ION Digital LLP

FP43301

Report of Measurements

Per

CFR47, FCC Part 15, Subpart B and C

Revision 1.0

October 24, 2002

Approvals		
Written By:	**Craig Long**	**Date**
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/B Report of Measurements

Testing Details:

TESTED BY: Robert Stirling\ Bruce Balston

TEST CONDITIONS: Temperature and Humidity: 19°C, 60%

TEST VOLTAGE: 3.0 V Lithium Battery

Test Facilities:

Protocol Labs
28945 McTavish Rd.
Abbotsford B.C., 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	09/26/02	09/26/03
Antenna	EMCO 3141 Bilog	1127	09/13/01	09/13/02
Antenna	EMCO 3105	2024	09/10/01	09/10/02
Spectrum Analyzer	Hewlett Packard 8566B	2241A02102	01/10/02	01/10/03
RF-Preselector	Hewlett Packard 85685A	3107A01222	01/10/02	01/10/03
Quasi-Peak Adapter	Hewlett Packard 85650A	2043A00240	01/10/02	01/10/03
Tower	Rhientech Labs	Custom	N/A	N/A
Turntable	Protocol	Custom	N/A	N/A

Equipment Under Test:

THE TEST SYSTEM:	**EUT**	**Security / Remote Control Transmitter**
	Manufacturer	ION Digital LLP
	Part Number	FP43301
	Serial Number	200016
	Emissions Designator:	N1D0k0

TEST SETUP: For the unintentional radiator portion of the testing the EUT was placed in receive mode, and for the Spurious emissions testing the EUT was placed in transmit mode for the duration of the testing.

TEST SUMMARY:

Test	Standard	Description	Result
Radiated Emissions	FCC15.109 15.209 Class B Limits	The Radiated Emissions are measured from 30 MHz to 1000 MHz	Complies
Radiated Spurious	FCC 2.103/ 2.1053, 15.231	The radiated emissions are measured up to the 10^{th} Harmonic	Complies
Occupied Bandwidth	FCC 2.1049	A Radiated measurement of the fundamental	Complies
Spurious Emissions at Antenna Terminal	FCC 2.1035/ 2.1051	The radiated emissions are measured in the 30-1000Mhz range	Complies

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

CONCLUSION: FP43301 tested complies with the requirements of FCC CFR47 part 15/B and 15/C

Part 1 - Radiated Emission Testing

DATE: October 23, 2002

TEST STANDARD: FCC CFR47, Part 15, Subpart B section 15.109/ 15.209 Class B

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

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

MINIMUM STANDARD: Class B Limits:

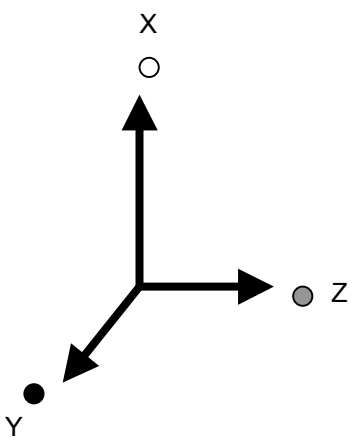
Frequency (MHz)	Maximum Field Strength dBuV/m at 3m
30 - 88	39.0
88 - 216	43.5
216 - 960	46.5
960 - up	49.5

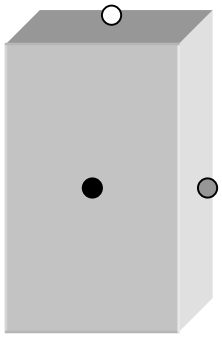
MEASUREMENT DATA: See Appendix B for Plots, The blue trace represents all emissions, including ambient noise. 'All Suspects' are marked in purple. FCC Class B limits are marked in solid purple.

EMISSIONS DATA: See Table 1 and 2 in Appendix B for corresponding frequencies.

PERFORMANCE: Complies.

COMMENTS: This device was tested in all the ways it could be mounted in the field. All the measurments made at the worst case position for that frequency.





Device Antenna Facing the Measurment Antenna

Part 2 - Radiated Spurious Emissions

DATE: August 18, 2002

TEST STANDARD: FCC CFR47, Part 2, 103, and 1053

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

TEST SETUP: The equipment was set up at a 3 m measurement distance, and. Spurious emissions we measured in both horizontal and vertical polarization's with signal strength and the results recorded on the attached graph and tables.

MINIMUM STANDARD: The limit for harmonics is 20 dBc. The fundumental 's limit is 80.8 dBµV/m.

Calculation of Averge Correction Factor is;

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 systemtransmitter worst case on time in any 100 sec time period is an on time 17msec.

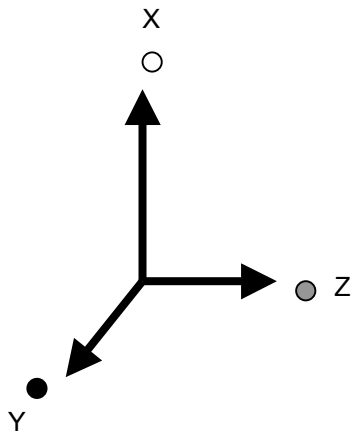
Correction Factor (dB) = 20*log(17/100) = -15.39

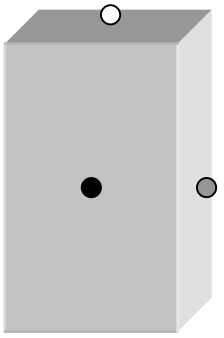
EMISSIONS DATA: See Appendix D, for Harmonics Data and Plots

MEASUREMENT PROCEDURE: A bilog and horn antenna located 3 meters away from the transmitter picks up any signal radiated from the transmitter. A spectrum analyzer covering the necessary frequency range is used to detect and measure any radiation picked up by the antenna. The testing procedure is repeated for both horizontal and vertical polarization's of the receiving antenna. Relative signal strength is indicated on the spectrum analyzer connected to this antenna., and the cable losses, amplifier gain and antenna correction factor are added to calculate the signal strength. Actual measurements are recorded on the attached graphs.

PERFORMANCE: Complies.

MEASURMENT POSITIONS:



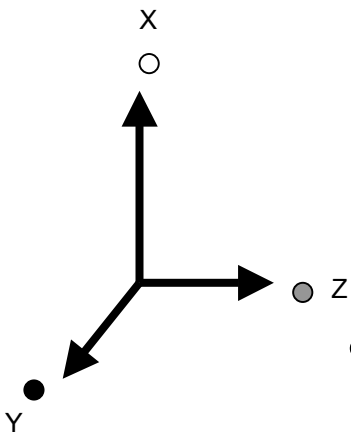


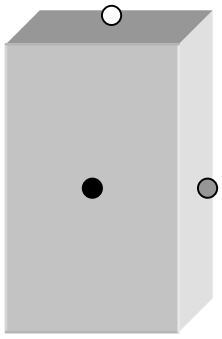
Device Antenna Facing the Measurment Antenna

Position Y was determined to be the worst case for all measurments.

Part 3 - Occupied Bandwidth

DATE:	October 23, 2002
TEST STANDARD:	FCC CFR47, Part 2.1049
DEVICE DESCRIPTIONS:	Refer to the Equipment Under Test Section, above, for EUT Descriptions.
TEST SETUP:	The equipment under test was placed in its normal transmitting mode for the duration of the test.
BANDWIDTH LIMIT:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier. (FCC Part 15.231)
	Calculation of 20dB Bandwidth and Result
	The 20dB bandwidth limit = 0.0025* 433.92 MHz = 1.0848 MHz
	The measured 20dB bandwidth is 42 kHz
MEASUREMENT DATA:	See Appendix C for Graphs
EMISSIONS DATA:	See Appendix C for corresponding frequencies
MEASUREMENT PROCEDURE:	The occupied bandwidth test was performed on the equipmentunder test while it was transmitting at full power. The occupied bandwidth test was conducted in accordance with FCC Part 2.
PERFORMANCE:	Complies.
MEASURMENT POSITIONS:	





Device Antenna Facing the Measurment Antenna

Position Y was determined to be the worst case for all measurments.

Appendix A: Photos

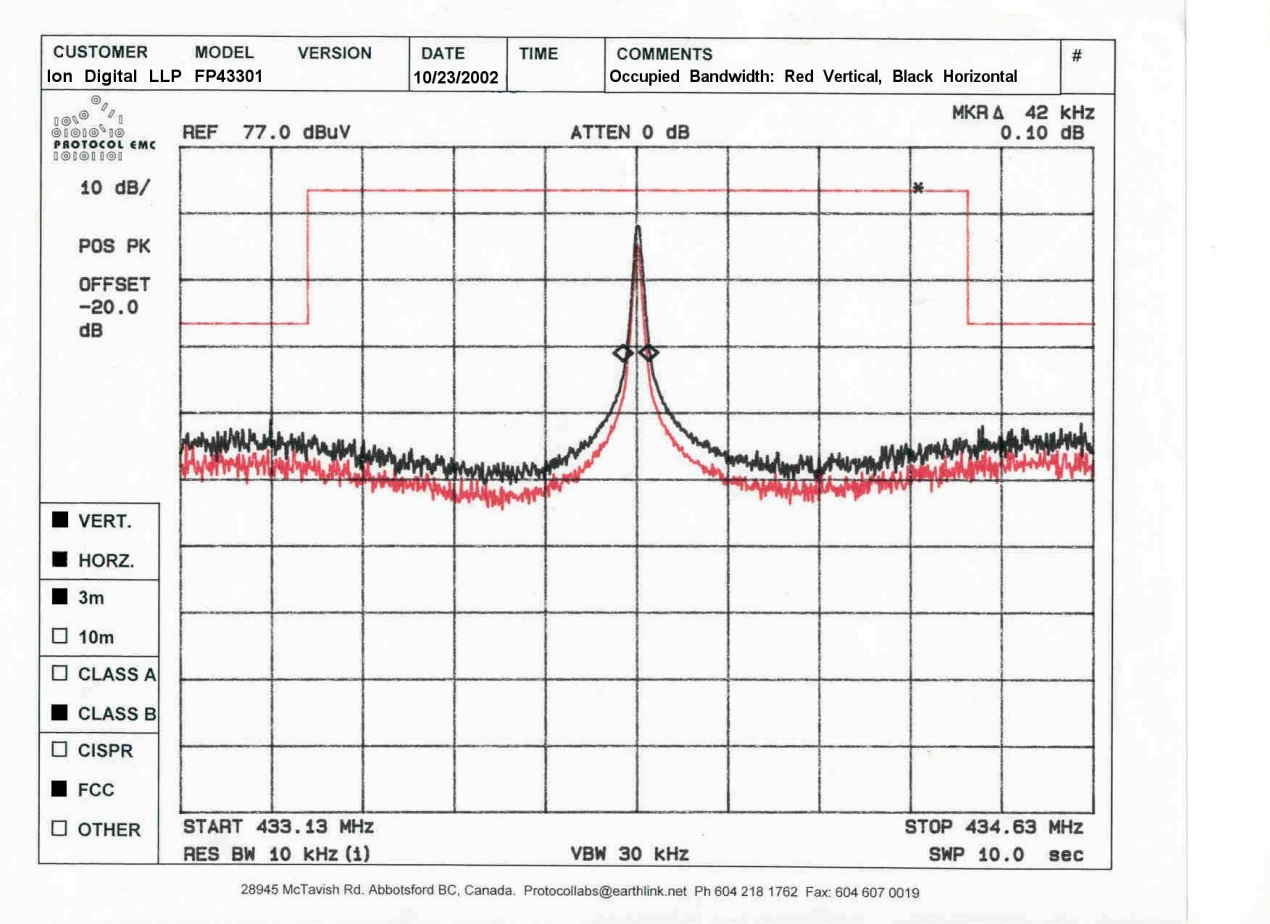
Emissions Test Setup

Appendix B: FCC Part 15/B Measurement Data and Plots

There were no measureable signals while the device was in “Stand by” mode.

Appendix C: Occupied Bandwidth

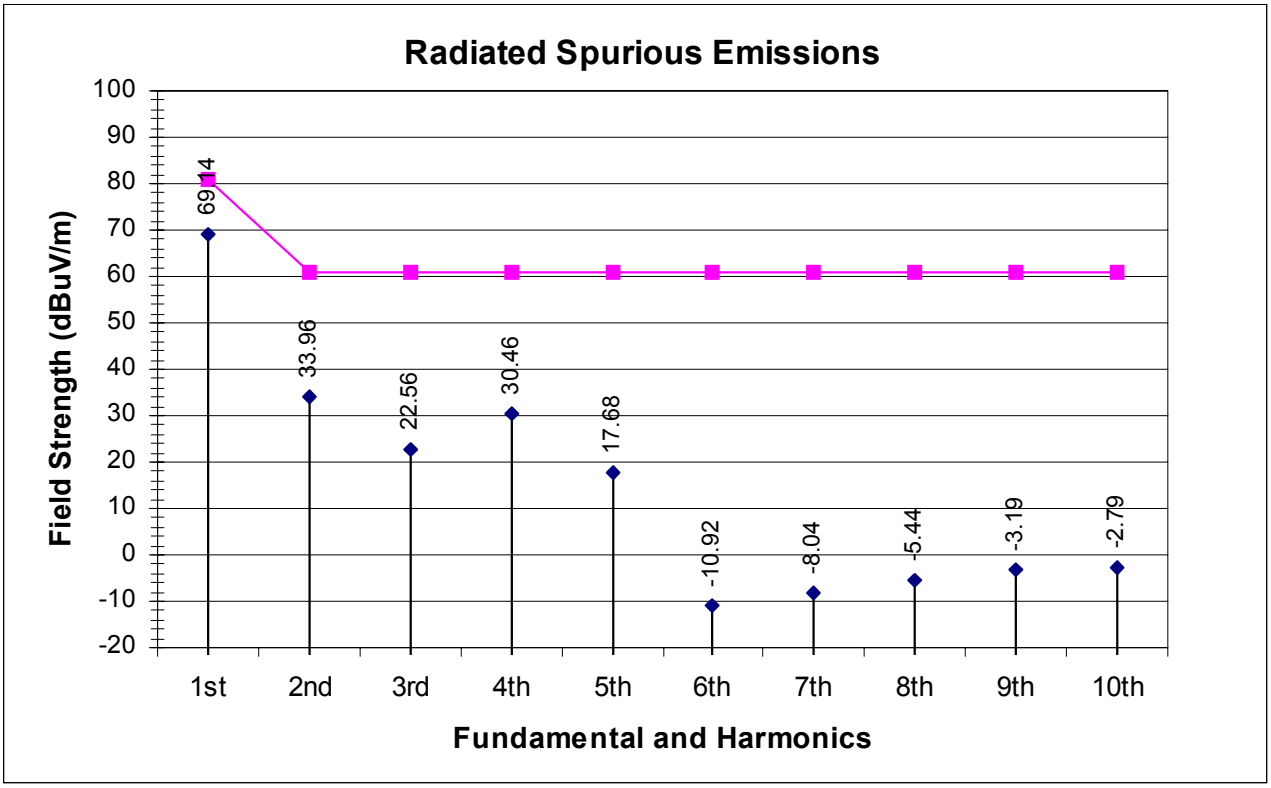
Occupied Bandwidth for 433.92 MHz



Occupied Bandwidth Plot

Appendix D: Harmonic Measurements

Harmonics for 433.92 MHz



Harmonic	Frequency (MHz)	Position	Polarity	Uncor Pk (dBuV)	Tot Corr (dB)	Peak (dbuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Delta Limit (dB)	dBc
1st	433.92	Y	V	65.10	19.433	84.53	69.14	80.8	-11.66	
2nd	867.84	X	H	22.4	26.95	49.35	33.95	60.8	-26.85	-46.85
3rd	1301.76	X	H	6	31.95	37.95	22.55	60.8	-38.25	-58.25
4th	1735.68	Y	H	10.5	35.353	45.85	30.46	60.8	-30.34	-50.34
5th	2169.60	X	H	39.9	-6.8251	33.07	17.68	60.8	-43.12	-63.12
6th	2603.52	Y	V	7.61	-3.1392	4.47	-10.92	60.8	-71.72	-91.72
7th	3037.44	Y	V	6.57	0.7766	7.35	-8.04	60.8	-68.84	-88.84
8th	3471.36	Y	V	6.05	3.9018	9.95	-5.43	60.8	-66.23	-86.23
9th	3905.28	Y	V	5.11	7.088	12.20	-3.19	60.8	-63.99	-83.99
10th	4339.20	Y	V	3.78	8.819	12.60	-2.79	60.8	-63.59	-83.59