

RF Emissions Test Report To Determine Compliance With: FCC, Part 15 Rules and Regulations

Model numbers: RR1-RX
December 9, 1999

Manufacturer: Paul C Buff
2725 Bransford Ave.
Nashville, TN 37204

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Section 1

General Information

Applicant/ Manufacturer: Paul C Buff
2725 Bransford Ave.
Nashville, TN 37204

Applicant representative: **Mr. David Mundie**

Equipment covered by this report: Model no. RR1-RX

Options covered by this report: None

Equipment serial no. Engineering sample

Test specifications: To determine compliance with:
FCC, Part 15, Subpart B Rules
and Regulations, Class B

Test report number: 99-279R

Test commenced: November 11, 1999

Test completed: December 7, 1999

Test engineer: **Kent Stewart**

Test Facility: The test facility used to perform these tests is on file with
the FCC under file 31040/SIT, 1300F2 and located at:

EMC Testing Laboratories, Inc.
2420 Oak Street West
Cumming, GA. 30041-6456

Section 2

Test report summary sheet 1 of 2

Summary:

Tests	Results
FCC, Part 15, Class B, Radiated Emissions:	Pass
FCC, Part 15, Class B, Conducted Emissions:	Pass

- 1- The product(s) covered by this report was found to comply with the class B radiated and conducted emission limits of the FCC, Part 15, Subpart B Rules and Regulations.
- 2- The minimum margin of compliance was **-17.1 dB μ V** at 15.5 Mhz followed by **18.5 dB μ V** at 28.0 Mhz

Product description:

The product(s) covered by this report consisted of a model RR1-RX , remote for use in receiving data sent to the receiver to adjust lighting equipment during photography. The received data is then interpreted by the receiver and then output to the lighting equipment via a RJ-11 cable.

The receiver is designed to receive a 916.5 MHz radio signal from a hand held remote control and utilizes an IF of 2.494 MHz.

Additionally, the unit may be powered from two double AA batteries or from a direct plug-in power supply. Emissions measurements were taken with the unit powered from both power types and it was found that all radiated emissions were 20dB μ V below the indicated limits.

Test configuration:

The equipment under test was set-up and configured as specified by the manufacturer.

- 1- The EUT was connected to the following support peripherals.

A) A direct plug-in power supply, manufactured by Strong World, Model CH-33001-N, input rated 120Vac, 60Hz, 4W, output rated 3Vdc, 300mA.

- 2- The EUT utilized the following cables and were connected as indicated below:

A) An unshielded, RJ-11 cable was connected to the EUT's, TO LIGHT port. The RJ-11 cable was provided with a ferrite and the cable was double looped through the ferrite, which was located 5.6 cm from the RJ-11 connector end that connects to the EUT.

Test report summary sheet 2 of 2

Test operation:

For all measurements, the equipment under test was and caused to function in a continuous mode of operation for maximum electrical activity as specified by the manufacturer. Specifically, the EUT was powered on.

Modifications:

The following modifications, were required to comply with the indicated limits:

1- None

Conclusion:

With the above indicated modifications, the product(s) covered by this report has been tested and found to comply with the radiated and conducted emission limits for a class B device in accordance with the FCC, Part 15, Subpart B Rules and Regulations.

Tested by:

Kent Stewart
Laboratory Manager
EMC Testing Laboratories, Inc.
December 9, 1999

Gene Bailey
Engineering Manager
EMC Testing Laboratories
December 9, 1999

Section 2 cont...

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(Reserved for future use)

Section 3

STANDARD REFERENCE

The following primary standards were used for this test:

- 1) **ANSI C63.4-1992:** Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9 Khz to 40 Ghz.
- 2) **US Code of Federal Regulations (CFR) - 1998:** Title 47, Part 15, Radio Frequency Devices, Subpart B, Unintentional Radiators.

Section 4

TEST METHOD

INTRODUCTION:

The product(s) covered by this report was subjected to electromagnetic interference emissions measurements to determine compliance with the FCC, Part 15 requirements.

Radiated emissions and conducted emissions were measured in accordance with Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 Khz to 40 Ghz, C63.4.

RADIATED EMISSIONS MEASUREMENT:

Radiated emissions measurements are performed at an open field test site. The receiving antennas were positioned 3 meters from the equipment under test along the center axis of the test site. Measurements were made with broadband antennas and if necessary, detected emissions were verified with dipole antennas. The dipole antenna was manually tuned to the signal frequency by adjusting the length of the antenna elements. The radiated emissions were measured for both the horizontal and vertical signal planes by rotating the antennas. Additionally, the EUT was rotated by the turntable and the antenna height was raised and lowered 1 to 4 meters to locate the maximum emission strength at each frequency.

The radiated emissions were measured over the frequency span of 30 Mhz to 5000 Mhz. The following antennas were used to measure the radiated emissions within the specified frequency spans.

<u>Antenna</u>	<u>Frequency Span</u>
Biconical	20 - 200 Mhz
Log Periodic	200 - 1000 Mhz
Dipoles	20 - 1000 Mhz
Horn	1-18 Ghz

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DETECTOR FUNCTION:

All measurements were taken using a peak hold signal detector function. In this mode, the spectrum analyzer makes continuous scans across the frequency band and stores the highest emission value detected at each frequency for all scans. The peak hold integration will detect transient or low duty cycle emissions peak which might be missed on single scan measurement. The emission value at each frequency was a true value.

SPECTRUM ANALYZER SETTING:

For all measurements, the spectrum analyzer was set for a 10 dB input attenuation. 10 dB/Division vertical scale and 90 or 100 dB μ V reference level. The resolution bandwidth was set at 9 Khz for the 0.45 - 30 Mhz span, 120 kHz for 30 - 1000 MHz span and 1 MHz for the 1000 – 5000 MHz span. The video bandwidth and sweep rate was automatically coupled by the analyzer.

MEASUREMENT CALCULATIONS:

Radiated Emissions:

For radiated emissions measurements, the signal attenuation due to impedance losses in the antenna and signal cable was significant and was added to the spectrum analyzer reading to give corrected signal strength reading. If a preamplifier was used, the signal gain is subtracted from the signal strength reading. Radiated emissions data was specified as decibels above 1 microvolt per meter (dB μ V/m) of radiated field strength.

Radiated emissions (dB μ V) = Analyzer reading (dB μ V) plus
antenna factor (dB) plus cable factor (dB) minus Amplifier gain (dB)

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INSTRUMENTATION:

Radiated and antenna power conduction signal strength measurements were taken with a spectrum analyzer. Radiated emissions were measured with broadband and tuned dipole antennas. Antenna power conduction was measured directly at the antenna terminals. The test equipment consists of the following:

<u>Test Equipment</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Cal. Due</u>
Spectrum Analyzer	HP 8591A	2919A00171	06-25-00
Spectrum Analyzer	8592L	3649A00744	02-08-00
LISN	94641-1	0145/0146	06-02-00
Biconical Antenna	3110B	1708	10-07-00
Biconical Antenna	BIA-25	2451	10-21-00
Log Periodic	LPA25	1112	10-12-00
Dipole Antenna	DM-105A-T1	31402-110	05-21-00
Dipole Antenna	DM-105A-T2	31402-105	05-21-00
Dipole Antenna	DM-105A-T3	31402-109	05-21-00
Horn Antenna	3115	9405-4264	10-05-00
R.F. Amplifier	QB-820	11602	10-06-00
Preamplifier	8449B	3008A00914	10-06-00

Section 5

RADIATED EMISSIONS MEASUREMENTS

RADIATED EMISSIONS MEASUREMENTS

Model number: RR1-RX

There were no measurable radiated emissions within 20 dB_{uV} of the specified limits with the unit powered by either batteries or the direct plug-in power supply .

Section 6

CONDUCTED EMISSIONS MEASUREMENTS

CONDUCTED EMISSIONS MEASUREMENTS

Model number: RR1-RX

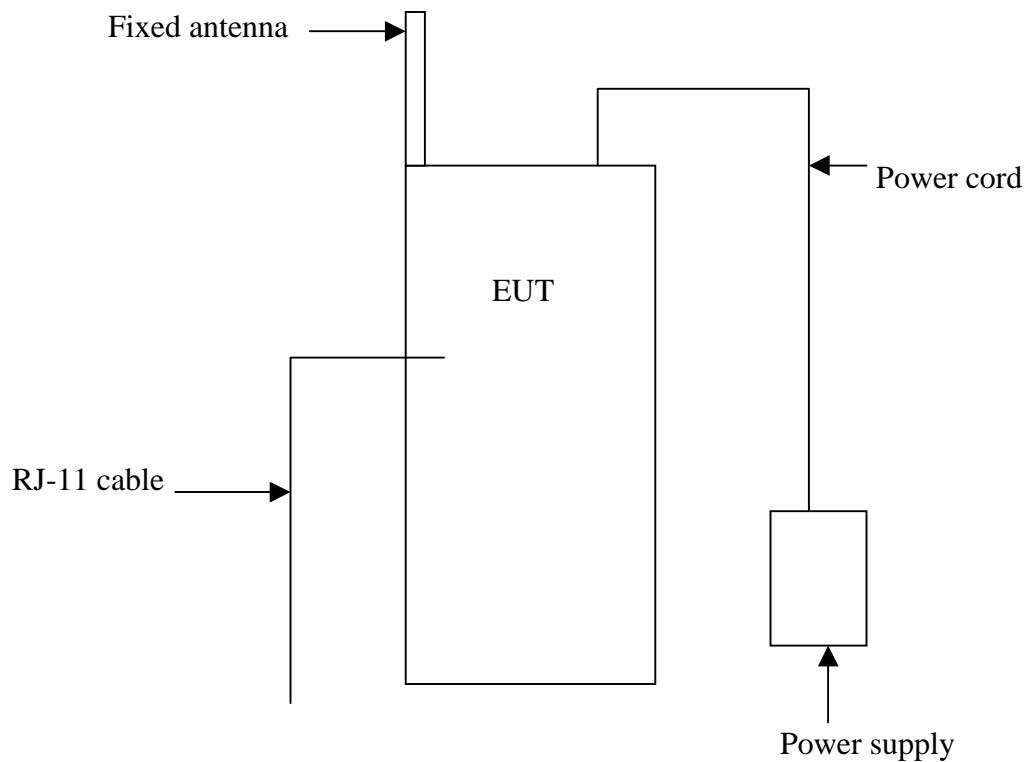
Test date: December 7, 1999

Test voltage: 120V, 60 Hz

Frequency Mhz	Reading dBuV, L1	Frequency Mhz	Reading dBuV, L2	FCC Limit, dBuV	Margin dBuV
3.9	29.3	4.3	29.2	48	-18.7
7.9	28.8	11.9	29.4	48	-18.6
15.5	30.9	14.3	29.5	48	-17.1
18.7	28.8	16.0	28.7	48	-19.2
23.9	29.3	19.0	29.1	48	-18.7
28.1	29.4	28.0	29.5	48	-18.5

Section 7

Configuration



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