



EMC Test Data

Client:	Handspring	Job Number:	J39377
Model:	Sparky	T-Log Number:	T39387
		Proj Eng:	Mark Hill
Contact:	Dave Chavez		
Emissions Spec:	FCC Part 24 Subpart E	Class:	N/A
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Handspring

Model

Sparky



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Test Configuration Information (1)

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Wavetek	4201S	Communication Test	113337	N/A

Test Configuration Information (2)

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Wavetek	4201S	Communication Test	113337	N/A
Hewlett Packard	E3610A	DC Power Supply	KR8302462	N/A

EUT Operation During Emissions

During radiated emissions the Communication Test Set was used to simulate a Base Station Transmission. An antenna, that was connected to the Comm. Set, was placed as close as possible to the EUT's antenna. This configuration allowed the EUT to transmit continuously for this test. This configuration was also used to test the conducted emissions at the antenna terminal output of the EUT.



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Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is a wireless module for a handheld computer which is designed to be used as a PCS Phone, when the module is installed in the handheld. The EUT was, therefore, placed on a table during emissions testing to simulate the end user environment.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Handspring	Sparky	Wireless handheld computer module	N/A	

Other EUT Details

EUT Enclosure

The EUT enclosure is primarily constructed of plastic with metal shield inside. It measures approximately 7.5 cm wide by 1.6 cm deep by 13.5 cm high.

Modification History

Mod. #	Test	Date	Modificaiton
1			
2			
3			



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RF Power Output (Section 2.1047)

Test Specifics

Objective: This test is required per section 2.1047 of the FCC Rules. This is the Power Output measurement test, either Radiated or Conducted, at antenna terminal output, method is used. The appropriate applicable rule part is used to show compliance for this test.

Date of Test: 09/01/2000
Test Engineer: Juan Martinez
Test Location: SVOATS# 3

Config. Used: 1
Config Change: None
EUT Voltage: 120Vac, 60 Hz

General Test Configuration

A spectrum analyzer, a combiner, support equipment, and EUT were all place on top of a table. The EUT was connected directly to the spectrum analyzer by a low loss coaxial cable, so as to perform the conducted measurements at the antenna terminal.

Ambient Conditions: Temperature: 15°C
Rel. Humidity: 92%

Summary of Results

Run#	Test Performed	Limit	Measured	Result
1	Radiated Power Output (Low Channel)	FCC 24.232 (b)	29.98 dBm	Pass

Modifications Made During Testing: None



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Spec:	FCC Part 24 Subpart E	Class:	N/A

Run #1: Radiated Power Measurement

Measurements made at 3m.

Fundamental Frequency : 1850.17 MHz (Low Channel)

Frequency	Level	Pol	FCC Part 24		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h			Pk/QP/Avg	degrees	meters	
1850.000	120.2	V			Pk	225	1.2	Radiated Measurement with antenna
1850.000	122.2	H			Pk	205	1.2	(Gain of Antenna -3dBi)

Vertical Polarization

$$P = [(E(V/m) * D (meters))^2 / (30 * G(numeric))] = \text{Watts}$$

$$P = [(1.0233 V/m * 3 m)^2 / (30 * .5)] = .628 \text{ Watts (E.I.R.P)}$$

$$10 * \text{Log} (.628 \text{ Watts} * 1000) = 27.98 \text{ dBm}$$

Horizontal Polarization

$$P = [(E(V/m) * D (meters))^2 / (30 * G(numeric))] = \text{Watts}$$

$$P = [(1.288 V/m * 3 m)^2 / (30 * .5)] = .995 \text{ Watts (E.I.R.P)}$$

$$10 * \text{Log} (.995 \text{ Watts} * 1000) = 29.98 \text{ dBm}$$



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Spec:	FCC Part 24 Subpart E	Class:	N/A

Conducted Emissions at the Antenna Terminal (Section 2.1051)

Test Specifics

Objective: This test is required per section 2.1051 of the FCC Rules. This test is to show compliance with the emission emanating out from the antenna terminal output. The appropriate applicable rule part is used to show compliance for this test.

Date of Test: 09/01/2000
Test Engineer: Juan Martinez
Test Location: SVOATS# 3

Config. Used: 1
Config Change: None
EUT Voltage: 120Vac, 60Hz

General Test Configuration

A spectrum analyzer, a combiner, support equipment, and EUT were all place on top of a table. The EUT was connected directly to the spectrum analyzer by a low loss coaxial cable, so as to perform the conducted measurements at the antenna terminal.

Ambient Conditions: Temperature: 15°C
Rel. Humidity: 92%

Summary of Results

Plot #	Test Performed	Limit	Result	
1	Bandedge Measurement (Low Channel)	FCC 24.238 (a)	Pass	
2	Bandedge Measurement (High Channel)	FCC 24.238 (a)	Pass	
3	26-dB Bandwidth	FCC 24.238 (b)	283 kHz	
4	Out-of-Band Measurement (Low Channel)	FCC 24.238 (a)	Pass	
5	Out-of-Band Measurement (High Channel)	FCC 24.238 (a)	Pass	



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Spec:	FCC Part 24 Subpart E	Class:	N/A

Radiated Emissions (Section 2.1053)

Test Specifics

Objective: This test is required per section 2.1053 of the FCC Rules. The objective of this test session is to perform final qualification testing the EUT relative to the specification(s) defined above.

Date of Test: 09/01/2000
Test Engineer: Juan Martinez
Test Location: SVOATS# 3

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located on the turntable for radiated emissions testing. All local support equipment were located at the bottom of the turntable.

Ttesting above 1 GHz, the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 15°C
Rel. Humidity: 92%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Fundamental frequency to 10th harmonic - Maximized	FCC Part 24.238 (a)	Pass	-8dB @ 9251 MHz

Modifications Made During Testing: None



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Spec:	FCC Part 24 Subpart E	Class:	N/A

Run #1: Maximized readings, 2nd - 10th Harmonic

Measurements made at 3m.

Fundamental Frequency : 1850.17 MHz (Low Channel)

Frequency	Level	Pol	FCC Part 24		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
3700.000	71.3	V	82.2	-10.9	Pk	225	1.2	
5550.000	65.8	V	82.2	-16.4	Pk	180	1.2	
7401.000	73.1	V	82.2	-9.1	Pk	175	1.2	
9251.000	74.3	V	82.2	-7.9	Pk	185	1.2	
11,101	63.4	V	82.2	-18.8	Pk	145	1.2	
12,951	64.1	V	82.2	-18.1	Pk	156	1.2	
14,801	63.6	V	82.2	-18.6	Pk	175	1.2	
16,519	51.8	V	82.2	-30.4	Pk	180	1.2	Noise Floor Measurement
18,501								20-dB below the limit
3700.000	72.8	H	82.2	-9.4	Pk	145	1.2	
5550.000	62.8	H	82.2	-19.4	Pk	156	1.2	
7401.000	71.8	H	82.2	-10.4	Pk	175	1.2	
9251.000	72.8	H	82.2	-9.4	Pk	175	1.2	
11,101	66.8	H	82.2	-15.4	Pk	180	1.2	
12,951	56.6	H	82.2	-25.6	Pk	180	1.2	
14,801	57.4	H	82.2	-24.8	Pk	185	1.2	
16,519	54.9	H	82.2	-27.3	Pk	225	1.2	Noise Floor Measurement
18,501								20-dB below the limit

Fundamental Frequency : 1909.8 MHz (High Channel)

3819.000	73.6	V	82.2	-8.6	Pk	180	1.0	
5729.000	64.9	V	82.2	-17.3	Pk	185	1.0	
7639.000	71.3	V	82.2	-10.9	Pk	180	1.0	
9549.000	66.8	V	82.2	-15.4	Pk	180	1.0	
11,458	67.9	V	82.2	-14.3	Pk	175	1.0	
13,368	62.6	V	82.2	-19.6	Pk	175	1.0	
15,278	59.6	V	82.2	-22.6	Pk	156	1.0	
17,188	52.9	V	82.2	-29.3	Pk	145	1.0	Noise Floor Measurement
19,098								20-dB below the limit



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Spec:	FCC Part 24 Subpart E						Class:	N/A
3819.000	70.8	H	82.2	-11.4	Pk	156	1.2	
5729.000	61.9	H	82.2	-20.3	Pk	185	1.5	
7639.000	70.4	H	82.2	-11.8	Pk	145	1.0	
9549.000	67.9	H	82.2	-14.3	Pk	122	1.0	
11,458	70.1	H	82.2	-12.1	Pk	180	1.0	
13,368	63.1	H	82.2	-19.1	Pk	174	1.0	
15,278	49.1	H	82.2	-33.1	Pk	185	1.0	
17,188	52.1	H	82.2	-30.1	Pk	225	1.0	Noise Floor Measurement
19,098								20-dB below the limit

Note: Used a Resolution and Video Bandwidth of 1 MHz for PEAK Measurements. Used a Resolution Bandwidth of 1 MHz and



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Spec: FCC Part 24 Subpart E	Class: N/A

Frequency Stability (Section 2.1055)

Test Specifics

Objective: This test is required per section 2.1055 of the FCC Rules. This is frequency stability measurement test, which is made by temperature and voltage variations. The appropriate applicable rule part is used to show compliance for this test.

Date of Test: 09/06/2000
Test Engineer: Juan Martinez
Test Location: Env. Chamber# 2

Config. Used: 2
Config Change: None
EUT Voltage: 4Vdc for this test

General Test Configuration

A spectrum analyzer, a combiner, and support equipment were all place on top of a table. The EUT was connected directly to the spectrum analyzer by a low loss coaxial cable, so as to measure the frequency drift. The EUT was place inside the Temperature chamber and all support equipment outside.

Summary of Results

Run #	Test Performed	Limit	Result
1	Temperature Vs. Frequency	FCC 24.235	Pass
2	Temperature Vs. Voltage	FCC 24.235	Pass

Modifications Made During Testing: None



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Spec: FCC Part 24 Subpart E	Class: N/A

Run# 1: Temperature Vs. Frequency

<u>Temp(Celsius)</u>	<u>Drift (Hz)</u>	<u>Comment</u>
-30	-3	Note 1
-20	12	Note 1
-10	24	Note 1
0	47	Note 1
10	45	Note 1
20	41	Note 1
30	57	Note 1
40	62	Note 1
50	94	Note 1

Note 1: The frequency drift was monitored by placing the marker at the frequency block edge. The -13 dBm limit was set and was used as a failing and passing criteria for this test. The marker was to remain under the -13 dBm limit. This method was used to ensure that the fundamental emission remain inside the assigned frequency block.

Run# 2: Temperature Vs. Voltage

The primary DC voltage was set to the end-point, which was **3 Vdc**, this voltage is going to stated by the manufacturer in the manual. The transmitter cease to function before it spill over the block Bandedge.