NCEE

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Test Report

Company: Adaptivation Inc.
2225 W 50th Street, Suite 100
Sioux Falls, SD

Contact: Jonathan Eckrich

Product: FSM-100
FCC ID: QK7FSM-100

Test Report No: R081402-01-2

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Total Pages: 11

NCEE is a FCC registered lab. Registration #100875

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1.0 Summary of test results

1.1 Test Results

The EUT was shown to comply with the guidelines for intentional radiators according to Parts 15.203, 15.209 and 15.231. See Section 4 for more detailed information. The unit is battery operated and does not connect to the mains network.

1.2 Test Methods

The equipment was tested to comply with CFR 47, Part 15, for intentional radiators. The EUT was tested in accordance to methods of ANSI/IEEE C63.4, 2001. The configuration of the EUT was varied to maximize emissions. All measurements were made at a distance of 3 meters; the antenna height was varied from 1 meter to 4 meters. Both antenna polarizations were examined. The orientation of the EUT was first examined to determine in which position the EUT produced the greatest emissions. New 9V alkaline batteries were used.

2.0 Description

2.1 Equipment under test

The FSM-100 is a battery-powered transmitter designed to work with Wireless Receivers or Powerhouse X-10 modules. The unit is intended to be used by persons unable to operate smaller buttons or reach standard switches.

2.1.1 Identification: FSM-100

2.1.2 EUT received date: 15 August 2002

2.1.3 EUT tested date: August 28th and September 3rd of 2002

2.1.4 Manufacturer: Adaptivation, Inc

2.1.5 Serial numbers: test1

2.2 Laboratory description

All testing was performed at the NCEE Lincoln facility, which is a FCC registered lab. This site has been fully described in a report submitted to the FCC, and accepted in a letter dated May 4, 2001. Laboratory environmental conditions varied slightly throughout the tests:

Relative humidity of 56 ± 5%
Temperature of 24 ± 3° Celsius

2.3 Special equipment or setup

The unit was modified so it would transmit continuously.

3.0 Test equipment used

Serial #	*Manufacturer*	*Model*	*Description*	*Last cal.*
1654	EMCO	3142B	Biconilog antenna	3-May-02
6415	EMCO	3115	DRG Horn ant.	24-Oct-01
100037	Rohde & Schwarz	ESIB26	EMI Test Receiver	11-Jun-02
2575	Rohde & Schwarz	ES-K1	Software v1.60	N/A

4.0 Detailed Results

4.1 FCC Part 15.203

The antenna is soldered to the printed circuit board and there are no connectors attached to it or leading from the case. The plastic case is sealed. Thus the EUT complies with part 15.203.

4.2 FCC Part 15.231

The EUT, SN: test1, was used to first find the orientation of the EUT that provided the worst case. The emissions from the unit were then examined from 30MHz to 4GHz. The antenna was positioned 3m from the EUT and the antenna position was varied between 1 and 4 meters as the EUT was rotated on the turntable. Figures 1 and 2 show the test setup that provided a worst-case configuration; this configuration is also the orientation of typical use. The table below shows the final measurements.

Frequency MHz	Level dBμV/m	Limit dBμV/m	Margin dB	Height cm	Angle deg	Pol.
309.78	59.99	75	15.01	100	195	HORIZONTAL
309.9	62.02	75	12.98	100	200	HORIZONTAL
619.68	29.34	55	25.66	100	262	VERTICAL
896.4	28.19	46	17.81	304	160	HORIZONTAL
929.58	34.65	55	20.35	149	274	HORIZONTAL
1548.16	35.6	53.9	18.3	349	192	HORIZONTAL
2830.66	43.22	53.9	10.68	149	54	HORIZONTAL
3196.54	44.1	53.9	9.8	99	47	HORIZONTAL

All final measurements were taken using a quasi-peak detector set to 120kHz bandwidth for measurements under 1GHz, for measurements over 1GHz an average detector set to 1MHz bandwidth was used. Appendix B contains a plot of the results from 30MHz to 1 GHz (Figure 3) and of the bandwidth (Figure 4) of the fundamental. The signal bandwidth as measured was 200kHz. All measurement results are located in the corresponding interval with a probability of approximately 95% (coverage factor k=2). The interval for these measurements is U_x (expanded uncertainty) = +/- 3.4 dB.

Appendix A

Test setup photos

Figure 1 Test setup

Figure 2 Test setup

Appendix B

Emissions results

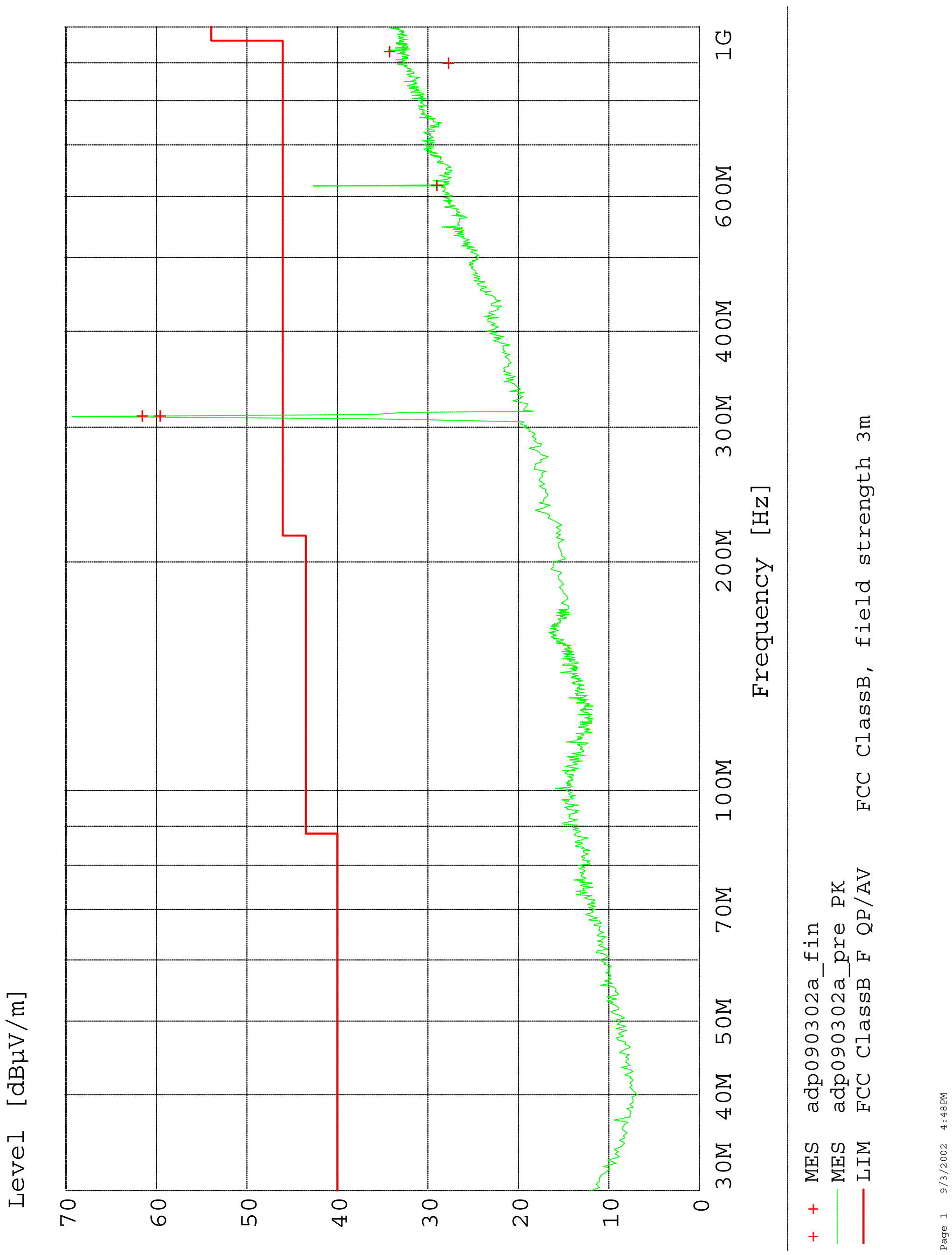

Figure 3 Results of radiated emissions

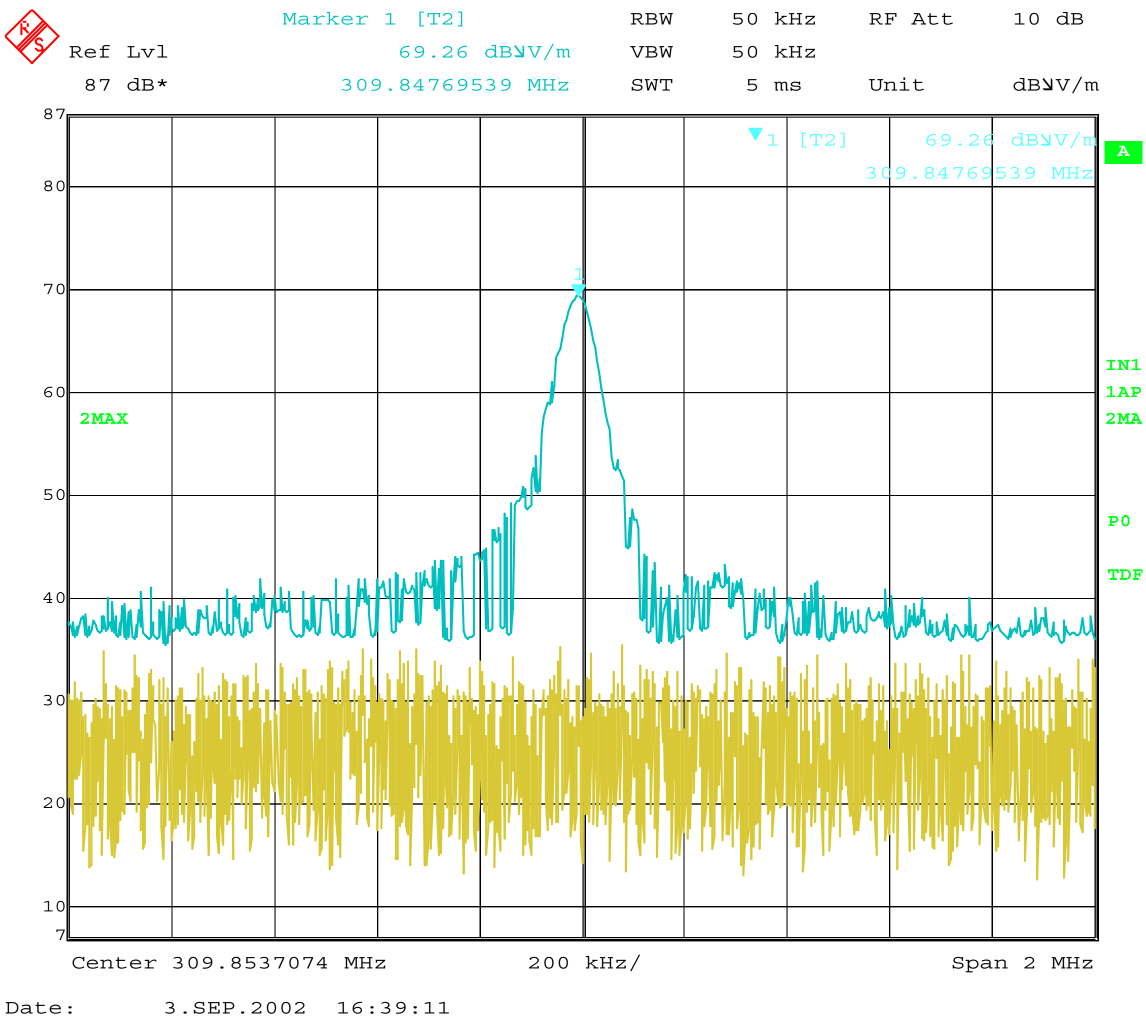

Figure 4 Bandwidth of fundamental

Appendix C

Sample calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

Assume a receiver reading of 55 dBµV is obtained. The Antenna Factor of 12 and a Cable Factor of 1.1 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dBµV/m.

FS = 55 + 12 + 1.1 - 20 = 48.1 dBµV/m

The 48.1 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m = Common Antilogarithm [(48.1 dBµV/m)/20]= 254.1 µV/m