FCC Part 24
Certification Application
for
FCC ID: O8F-NYNY

Test Report
on
Handspring, Inc.
“Manhattan” and “Shea”

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Units tested June / July 2001

Schematics and block diagrams subject to the attached confidentiality statement

General Information

Units Under Test:

Handspring Manhattan
Handspring Shea

NOTE: *These are Handspring internal product names. The actual "consumer" names of the units have not been determined. It is anticipated that the actual names will be chosen in two to three weeks. These names will be passed on to the FCC when they become available.*

Tested For:

Handspring, Inc
189 Bernardo Ave.
Mt View, CA 94043

Tested By:

Eliott Laboratories
684 Maude Ave
Sunnyvale, CA 94086
USA

Aprel Laboratories
51 Spectrum Way
Nepean, Ontario, K2R 1E6
Canada

Tested:

June / July 2001

Objective:

The objective of this application is to obtain certification of two versions of Handspring's PDA incorporating PCS phone capability.

Information:

Handspring has developed two new versions of a Handspring PDA that incorporate PCS phone capabilities. This Handspring PDA is running the Palm operating system. There are two versions of this product. From an RF standpoint both phones are the same and use the same GSM phone module and the same antenna, both of which are purchased components from another company. The EIRP of both devices is essentially the same. The main printed circuit board is also the same for both products.

The notable difference between the two products is the method of entering the text into the PDA. One version uses a small QWERTY keyboard on the device. The second version uses a typical PDA "Graffiti" area on the touch screen where the user writes on the display with a stylus.

Both products are capable of operating on GSM 900 MHz and PCS 1.9 GHz bands, however the phones WILL NOT OPERATE in the United States or Canada on 900 MHz. Thus only 1.9 GHz data is submitted for this certification application. If one of the phones were taken to Europe, it would then operate on their 900 MHz system.

FCC Part 24 radiated emission testing and frequency stability testing were performed at Elliott Labs in Sunnyvale, California. SAR testing was performed by Aprel Labs in Ottawa, Ontario. SAR testing was conducted for each unit in body worn and handheld configurations for the 1.9 GHz band. When the units are body worn, it is expected that the units will be used with a headset and worn on the body in a Handspring case made for this product. The "RF Exposure Warning" statement contained in the user manual will tell the user that use of either Handspring brand accessory, or a third party manufacturer accessory that has been tested and found to comply with SAR requirements is required when used in a body worn configuration.

Results Summary

The following tests were performed to demonstrate compliance with FCC Part 24

Test	Results	Spec
Radiated Emissions of Harmonics		
Manhattan	-20.0 dBm EIRP @ 13120MHz	-13 dBm
Shea	-24.3 dBm EIRP @ 13088MHz	-13 dBm
Freq Stability vs. temperature (*1)	0 Hz	Carrier must stay in band
SAR - Manhattan		
HEAD	.76 W/kg	1.6 W/kg
BODY (in pouch)	.31 W/kg	1.6 W/kg
HAND	1.97 W/kg	4.0 w/kg
SAR – Shea		
HEAD	.75 W/kg	1.6 W/kg
BODY (in pouch)	.58 W/kg	1.6 W/kg
HAND	2.37 W/kg	4.0 w/kg
Band Edge measurement (*2)		
Manhattan		
HIGH Edge	-46 dBc	-43 dBc
LOW Edge	-44 dBc	-43 dBc

*1: Freq Stability was only tested on Manhattan; at the time of the test there were no Shea units available for this test. Since both units use the same RF module, there is no reason to suspect that the results would differ between the two units.

*2: At the time of the band edge test, all of the 1.9GHz Shea units were in Ottawa for SAR testing. The band edge measurements were conducted on the Manhattan unit. Since both units use the same RF module, there is no reason to suspect that the results would differ between the two units.

Detailed Test Results
Radiated Emissions of Harmonics Test Procedure
FCC Paragraph 24.238
IC RSS-133 ,Paragraph 6.3

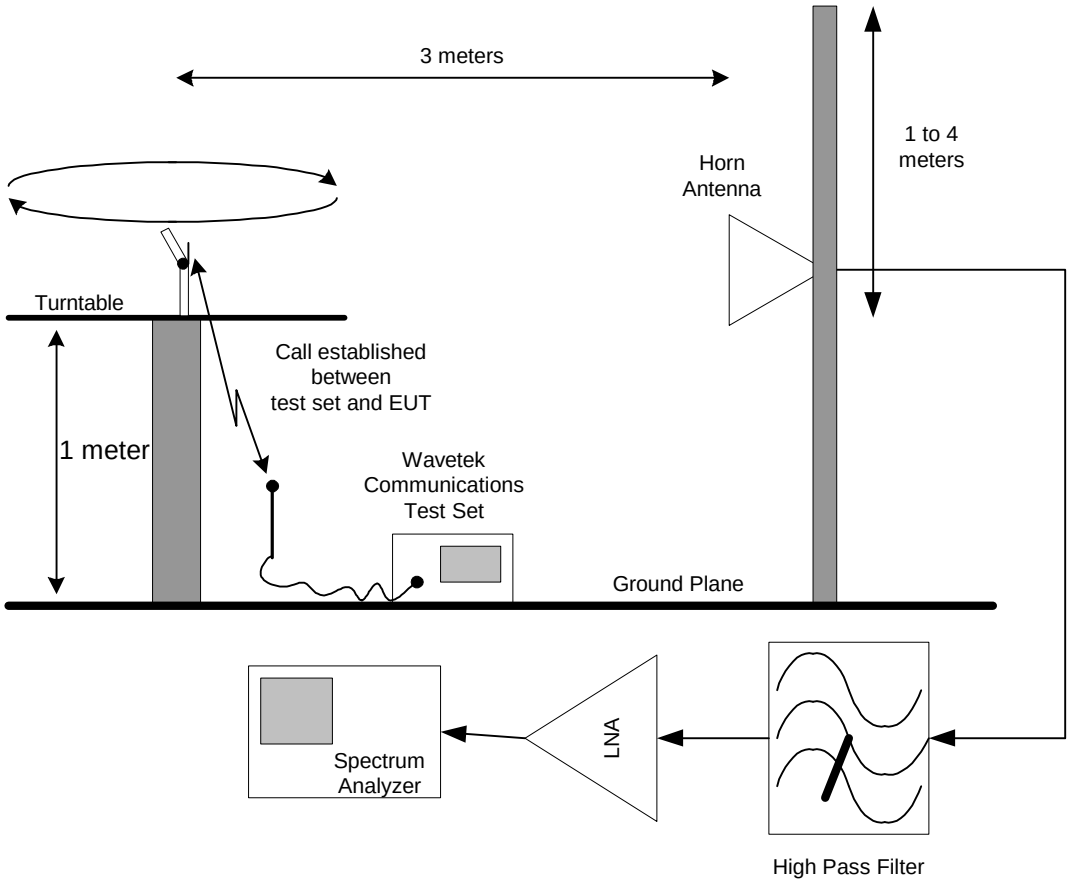
Procedure:

This test was conducted on a 3-meter open-air test site at EC Labs. The unit was placed on a rotatable wooden table 1 meter above the ground plane. A 1 - 18 GHz Horn antenna was secured to a mast 3 meters away. A call was established and the unit was set to transmit maximum power at the center of the 1.9 GHz PCS band at the center of the 1.9 GHz PCS band. The test equipment was configured as shown below. A high pass filter prior to the pre-amplifier was required to prevent the large signal level of the fundamental frequency from overloading the front end of the spectrum analyzer and creating harmonics within the analyzer.

The UUT was rotated 360 degrees and the height of the antenna adjusted from 1 to 4 meters above the ground plane. First a “coarse” scan was performed to identify emissions that may be close to the limit. Once this “coarse” scan was complete a more precise “fine” scan was conducted on each of the identified emissions to determine the exact maximum level of the emission.

Results:

There were some harmonic emissions detected during the test. The maximum emission is noted in the results summary and detailed test results are included in this submission as a separate file.



Radiated Emissions (Harmonics) Test Setup

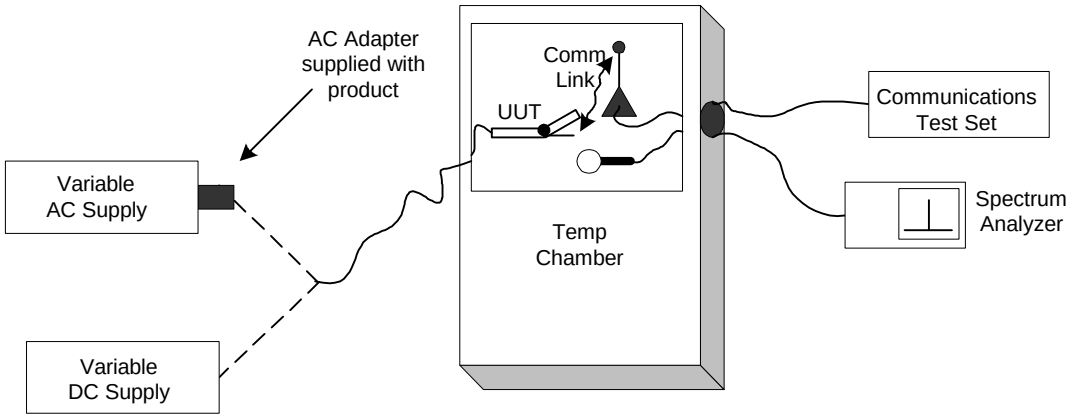
Frequency Stability vs temperature

Test Procedure

The EUT was placed inside the temperature chamber and all the required support equipment was outside of the chamber. A phone call was established between the UUT and the communications test set. And the transmit frequency of the UUT was monitored with an antenna inside the chamber connected to a spectrum analyzer set to MAX HOLD. The temperature of the chamber was varied from –30 to +50 C in 10 degree steps. The UUT was allowed to stabilize in temperature after each temperature step. Any frequency deviations are noted on the data sheet.

The input voltage to the unit was varied by varying the AC voltage into the AC adapter that will be supplied with the unit. Frequency drift was also verified when varying the DC power directly into the unit.

Results:
There was no noticeable frequency drift.



Frequency Stability vs. Temperture Test Setup

Out of band Emissions at the Band edge

Test Procedure:

The test equipment was configured as shown. A call was established between the UUT and the communications test set. The call was first established on channel 512 (1850.2MHz) and the UUT set to transmit maximum power (30 dBm) The spectrum analyzer was set to MAX HOLD and the trace allowed to stabilize. The RBW and VBW were set to 3kHz. After the trace stabilized a reference marker was set to the peak and a DELTA measurement was made to the band edge. This procedure was repeated for the high edge of the band, channel 810 (1909.8 MHz).

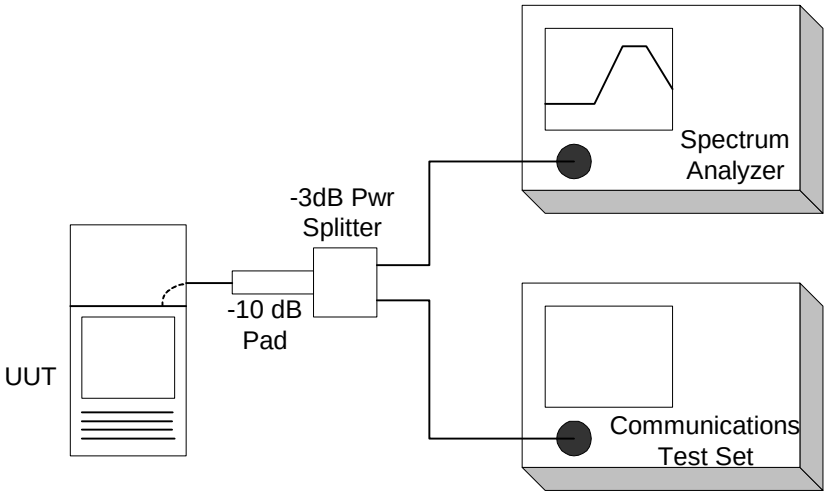
Test results:

The test specification is: 13 + 10 Log Pwr = 13 + 10 Log 1000 = 43 dB

The test results are below

High Band Edge: -46 dBc @ Band Edge (1910 MHz)

Low Band Edge: 42 dBc @ Band Edge (1850 MHz)



Band-Edge Test Setup

SUPPORT EQUIPMENT

The following equipment was used as remote support equipment for testing:

Manufacturer/Model/Description	Serial Number	FCC ID Number
Wavetek Communications Test Set	L01 13 505	NONE

EXTERNAL I/O CABLING

The I/O cabling configuration during emissions testing was as follows:

Cable Description	Length (m)	From Unit/Port	To Unit/Port
NONE			

ELLIOTT LABS TEST SITE

GENERAL INFORMATION

Final test measurements were taken on June, 2001 at the Elliott Laboratories Open Area Test Site #3 located at 684 West Maude Avenue, Sunnyvale, California. Pursuant to section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the FCC and Industrie Canada

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with Section 2 of FCC Rules. Measurements are made with the EUT connected to a spectrum analyzer through an attenuator to prevent overloading the analyzer.

RADIATED EMISSIONS CONSIDERATIONS

Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR 16-1 defined elliptical area.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers are capable of measuring over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the particular detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. If average measurements above 1000MHz are performed, the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz is used.

INSTRUMENT CONTROL COMPUTER

A Rohde and Schwarz EZM Spectrum Monitor/Controller is utilized to convert the receiver measurements to the field strength at the antenna, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate.

The EZM provides a visual display of the signal being measured. In addition, the EZM Spectrum Monitor runs the automated data collection programs that control both receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors, are added automatically. .

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the 30 to 1000 MHz range for precision measurements of field strength if required. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.
The requirements of ANSI C63.4 were used for configuration of the equipment turntable. It specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An appendix of this report contains the list of test equipment used and calibration information.