MEASUREMENT/TECHNICAL REPORT

RF Ideas, Model PC Prox

FCC ID: M9MBUPCPROXM100

APPLICATION FOR CERTIFICATION

RF Emission Measurements Performed For Determination of Compliance with the US Code of Federal Regulations Title 47, Chapter I, FCC Part 15 Subpart C As Required for Certification for Intentional Radiators

Radiometrics Midwest Corporation Test Document RP-4392C
Issue Date: December 27, 2000
This report concerns: Original Grant
Equipment type: 125 kHz Low Power Transmitter

Tests Performed For	*Test Facility*
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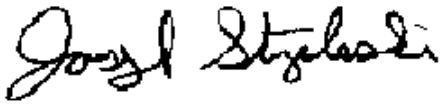
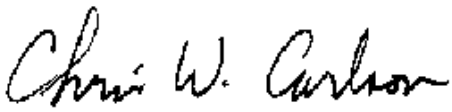
Test Report Written By	*Test Report Approved By*
 Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	 Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

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1 GENERAL INFORMATION (EUT DETAILS)

1.1 Product Description

The Model PCProxM100 (referred to as the EUT in this report) is a 125 kHz transmitter. The EUT is manufactured by RF Ideas. The EUT is a computer access control and logon system. As a user approaches their PC, the EUT detects the user's badge, granting immediate access. If the PC user walks away, the system detects this event and is automatically secured and enters into a screensaver mode. When an unauthorized person attempts to use the PC, access is denied.

The EUT was in good working condition during the test, with no known defects.

1.2 Related Submittals

RF Ideas is not submitting any other authorizations related to the EUT.

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system which have grants, are:

Model Number Serial Number	FCC ID	Manufacturer & Description	Cable Descriptions
M/N: PCProxM100 S/N: N/A	M9MBUPCPROXM100	RF Ideas PC locking device	KB cable (0.3m, US) RS-232 cable (1.9m, SH)
M/N: PCG-9251 S/N: 2831005314024706	F825K4QUIN51D	Sony Laptop Computer	DC Power (1.8m, US) AC Power (1m, US)
M/N: NX-1001 S/N: 510030137823	B6DZ150L	Star Printer	Power (1.8m, US) Printer Cable. (1.8m, SH w/ metal shells)
M/N: 6511-HW S/N: K6569131108P	JVPKBS-WIN	ACER Keyboard	Data/power (1.5m, SH) Coiled cable

Note: SH = Shielded; US = Unshielded; m = Cable Length in Meters,

1.4 Tested System and Justification

Wiring was consistent with manufacturer's recommendations. The EUT was placed on an 80-cm high, nonconductive test stand. The system was configured for testing in a typical fashion (as a customer would normally use it).

A printer was connected to the parallel port by a shielded parallel printer cable. The EUT was connected to the serial port (COM1) via its integral data cable and the keyboard connector. A keyboard was attached to the EUT. Power was supplied at 115 VAC, 60 Hz single-phase to the hosts computer external power supply.

1.5 EUT Exercise Software

The exercise program used during radiated and conducted testing was contained on a floppy disk. The program sequentially exercises each system component in turn. The complete cycle takes about 10 seconds and is repeated continuously. The software continuously fill the screen with capitol H's, even when reading and writing to the drive. No data was transmitted to the keyboard and mouse during the tests. They are, however, continuously scanned for data input activity.

The 125 kHz transmitter was on at all times during the test.

1.6 EUT Modifications and Special Accessories

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report. No special accessories were used during the tests in order to achieve compliance.

2 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

3 TEST METHODOLOGY

The test procedures used are in accordance with the ANSI document C63.4-1992, (July 17, 1992) "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

3.1 Test Facility

The open area test site used to collect the radiated data is located on 8625 Helmar Road in Newark, Illinois. The open field test site has a metal ground screen. Details of the site characteristics are on file with the FCC. Conducted emission measurements and preliminary radiated emission scans were performed in shielded enclosure “C” at Radiometrics' Romeoville, Illinois EMI test lab. These sites have been fully described in a report and accepted by the FCC in a letter dated October 1, 1996 (31040/SIT 1300F2).

Conducted emission measurements were performed using a Line Impedance Stabilization Network (LISN) as the pick-up device. This device is constructed in accordance with the circuit diagram provided in Figure 3 of ANSI document C63.4-1992.

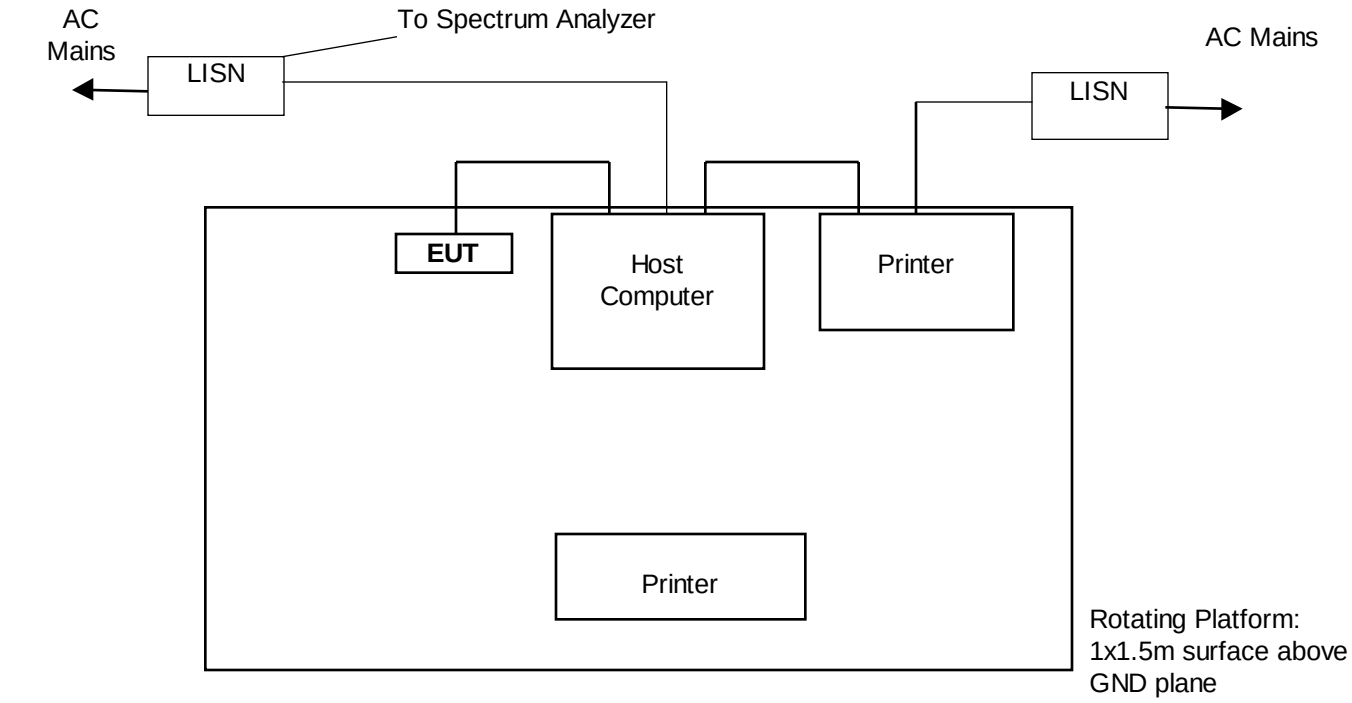
3.2 Test Equipment

Below 30 MHz, radiated emission measurements are performed with shielded loop antennas. An Empire LG-105 and an Empire LP-105 antenna were used. The emission measurements were performed with spectrum analyzer with a peak detector.

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. Below 1 GHz, when a radiated emission is detected approaching the specification limit, the measurement of the emission is repeated using a tuned dipole antenna with a Roberts Balun.

The emission measurements were performed with a spectrum analyzer. The bandwidths of the spectrum analyzers are adjusted to the correct bandwidths as specified by the FCC Rules. The bandwidth used from 9 kHz to 150 kHz is 1 kHz. The bandwidth used from 450 kHz to 30 MHz is 9 or 10 kHz, and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz a 1 MHz bandwidth is used. In order to increase the sensitivity of the spectrum analyzer, a preamplifier was used. The preamplifiers used had sufficient dynamic range that ensured that an overload condition was not present during the tests.

Figure 1. Configuration of Tested System



Antenna For Radiated Emissions

Preamp

Spectrum Analyzer

Radiated Emissions:
- LISN's not used
- AC outlet with low-pass filter at the base of the turntable
- No vertical conductive wall
- Antenna height varied from 1 to 4 meters
- Distance from antenna to tested system is 3 meters

Notes:
- Not to Scale

Conducted Emissions:
- LISN's at least 80 cm from EUT chassis
- Vertical conductive plane 40 cm from rear of table top
- EUT power cord bundled
- Test platform is not rotated

4 TEST RESULTS

4.1 Conducted Emission Data

The initial step in collecting conducted data is a spectrum analyzer peak scan and the plotting of the measurement range. Significant peaks are then marked as shown on the following table, and these signals are then measured with the quasi-peak detector. The following represents the worst case emissions from the host computer (with the EUT connected) power cord, after testing all modes of operation.

Model : PCPROXM100
Test Date : November 29, 2000

Line Tested	Freq. MHz	Reading dBuV	Cable Loss dB	Strength of Signal dBuV	Limit dBuV	Margin Limit dB
AC Hot	0.550	40.5	0.1	40.6	48.0	7.4
AC Hot	0.622	38.3	0.1	38.4	48.0	9.6
AC Hot	5.2	31.0	0.2	31.2	48.0	16.8

Line Tested	Freq. MHz	Reading dBuV	Cable Loss dB	Strength of Signal dBuV	Limit dBuV	Margin Limit dB
Neutral	0.549	40.3	0.1	40.4	48.0	7.6
Neutral	0.625	37.9	0.1	38	48.0	10
Neutral	5.3	32.4	0.2	32.6	48.0	15.4

* All readings are quasi-peak with a 9 kHz bandwidth and no video filter.
Judgment: System Passed by 7.4 dB

Test Personnel: Joseph Strzelecki
Senior EMC Engineer

4.2 Magnetic Field Radiated Emissions Data (0.009 to 30 MHz)

Model: PCProxM100
Specification: FCC 15.209
Antennas Used: Shielded Loop Antennas
Test Date: November 27, 2000
Correction Factors = cable loss - preamp gain - distance correction factor
Amplifier gain is 36 dB
Test Distance: 3 Meters
Decay Exponent: 2

Freq. kHz	Meter Reading dBuV	Antenna Factor dB	Antenna Type	Corr. Factors dB	Field Strength of Signal dBuV/m	Limit Field Strength dBuV/m	Margin Under Limit dB
125	58.3	51.3	Loop	-116.0	-6.4	25.7	32.1

No emissions were detected from 125 kHz to 30 MHz with 15 dB of the Limit

Judgement: Passed by at least 15.0 dB.

Test Personnel: Joseph Strzelecki
Senior EMC Engineer

4.3 Electric Field Radiated Emissions Data (30 to 1000 MHz)

The following table lists the highest measured emissions from the full system. A sample calculation is given in paragraph 4.1. The analyzer readings are quasi-peak with a 120 kHz bandwidth and no video filter.

Model : PC Prox M100
Test Date : November 29, 2000
Notes : Pol = Antenna Polarization; V = Vertical; H = Horizontal
BC = Biconical; LP = Log Periodic; P = Peak; Q = QP Corr. Factors = cable loss - preamp gain

Freq. MHz	Meter Reading dBuV	Antenna Factor dB	Antenna Pol/ Type	Corr. Factors dB	Field Strength of Signal dBuV/m	Limit Field Strength dBuV/m	Margin Under Limit dB
99.0	40.5 P	11.0	H/BC	-25.1	26.4	43.5	17.1
110.9	44.5 P	12.0	H/BC	-24.9	31.6	43.5	11.9
140.2	46.9 P	12.0	H/BC	-24.5	34.4	43.5	9.1
180.4	35.7 P	16.9	H/BC	-23.9	28.7	43.5	14.8
198.0	37.1 Q	16.8	H/BC	-23.8	30.1	43.5	13.4
210.0	40.0 P	15.9	H/BC	-23.6	32.3	43.5	11.2
211.3	40.0 P	15.8	H/BC	-23.6	32.2	43.5	11.3
212.3	40.7 P	15.7	H/BC	-23.6	32.8	43.5	10.7
219.4	42.7 P	15.5	H/BC	-23.5	34.7	46.0	11.3
230.6	37.8 P	15.8	H/BC	-23.4	30.3	46.0	15.7
232.8	35.9 P	16.0	H/BC	-23.3	28.6	46.0	17.4
217.9	48.8 P	11.6	H/LP	-23.5	37.0	46.0	9.0
246.0	47.6 P	12.5	H/LP	-23.2	36.9	46.0	9.1
277.7	46.7 P	13.6	H/LP	-22.9	37.4	46.0	8.6
297.1	48.4 P	14.7	H/LP	-22.6	40.5	46.0	5.5
336.2	43.7 P	15.0	H/LP	-22.0	36.6	46.0	9.4
40.8	40.4 P	11.0	V/BC	-26.1	25.3	40.0	14.7
47.5	43.7 P	11.4	V/BC	-26.0	29.2	40.0	10.8
48.9	44.0 P	11.6	V/BC	-26.0	29.7	40.0	10.3
49.9	45.9 P	11.8	V/BC	-26.0	31.7	40.0	8.3
51.0	46.5 P	11.7	V/BC	-25.9	32.2	40.0	7.8
51.5	47.1 Q	11.6	V/BC	-25.9	32.8	40.0	7.2
111.0	44.1 P	12.5	V/BC	-24.9	31.7	43.5	11.8
112.3	44.8 P	12.7	V/BC	-24.9	32.6	43.5	10.9
116.1	42.1 P	13.1	V/BC	-24.9	30.4	43.5	13.1
159.4	41.2 P	15.3	V/BC	-24.2	32.3	43.5	11.2
178.8	38.3 P	17.1	V/BC	-23.9	31.5	43.5	12.0
198.1	38.8 P	16.7	V/BC	-23.8	31.7	43.5	11.8
237.7	35.6 P	17.8	V/BC	-23.3	30.1	46.0	15.9
240.5	39.8 P	18.2	V/BC	-23.3	34.8	46.0	11.2
281.0	41.7 P	13.9	V/LP	-22.8	32.8	46.0	13.2
299.8	45.0 P	14.8	V/LP	-22.5	37.3	46.0	8.7
336.2	39.1 P	15.0	V/LP	-22.0	32.1	46.0	13.9

Judgment: System Passed by 5.5 dB
Test Personnel: Joseph Strzelecki
Senior EMC Engineer

4.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain 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 49.5 dBuV is obtained. The Antenna Factor of 8.1 and a Cable Factor of 1.7 is added. The Amplifier Gain of 23.3 dB is subtracted, giving a field strength of 36 dBuV/m. The 36 dBuV/m can be mathematically converted to its corresponding level in uV/m.

FS = 49.5 + 8.1 + 1.7 - 23.3 = 36.0 dBuV/m

Level in uV/m = Common Antilogarithm [(36 dBuV/m)/20] = 63.1 uV/m

4.4.1 Decay Factor Calculations

The Decay exponent is 2. This is considered a worst case value.

The distance correction factor is calculated as follows:

Distance factor (dB) = 2*20*Log(300/TD)

TD is the actual test distance in meters. 300 meters is the specification distance. The actual Distance correction factor at 3 meters is –80.0 dB.

4.5 Occupied Bandwidth Results

The Occupied Bandwidth is 1 kHz. Each Horizontal division is 1 kHz;