732.806	4th	-3.4	35.0	31.6	11.6	52.88	-21.3	-41.28
2166.008	5th	34.6	2.3	36.9	16.9	52.88	-16.0	-35.98
2599.210	6th	49.3	6.4	55.7	35.7	52.88	2.8	-17.18
3032.412	7th	40.4	9.9	50.3	30.3	52.88	-2.6	-22.58
3465.614	8th	24.7	13.1	37.8	17.8	52.88	-15.1	-35.08
3898.816	9th	18.6	16.6	35.2	15.2	52.88	-17.7	-37.68
4332.018	10th	22.3	18.2	40.5	20.5	52.88	-12.4	-32.38

433.350MHz, Channel A; High Peak

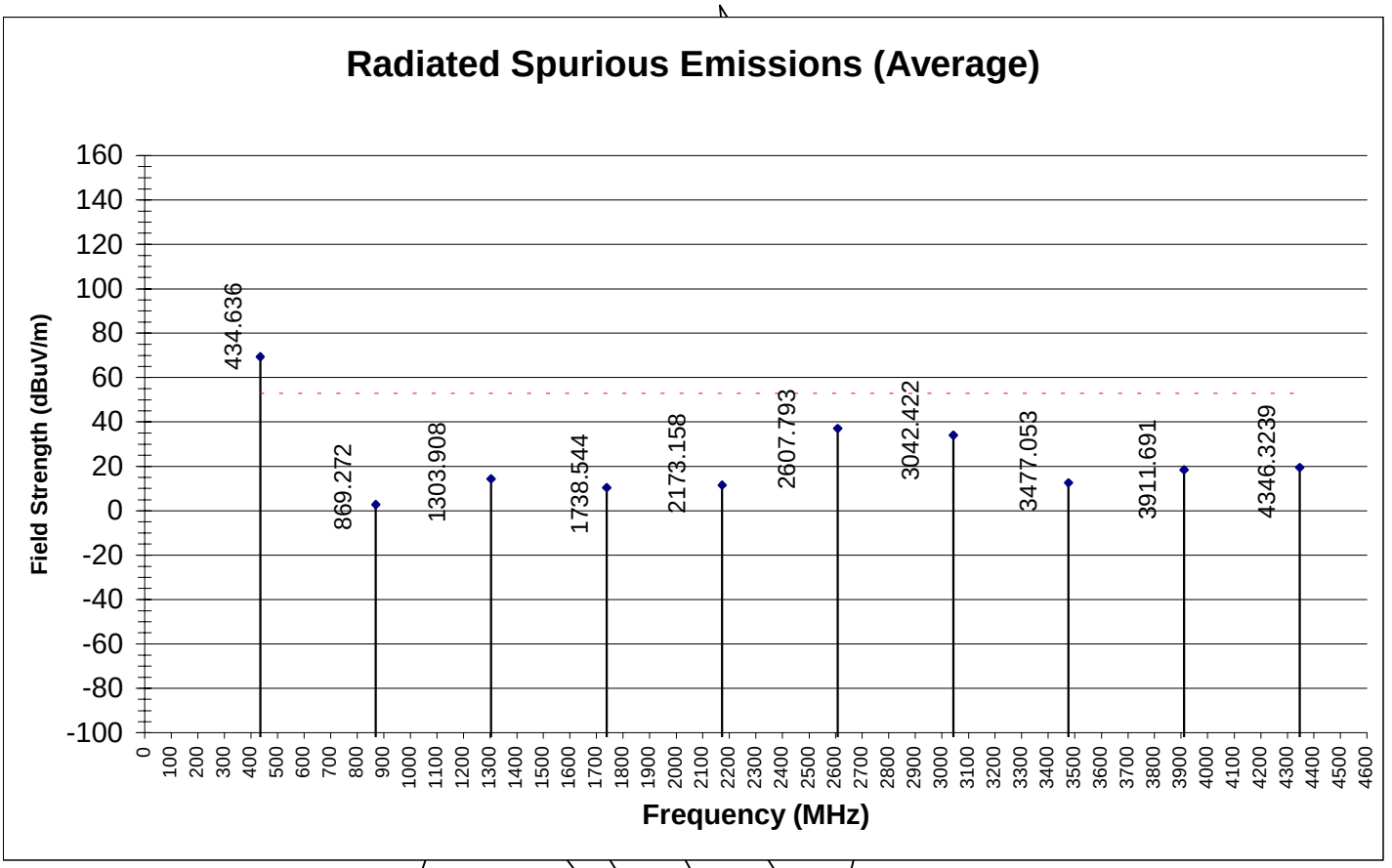


Freq. (MHz)	Harmonic	Measured Signal (dBµV)	Equipment Attenuation (dB)	Signal (dBµV)	Average Signal with Correction – 20 dB (dBµV) (* see 3.4)	Corrected Limit Line Peak (72.88 – 20dB correction) (dBµV) (* see 3.3)	Delta Limit Peak (dB)	Delta Limit Average (dB)
433.350	1st	62.6	20.3	82.9	62.9	72.88	NA	NA
866.700	2nd	-4.9	27.1	22.2	2.2	52.88	-30.68	- 50.68
1300.050	3rd	2.2	32.0	34.2	14.2	52.88	-18.68	- 38.68
1733.401	4th	-2.9	35.4	32.5	12.5	52.88	-20.38	- 40.38
2166.758	5th	34.3	2.8	37.1	17.1	52.88	-15.74	- 35.78
2600.108	6th	51.3	6.4	57.7	37.7	52.88	4.82	- 15.18
3033.459	7th	46.4	10.0	56.4	36.4	52.88	3.52	- 16.48
3466.809	8th	23.6	13.4	37.0	17.0	52.88	-15.88	- 35.88
3900.164	9th	21.0	16.6	37.6	17.6	52.88	-15.25	- 35.28
4333.515	10th	22.4	18.3	40.7	20.7	52.88	-12.18	- 32.18

434.473MHz, Channel B; Low Peak



Freq. (MHz)	Harmonic	Measured Signal (dBµV)	Equipment Attenuation (dB)	Signal (dBµV)	Average Signal with Correction – 20 dB (dBµV) (* see 3.4)	Corrected Limit Line Peak (72.88 – 20dB correction) (dBµV) (* see 3.3)	Delta Limit Peak (dB)	Delta Limit Average (dB)
434.473	1st	70.4	20.0	90.4	70.4	72.88	NA	NA
868.948	2nd	-7.7	26.0	18.3	-1.7	52.88	-34.58	- 54.58
1303.421	3rd	6.1	32.0	38.1	18.1	52.88	-14.78	- 34.78
1737.895	4th	-1.8	35.0	33.2	13.2	52.88	-19.68	- 39.68
2172.396	5th	30.6	2.3	32.9	12.9	52.88	-19.96	- 39.98
2606.870	6th	45.7	6.4	52.1	32.1	52.88	-0.78	- 20.78
3041.350	7th	38.5	9.9	48.4	28.4	52.88	-4.48	- 24.48
3475.830	8th	22.6	13.1	35.7	15.7	52.88	-17.23	- 37.18
3910.300	9th	19.4	16.6	36.0	16.0	52.88	-16.85	- 36.88
4344.780	10th	15.8	18.2	34.0	14.0	52.88	-18.88	- 38.88



434.635MHz, Channel B; High Peak

Freq. (MHz)	Harmonic	Measured Signal (dBµV)	Equipment Attenuation (dB)	Signal (dBµV)	Average Signal with Correction – 20 dB (dBµV) (* see 3.4)	Corrected Limit Line Peak (72.88 – 20dB correction) (dBµV) (* see 3.3)	Delta Limit Peak (dB)	Delta Limit Average (dB)
434.636	1st	69.3	20.0	89.3	69.3	72.88	NA	NA
869.272	2nd	-3.2	26.0	22.8	2.8	52.88	-30.08	- 50.08
1303.908	3rd	2.4	32.0	34.4	14.4	52.88	-18.48	- 38.48
1738.544	4th	-4.6	35.0	30.4	10.4	52.88	-22.48	- 42.48
2173.158	5th	29.2	2.3	31.5	11.5	52.88	-21.36	- 41.38
2607.793	6th	50.7	6.4	57.1	37.1	52.88	4.22	- 15.78
3042.422	7th	44.1	9.9	54.0	34.0	52.88	1.12	- 18.88
3477.053	8th	19.6	13.1	32.7	12.7	52.88	-20.23	- 40.18
3911.691	9th	21.8	16.6	38.4	18.4	52.88	-14.45	- 34.48
4346.324	10th	21.3	18.2	39.5	19.5	52.88	-13.38	- 33.38

4. Duration of Transmission and Minimum Silent Period

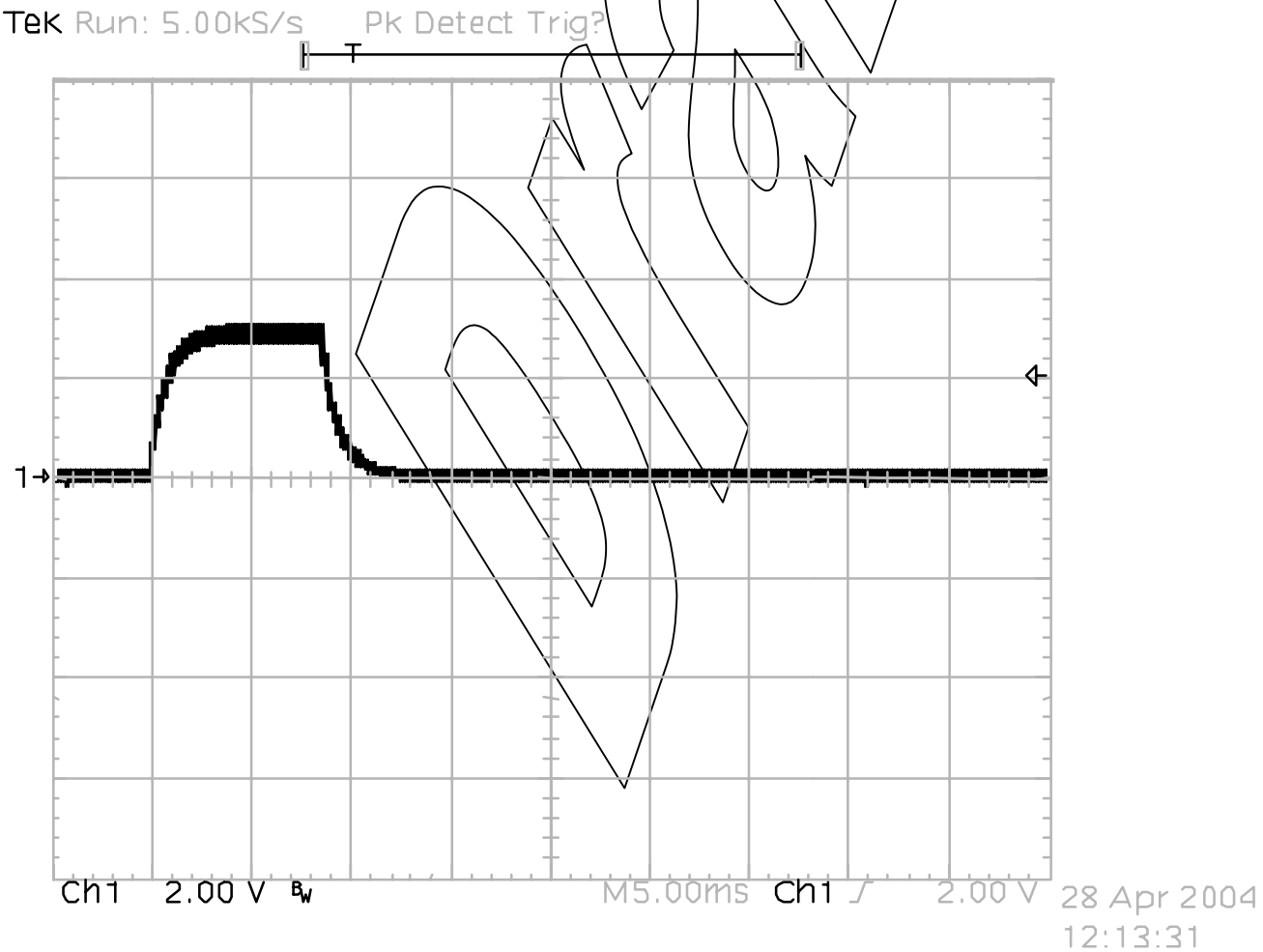
4.1 Regulation

15.231(e) In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

4.2 Result

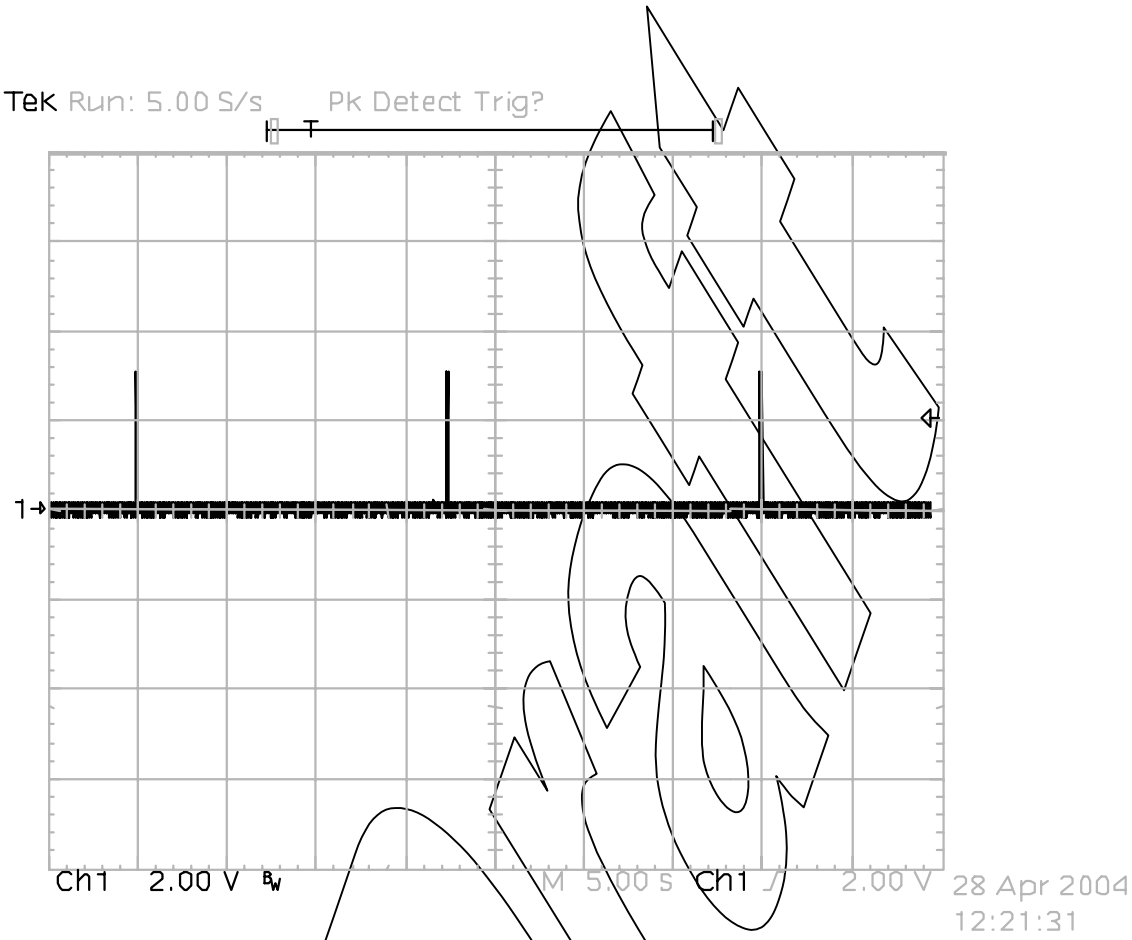
When in operation, this device transmits for a maximum period of 8 milliseconds. The silent period between transmissions is 17.5 seconds. Therefore, this device meets the criteria as set out in Section 15.231(e). The results are contained in the following plots taken from an Oscilloscope.

Plot showing the Pulse Duration:



Plot of RF output amplifier enable signal PAEN at test point TP28.
Transmit pulse width is 8ms nominal.

Plot showing the Pulse Period and Silent Period:



Plot of RF output amplifier enable signal PAEN at test point TP28.
Transmit period is 17.5s nominal.

5. 20dB Bandwidth

5.1 Regulation

15.231 (C) - The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

5.2 Calculation of 20dB Bandwidth and Result

The 20dB bandwidth limit = (0.0025 x 433 MHz) = 1.08MHz.

The measured 20dB bandwidth limit is:
Channel A – 433.28 MHz 570 kHz
Channel B – 434.55 MHz 496KHz

6. Frequency Tolerance in the 40.66MHz to 40.76MHz Band

6.1 Regulation

15.231(d) - For devices operating within the frequency band 40.66 - 40.70 MHz, the bandwidth of the emission shall be confined within the band edges and the frequency tolerance of the carrier shall be +0.01%. This frequency tolerance shall be maintained for a temperature variation of -20 degrees to +50degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

6.2 Result

Not applicable. The EUT does not transmit in this band.

7. Restricted Bands Review

7.1 Regulation

15.205(b) - Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

7.2 Result

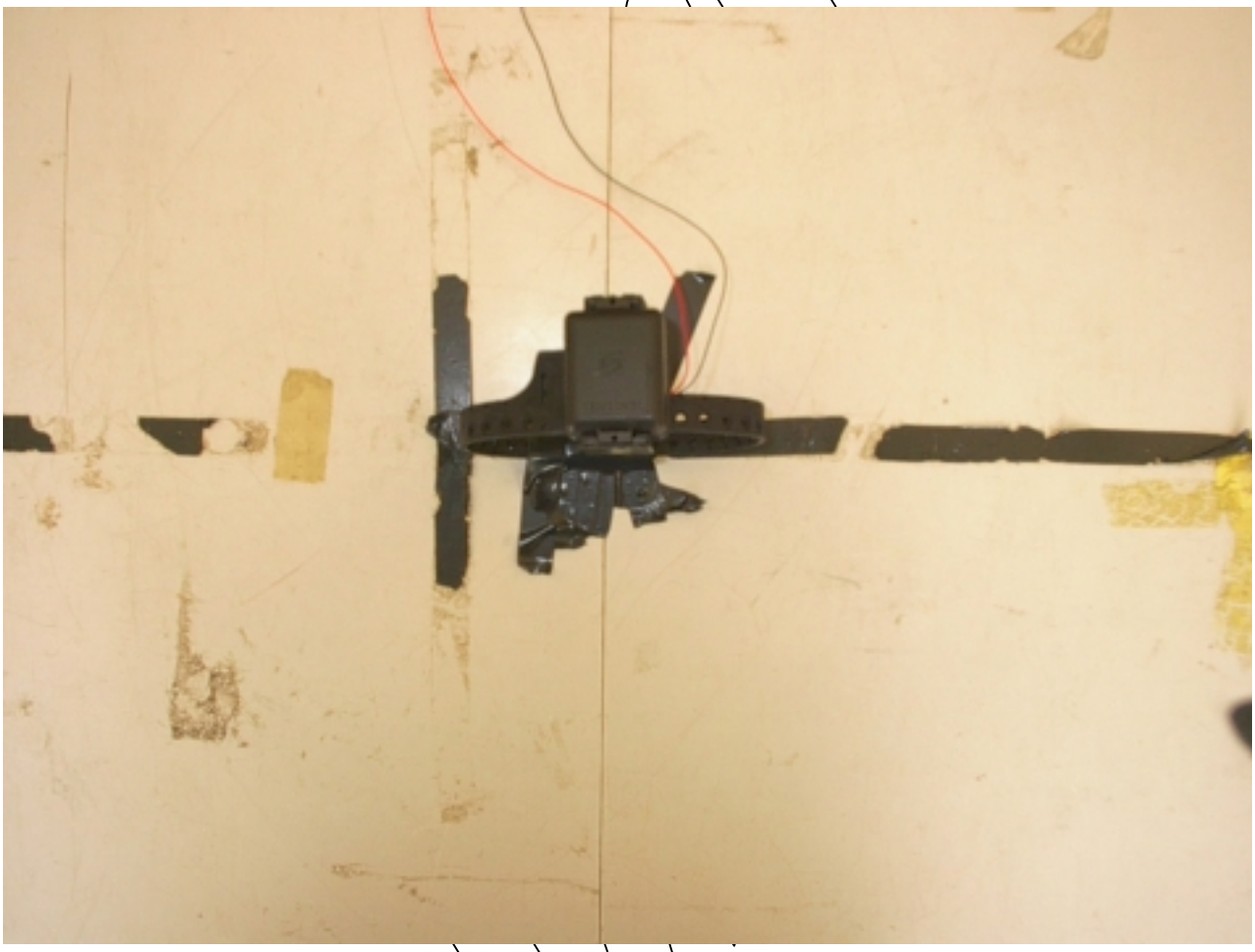
The spurious frequencies that have been identified are the 3rd, 9th and 10th Harmonics, in the restricted bands1300-1427 and 3600-4400. Based on the perimeters of FCC Section 15.209, the calculation of the Spurious Emission limits allow for a peak limit of 52.88dB.

Referring to my tables and results in section 3.5, all frequencies in the restricted bands are below this limit.

Test Setup Photos:

Emission Set Up Front View

Emission Set Up Back View



Emission Set Up/Table Top