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

Model numbers: RR1-TX
November 8, 1999

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

Contents Section

Section 1

General Information

Manufacturer:	Paul C Buff 2725 Bransford Ave. Nashville, TN 37204
Manufacturer representative:	**Mr. David Mundie**
Equipment covered by this report:	Model no. RR1-TX
Options covered by this report:	None
Equipment serial no.	Prototype
Test specifications:	To determine compliance with: FCC, Part 15, Subpart C Rules and Regulations, Class B
Test report number:	99-279A
Test commenced:	November 6, 1999
Test completed:	November 8, 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:	**N/A**

1- The product(s) covered by this report was found to comply with the limits indicated in paragraph 15.109 Subpart B and 15.249, Part 15, Subpart C of the FCC Rules and Regulations.

Note: The conducted emissions test was not performed since the EUT is battery operated with no means for connection to public mains.

Product description:
The product(s) covered by this report consisted of a model RR1-TX, battery operated light monitor remote control, intended for use with photography equipment.

Model RR1-TX is an intentional pulsed radiator, which transmits at 916.5 MHz utilizing an average 50% duty cycle, (see manufacturers letter in section 9).

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) None

2- The EUT was connected to the following cables.

A) None

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 programmed to continuously send data when 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 limits indicated in paragraph 15.249 of the FCC, Part 15, Subpart C Rules and Regulations and all subsequent limits indicated therein for a class B device.

Tested by:

Kent Stewart
Laboratory Manager
EMC Testing Laboratories, Inc.
November 12, 1999

Reviewed by:

Gene J. Bailey
Engineering Manager
EMC Testing Laboratories, Inc.
November 12, 1999

Section 2 cont…

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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 C, Intentional Radiators.

Section 4

TEST METHOD

INTRODUCTION:

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

Radiated 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.

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 was subtracted from the signal strength reading. Radiated emissions data was specified as microvolt per meter (μV/m) of radiated field strength.

Radiated emissions (μV/m) = Analyzer reading (μV) plus
antenna factor (dB) plus cable factor (dB) minus Amplifier gain (dB)

RADIATED EMISSIONS MEASUREMENT:

Radiated emissions measurements were performed at an open field test site. The receiving antenna was positioned 3 meters from the equipment under test as indicated below, 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.

Emission measurements made from 30 Mhz to 10 GHz were made at an antenna to EUT distance of 3 meters.

The following antennas were used to measure the radiated emissions within the specified frequency spans.

Antenna	**Frequency Span**
Biconical	20 - 200 Mhz
Log Periodic	200 - 1000 Mhz
Dipoles	20 - 1000 Mhz
Horn	1-18 Ghz

INSTRUMENTATION:

Radiated strength measurements were taken with a spectrum analyzer. Radiated emissions are measured with broadband and tuned dipole antennas. The test equipment consists of the following:

Test Equipment	**Model No.**	**Serial No.**	**Cal. Due**
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

DETECTOR FUNCTION FOR OUT OF BAND EMISSIONS:

The out of band emissions measurements were taken using a peak hold signal detector function. In this mode, the spectrum analyzer makes continuous scans across the frequency ban 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 OUT OF BAND EMISSIONS:

For all out of band emissions measurements, the spectrum analyzer was set for a 10 dB input attenuation, 10 dB/Division vertical scale and 90 or 100 dBµV reference level. The resolution bandwidth is set at 9 Khz for the 0.45 - 30 Mhz span and at 120 Khz for 30 - 1000 Mhz span. The video bandwidth and sweep rates were automatically coupled by the analyzer.

Section 5

RADIATED OUT OF BAND EMISSIONS MEASUREMENTS

Radiated Out of Band Emissions - Section 15.209 Limits

Model number: RR1-TX

Frequency Mhz	**Measurement Reading dBµV**	**Corrected Reading dBµV**	**FCC Limit dBµV**	**Minimum Margin dBµV**
Horizontal				
Other than harmonic emissions originating from the fundamental frequency there were no measurable emissions within 20dBuV of the limits				

Section 6

Fundamental Frequency Radiated Emissions Measurements

EMISSION MEASUREMENTS FOR EQUIPMENT OPERATING WITHIN THE BAND 902 - 928:

As per Section 15.249 of the 47 CFR and in accordance with the measurement provisions in Section 15.35, the peak and quasi-peak emissions field strength of the fundamental frequency were measured and recorded. For the harmonics emissions above 1000 MHz, peak and average measurements were recorded.

During the emissions measurement of the fundamental frequency, the antenna was positioned 3 meters from the EUT and with the spectrum analyzer in the Linear mode and the resolution bandwidth set to 10Khz minimum resolution bandwidth the fundamental frequency was measured. The measurements were performed with the antenna in the horizontal and vertical polarization. Peak and Quasi-peak measurements were taken as indicated in the plot.

During the emissions measurement of the harmonic emissions of the fundamental frequency, the antenna was positioned 3 meters from the EUT and with the spectrum analyzer in the Linear mode and the resolution bandwidth set to 1 MHz minimum the harmonic emissions were measured. The measurements were performed with the antenna in the horizontal and vertical polarization.

After measurement data was recorded the data was then corrected, as indicated in the Measurement Calculations section above.

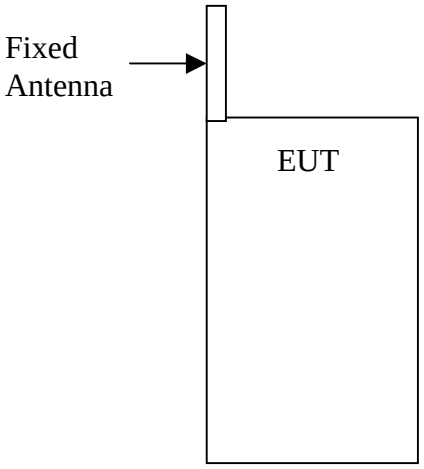
Additionally the following graphs show that the maximum field strength for the fundamental frequency was in compliance with the peak limits as indicated in Section 15.249.

The limits indicated in the tables below have been calculated for the measurement distance as indicated above.

Model: RR1-TX

Frequency Mhz	Detection method	Total Level dBµV/m	FCC Limit dBµV/m	Margin dBµV
Vertical				
916.5	Quasi-peak	88.6	94.0	-5.4
1833	Average	32.6	54.0	-21.4
3666	Average	45.4	54.0	-8.6
4583	Average	42.0	54.0	-12.0
Horizontal				
916.5	Quasi-peak	80.9	94.0	-13.1
1833	Average	36.2	54.0	-17.8
3666	Average	42.6	54.0	-11.4
4583	Average	42.7	54.0	-11.3
Horizontal				
916.5	Peak	81.2	114.0	-32.8
1833	Peak	42.9	74.0	-31.1
3666	Peak	47.5	74.0	-26.5
4583	Peak	47.3	74.0	-26.7
Vertical				
916.5	Peak	88.8	114.0	-25.2
1833	Peak	41.8	74.0	-32.2
3666	Peak	54.0	74.0	-20.0
4583	Peak	52.2	74.0	-21.8

Section 8
CONFIGURATION



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