

*FCC PART 15, SUBPART B and C
TEST REPORT*
for
TRANSMITTER
MODEL: 84-941-XX

Prepared for

 SHURflo, LLC
 5900 KATELLA AVENUE
 CYPRESS, CALIFORNIA 90630

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KYLE FUJIMOTO

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JAMES ROSS

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DATE: MAY 16, 2006

	REPORT BODY	APPENDICES					TOTAL
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	
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1	Plot Map And Layout of Radiated Test Site



GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Device Tested: Transmitter
 Model: 84-941-XX
 S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified in order to meet the specifications.

Manufacturer: SHURflo, LLC
 5900 Katella Avenue
 Cypress, California 90630

Test Dates: May 10 and 15, 2006

Test Specifications: EMI requirements
 CFR Title 47, Part 15 Subpart B; and Subpart C, Sections 15.205, 15.209, and 15.231

Test Procedure: ANSI C63.4

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	This test was not performed because the EUT operates on batteries only and cannot be plugged into the AC public mains.
2	Radiated RF Emissions, 10 kHz – 4340 MHz	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.
3	-20 dB Bandwidth of the Fundamental	Complies with the limits of Subpart C, sections 15.231 [c].



1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Transmitter Model: 84-941-XX. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.



2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

SHURflo, LLC

Bernard Perkins	Project Engineer
Quang Truong	Electrical Engineer

Compatible Electronics, Inc.

Kyle Fujimoto	Test Engineer
James Ross	Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to its qualification testing on May 10, 2006.

2.5 Disposition of the Test Sample

The test sample has not been returned to SHURflo, LLC as of May 16, 2006.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
PCB	Printed Circuit Board
TX	Transmit
RX	Receive



3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4: 2003	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz



4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The Transmitter Model: 84-941-XX (EUT) was tested as a stand-alone unit and tested in three orthogonal axis. The EUT was continuously transmitting.

The antenna is a trace on the PCB of the EUT.

The EUT will only transmit when a button is being pressed down. The EUT will cease operation immediately after the button is released.

The final radiated data was taken in the mode described above. Please see Appendix E for the data sheets.



4.1.1 **Cable Construction and Termination**

There were no external cables connected to the EUT.



5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
TRANSMITTER (EUT)	SHURflo, LLC	84-941-XX	N/A	TLC-84941XXB



5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
GENERAL TEST EQUIPMENT USED FOR ALL RF EMISSIONS TESTS					
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	3638A08784	June 10, 2005	June 10, 2006
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	3701A22279	June 10, 2005	June 10, 2006
Quasi-Peak Adapter	Hewlett Packard	85650A	2430A00424	June 11, 2005	June 11, 2006
Computer	Hewlett Packard	4530	US91912319	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100172	October 28, 2004	October 28, 2006
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
RF RADIATED EMISSIONS TEST EQUIPMENT					
Radiated Emissions Data Capture Program	Compatible Electronics	2.0	N/A	N/A	N/A
Preamplifier	Com Power	PA-103	1582	January 19, 2006	Jan. 19, 2007
Biconical Antenna	Com Power	AB-900	15251	March 9 2006	March 9 2007
Log Periodic Antenna	Com Power	AL-100	16247	August 22, 2005	Aug. 22, 2006
Loop Antenna	Com Power	AL-130	17089	September 21, 2005	Sept. 21, 2006
Horn Antenna	Com Power	AH-118	10067	July 27, 2004	July 27, 2006
Microwave Preamplifier	Com Power	PA-122	181917	January 20, 2006	Jan. 20, 2007
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A



6. TEST SITE DESCRIPTION**6.1 Test Facility Description**

Please refer to section 2.1 and 7.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.



7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer and EMI Receiver were used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-103 was used for frequencies from 30 MHz to 1 GHz, and the Com-Power Microwave Preamplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer and EMI Receiver record the highest measured reading over all the sweeps.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 4.34 GHz	1 MHz	Horn Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results. The loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.



Radiated Emissions (Spurious and Harmonics) Test (continued)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with the limits of CFR Title 47, Part 15, Subpart B; and Subpart C, section 15.205, 15.209 and 15.231 for radiated emissions.

7.2

Bandwidth of the Fundamental

The -20 dB bandwidth was checked to see that it was within 0.25% of the fundamental frequency for the EUT. Photographs of the -20 dB bandwidth are located in Appendix E.

Test Results:

The EUT complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231 [c].



8. CONCLUSIONS

The Transmitter, Model: 84-941-XX meets all of the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.



APPENDIX A

LABORATORY RECOGNITIONS



LABORATORY RECOGNITIONS

Compatible Electronics has the following agency accreditations:

National Voluntary Laboratory Accreditation Program - Lab Code: 200528-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

Compatible Electronics is recognized or on file with the following agencies:

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)



APPENDIX B

MODIFICATIONS TO THE EUT



MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.231 or FCC Class B specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT.



APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT



ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Transmitter
Model: 84-941-XX
S/N: N/A

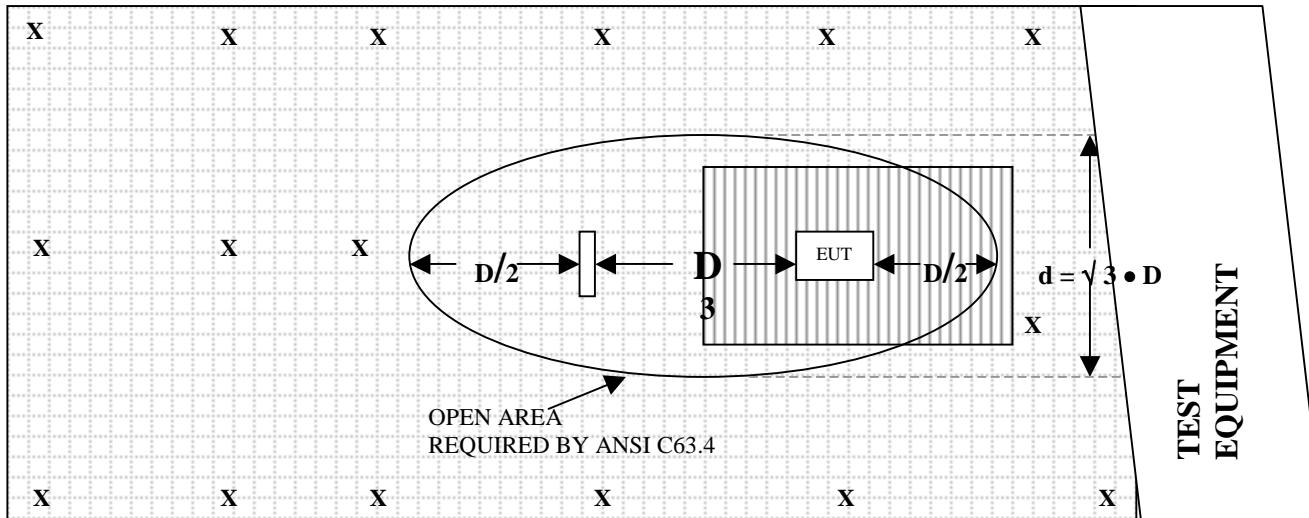
There were no additional models covered under this report.



APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS



FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED TEST SITE
OPEN LAND > 15 METERS
OPEN LAND > 15 METERS

OPEN LAND > 15 METERS

	= GROUND RODS		= GROUND SCREEN
	= TEST DISTANCE (meters)		= WOOD COVER



COM-POWER AB-900**BICONICAL ANTENNA****S/N: 15251****CALIBRATION DATE: MARCH 9, 2006**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	11.27	120	13.04
35	10.29	125	12.67
40	9.72	140	11.91
45	11.45	150	11.61
50	13.34	160	13.67
60	11.44	175	15.97
70	8.41	180	16.64
80	6.21	200	16.54
90	7.50	250	16.96
100	11.65	300	17.48



COM-POWER AL-100**LOG PERIODIC ANTENNA****S/N: 16247****CALIBRATION DATE: AUGUST 22, 2005**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	12.70	700	19.72
400	13.19	800	20.59
500	14.99	900	21.10
600	15.95	1000	24.35



COM-POWER PA-103**PREAMPLIFIER****S/N: 1582****CALIBRATION DATE: JANUARY 19, 2006**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	32.7	300	32.4
40	32.6	350	32.4
50	32.6	400	32.1
60	32.8	450	32.1
70	32.7	500	31.8
80	32.7	550	31.8
90	32.7	600	32.0
100	32.6	650	31.9
125	32.6	700	31.5
150	32.5	750	31.7
175	32.4	800	31.4
200	32.5	850	31.6
225	32.5	900	30.8
250	32.3	950	31.1
275	32.4	1000	30.9



COM-POWER PA-122**PREAMPLIFIER****S/N: 181917****CALIBRATION DATE: JANUARY 20, 2006**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	34.697	10.0	36.558
1.5	33.817	10.5	35.048
2.0	33.587	11.0	33.258
2.5	33.804	11.5	32.960
3.0	33.850	12.0	33.312
3.5	33.943	12.5	33.836
4.0	34.399	13.0	34.178
4.5	34.847	13.5	34.197
5.0	35.172	14.0	33.769
5.5	35.383	14.5	33.392
6.0	35.539	15.0	33.387
6.5	34.802	15.5	34.038
7.0	33.793	16.0	34.884
7.5	33.511	16.5	35.740
8.0	33.910	17.0	35.341
8.5	34.907	17.5	34.729
9.0	36.036	18.0	33.760
9.5	36.661		



COM POWER AH-118**HORN ANTENNA****S/N: 10067****CALIBRATION DATE: JULY 27, 2004**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	25.0	10.0	37.8
1.5	27.9	10.5	39.4
2.0	31.5	11.0	39.4
2.5	31.1	11.5	40.6
3.0	30.6	12.0	40.8
3.5	30.5	12.5	40.5
4.0	30.6	13.0	41.2
4.5	31.4	13.5	42.0
5.0	33.7	14.0	43.1
5.5	33.8	14.5	43.4
6.0	34.7	15.0	39.2
6.5	35.0	15.5	38.8
7.0	35.9	16.0	40.1
7.5	38.1	16.5	40.2
8.0	38.2	17.0	43.4
8.5	37.7	17.5	46.6
9.0	37.7	18.0	45.8
9.5	38.4		



COM-POWER AL-130

LOOP ANTENNA

S/N: 17089

CALIBRATION DATE: SEPTEMBER 21, 2005

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-42.84	8.66
0.01	-41.93	9.57
0.02	-41.29	10.21
0.05	-42.37	9.13
0.07	-41.8	9.7
0.1	-41.83	9.67
0.2	-44.13	7.37
0.3	-41.73	9.77
0.5	-41.8	9.7
0.7	-41.53	9.97
1	-41.46	10.04
2	-41.14	10.36
3	-41.26	10.24
4	-41.46	10.04
5	-41.10	10.40
10	-40.83	10.67
15	-41.47	10.03
20	-35.44	16.06
25	-42.37	9.13
30	-42.94	8.56





FRONT VIEW

SHURFlo, LLC
TRANSMITTER
MODEL: 84-941-XX

FCC SUBPART B AND C – RADIATED EMISSIONS – 10 kHz to 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



**REAR VIEW**

SHURFlo, LLC
TRANSMITTER
MODEL: 84-941-XX

FCC SUBPART B AND C – RADIATED EMISSIONS – 10 kHz to 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**





FRONT VIEW

SHURFlo, LLC
TRANSMITTER
MODEL: 84-941-XX

FCC SUBPART B AND C – RADIATED EMISSIONS – 1 GHz to 4.34 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**





REAR VIEW

SHURFlo, LLC
TRANSMITTER
MODEL: 84-941-XX

FCC SUBPART B AND C – RADIATED EMISSIONS – 1 GHz to 4.34 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



APPENDIX E

DATA SHEETS



RADIATED EMISSIONS

DATA SHEETS



RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	SHURflo, LLC	DATE	5/10/2006
EUT	Transmitter	DUTY CYCLE	13.68 %
MODEL	89-941-XX	PEAK TO AVG	-17.2782781 dB
S/N	N/A	TEST DIST.	3 Meters
TEST ENGINEER	Kyle Fujimoto	LAB	A

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA ≡ SPEC LIMIT - CORRECTED READING

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	SHURflo, LLC	DATE	5/10/2006	
EUT	Transmitter	DUTY CYCLE	13.68 %	
MODEL	89-941-XX	PEAK TO AVG	-17.2782781 dB	
S/N	N/A	TEST DIST.	3	Meters
TEST ENGINEER	Kyle Fujimoto	LAB	A	

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

FCC 15.231

SHURflo, LLC

Transmitter

Model: 84-941-XX

Date: 05/10/06

Lab: B

Tested By: Kyle F.

X-Axis

Duty Cycle: 13.68%

FCC 15.231

SHURflo, LLC

Transmitter

Model: 84-941-XX

Date: 05/10/06

Lab: B

Tested By: Kyle F.

X-Axis

Duty Cycle: 13.68%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1301.76	63.52	H	74	-10.48	Peak	1	135	
1301.76	46.25	H	54	-7.75	Avg	1	135	
1735.7	44.12	H	80.82	-36.7	Peak	2.21	135	
1735.7	26.85	H	60.82	-33.97	Avg	2.21	135	
2169.6	50.56	H	80.82	-30.26	Peak	1.62	135	
2169.6	33.29	H	60.82	-27.53	Avg	1.62	135	
2603.52	41.5	H	80.82	-39.32	Peak	2.42	180	
2603.52	24.23	H	60.82	-36.59	Avg	2.42	180	
3037.44	42.46	H	80.82	-38.36	Peak	2.42	225	
3037.44	25.19	H	60.82	-35.63	Avg	2.42	225	
3471.36	41.83	H	80.82	-38.99	Peak	2.42	135	No Emission
3471.36	24.56	H	60.82	-36.26	Avg	2.42	135	Detected
3905.28	35.26	H	74	-38.74	Peak	2.42	135	No Emission
3905.28	17.99	H	54	-36.01	Avg	2.42	135	Detected
4339.2	39.26	H	74	-34.74	Peak	2.42	135	No Emission
4339.2	21.99	H	54	-32.01	Avg	2.42	135	Detected

FCC 15.231

SHURflo, LLC

Transmitter

Model: 84-941-XX

Date: 05/10/06

Lab: B

Tested By: Kyle F.

Y-Axis

Duty Cycle: 13.68%

FCC 15.231

SHURflo, LLC

Transmitter

Model: 84-941-XX

Date: 05/10/06

Lab: B

Tested By: Kyle F.

Y-Axis

Duty Cycle: 13.68%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1301.76	61.87	H	74	-12.13	Peak	1	180	
1301.76	44.6	H	54	-9.4	Avg	1	180	
1735.7	44.93	H	80.82	-35.89	Peak	1	135	
1735.7	27.66	H	60.82	-33.16	Avg	1	135	
2169.6	48.7	H	80.82	-32.12	Peak	2.02	135	
2169.6	31.43	H	60.82	-29.39	Avg	2.02	135	
2603.52	43.05	H	80.82	-37.77	Peak	1.49	135	
2603.52	25.78	H	60.82	-35.04	Avg	1.49	135	
3037.44	42.29	H	80.82	-38.53	Peak	1.14	135	
3037.44	25.02	H	60.82	-35.8	Avg	1.14	135	
3471.36	42.65	H	80.82	-38.17	Peak	1.14	90	
3471.36	25.38	H	60.82	-35.44	Avg	1.14	90	
3905.28		H	74	-74	Peak			No Emission
3905.28		H	54	-54	Avg			Detected
4339.2		H	74	-74	Peak			No Emission
4339.2		H	54	-54	Avg			Detected

FCC 15.231

SHURflo, LLC

Transmitter

Model: 84-941-XX

Date: 05/10/06

Lab: B

Tested By: Kyle F.

Z-Axis

Duty Cycle: 13.68%

FCC 15.231

SHURflo, LLC

Transmitter

Model: 84-941-XX

Date: 05/10/06

Lab: B

Tested By: Kyle F.

Z-Axis

Duty Cycle: 13.68%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1301.76	58.28	H	74	-15.72	Peak	1.71	135	
1301.76	41.01	H	54	-12.99	Avg	1.71	135	
1735.7	42.34	H	80.82	-38.48	Peak	1.71	90	
1735.7	25.07	H	60.82	-35.75	Avg	1.71	90	
2169.6	54.35	H	80.82	-26.47	Peak	1.74	90	
2169.6	37.08	H	60.82	-23.74	Avg	1.74	90	
2603.52	45.17	H	80.82	-35.65	Peak	1	90	
2603.52	27.9	H	60.82	-32.92	Avg	1	90	
3037.44	44.02	H	80.82	-36.8	Peak	2.19	135	
3037.44	26.75	H	60.82	-34.07	Avg	2.19	135	
3471.36	44.53	H	80.82	-36.29	Peak	1.84	135	
3471.36	27.26	H	60.82	-33.56	Avg	1.84	135	
3905.28		H	74	-74	Peak			No Emission
3905.28		H	54	-54	Avg			Detected
4339.2		H	74	-74	Peak			No Emission
4339.2		H	54	-54	Avg			Detected

FCC Class B and FCC 15.231

SHURflo, LLC

Transmitter

Model: 84-941-XX

Date: 05/10/06

Labs: A and B

Tested By: Kyle F.

Spurious Emissions -- 10 kHz to 4400 MHz

X-Axis - Worst Case

-20 dB BANDWIDTH

DATA SHEET

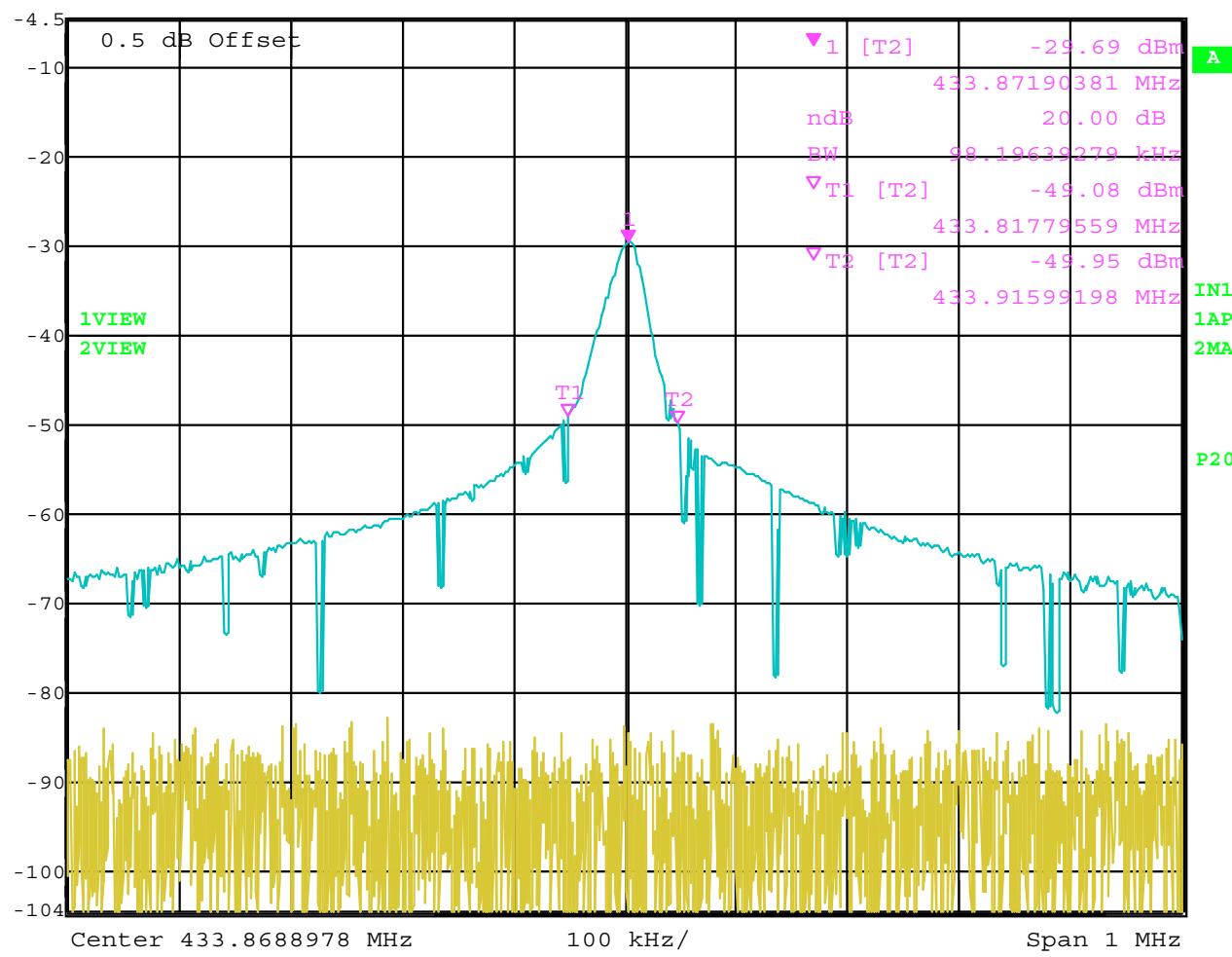




Ref Lvl
-4.5 dBm

Marker 1 [T2 dB]
dB 20.00 dB
BW 98.19639279 kHz

RBW 30 kHz
VBW 100 kHz
SWT 5.5 ms
RF Att Unit
30 dB
dBm



Date: 15.MAY.2006 16:43:02

-20 dB Bandwidth Plot of the Fundamental Emission