

RETLIF TESTING LABORATORIES
TEST REPORT R-4564N-1
April 24, 2006

FCC COMPLIANCE TEST REPORT
ON

LAB PARTNERS ASSOCIATES, INC.
POCKETWIZARD PLUSII
FCC ID: KDS-PW2-003

APPLICANT Lab Partners Associates, Inc. 41 IDX Drive, Suite 265 South Burlington, VT 05403	MANUFACTURER SAME
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TEST SPECIFICATION: FCC Rules and Regulations Part 15, Subpart C, Para. 15.231

TEST PROCEDURE: ANSI C63.4:2003

TEST SAMPLE DESCRIPTION:

BRANDNAME: PocketWizard

MODEL: PocketWizard Plus II

TYPE: Remote Triggering System (Camera Flash Control)

POWER REQUIREMENTS: DC via wall mount 120VAC, 60Hz power adapter

FREQUENCY BAND OF OPERATION: 344.04MHz to 354.0MHz

MODULATION: OOK (On/Off Keying)

TYPE OF TRANSMISSION: Control Signal (Pulse Recognition Codes)

FREQUENCIES TESTED: 344.05MHz, 354.0MHz

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TESTS PERFORMED:

15.231 (b) Spurious Radiated Emissions (30MHz to 3.6GHz)

15.231 (b) Field Strength of Fundamental

15.231 (c) Occupied Bandwidth, 0.25% of Fundamental Frequency

15.207 (a) Conducted Emissions

Duty Cycle Determination

NOTE: Testing was performed at 2 frequencies (low and high) within the operational band per the requirements of 15.31 (m) for devices operating within a 1 - 10MHz band but not exceeding 10MHz.

TEST SAMPLE OPERATION:

The EUT is dc powered via an external 120VAC/DC Power Supply. The device is normally manually operated and transmits a control signal for remote triggering of a flashpack. Normal operation of the EUT complies with the parameters required in Part 15, Subpart C, Section 15.231. For testing purposes only the EUT was configured to continuously transmit.

TEST SAMPLE / TEST PROGRAM

- The transmitter is manually activated and employs a switch that automatically deactivates the transmitter within 5 seconds of being released.
- The transmitter does not perform periodic transmissions at regularly predetermined intervals.
- The device can not be employed for RC purposes involving security.
- The device uses an external permanently attached rubber coated copper spring antenna.
- The fundamental field strength at 344.05MHz did not exceed 7250 μ V/M (Average) at a test distance of 3 meters.
The fundamental field strength at 354.0MHz did not exceed 7666 μ V/M (Average) at a test distance of 3 meters.
- The peak value of fundamental emissions did not exceed a peak field strength limit corresponding to 20dB above the maximum permitted average limit.
- The field strength of harmonic and spurious emissions did not exceed 725 μ V/M or 500 μ V/M as applicable for a fundamental frequency of 344.05MHz.
The field strength of harmonic and spurious emissions did not exceed 766 μ V/M or 500 μ V/M as applicable for a fundamental frequency of 354.0MHz.
No harmonic or spurious emissions were observed within 20dB of the specified limit at test distances of 1 or 3 meters.
- The device can operate within the range of 344.04 to 354.00MHz. The device was tested at the frequencies of 344.05MHz and 354.0MHz. The bandwidth of emissions did not exceed 0.25% of the operating frequency and was determined as follows:

Fundamental Frequency	=	344.05MHz
0.25% of Center Frequency	=	0.860MHz
0.860 divided by 2	=	0.430MHz
Bandwidth Range	=	Fundamental Frequency + and - 0.430MHz
344.05MHz - 0.430MHz	=	343.62MHz
344.05MHz + 0.430MHz	=	344.48MHz
Bandwidth Range	=	343.62MHz - 344.48MHz

TEST SAMPLE / TEST PROGRAM (continued): (Bandwidth)

Fundamental Frequency	=	354.0MHz
0.25% of Center Frequency	=	0.885MHz
0.885 divided by 2	=	0.4425MHz
Bandwidth Range	=	Fundamental Frequency + and - 0.4425MHz
354.0MHz - 0.4425MHz	=	353.5575MHz
354.0MHz + 0.4425MHz	=	354.4425MHz
Bandwidth Range	=	353.5575MHz - 354.4425MHz

- Radiated Emissions from the EUT were measured in all three axis. The attached Radiated Emissions test data is representative of the worst case orientation.
- Conducted Emissions did not exceed the limits specified in 15.207 (a).

DETERMINATION OF FIELD STRENGTH LIMITS

The field strength limits shown below were calculated as instructed in Section 15.231.

Fundamental Frequency: 344.05MHz

Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strength for the band 260-470MHz, $\mu\text{V/m}$ at 3 meters is as follows:

$$\begin{aligned} 41.6667(F) - 7083.3333 &= \text{Field Strength Limit } (\mu\text{V/m}) \\ 41.6667 \times 344.05 &= 14335.428 \\ 14335.428 - 7083.3333 &= 7252 \\ \text{Field Strength Limit} &= 7252\mu\text{V/m} = 77.21\text{dBuV/M} \end{aligned}$$

The maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level which equals $725\mu\text{V/m} = 57.21\text{dBuV/M}$.

TEST SAMPLE / TEST PROGRAM (continued)

Field Strength Limit Calculations continued:

Fundamental Frequency: 354.0MHz

Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strength for the band 260-470MHz, $\mu\text{V/m}$ at 3 meters is as follows:

$$\begin{aligned} 41.6667(F) - 7083.3333 &= \text{Field Strength Limit } (\mu\text{V/m}) \\ 41.6667 \times 354.0 &= 14750.012 \\ 14750.012 - 7083.3333 &= 7666.678 \\ \text{Field Strength Limit} &= 7666.678\mu\text{V/m} = 77.69\text{dBuV/M} \end{aligned}$$

The maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level which equals $766.67\mu\text{V/m} = 57.69\text{dBuV/M}$

DETERMINATION OF DUTY CYCLE

The transmitter controls were adjusted to maximize the transmitted duty cycle. The analyzer was set for a frequency span of 0Hz. The sweep time was then adjusted in order to display one full pulse train. The transmitter on time was then summed and compared to the time for one full cycle in order to obtain the duty cycle. As the pulse train exceeded 100msec in duration the worst case duty cycle was determined by measuring/calculating the 100msec period with the greatest on time. The on times were determined as follows:

The worst case 100msec period contained 6 pulse bursts. The individual pulses within each burst were measured and summed in order to obtain the total "on time" within 100msec.

Fundamental Frequency: 344.0MHz

$$\begin{aligned} \text{Transmitter On Time} &= .995 \text{ milliseconds} \\ \text{Transmitter Cycle Time} &= 100 \text{ milliseconds} \\ \text{Transmitter Duty Cycle} &= .995 \% \\ \text{On Time divided by Cycle Time} &= \text{Duty Cycle Factor} \\ 4.492 \text{ divided by } 100 &= 0.00995 \\ 0.00995 \text{ converted to dB } (\text{LOG}_{10} .00995)20 &= -40.04 \\ \text{Duty Cycle Factor} &= -40.04\text{dB} \end{aligned}$$

DETERMINATION OF DUTY CYCLE (continued)

Fundamental Frequency: 354.0MHz

Transmitter On Time	=	1.88 milliseconds
Transmitter Cycle Time	=	100 milliseconds
Transmitter Duty Cycle	=	1.88 %
On Time divided by Cycle Time	=	Duty Cycle Factor
1.88 divided by 100	=	0.0188
.0188 converted to dB ($\text{LOG}_{10} .01888$)20	=	-34.51
<i>Duty Cycle Factor</i>	=	<i>-34.51dB</i>

Duty Cycle Factor Determination Plots are included with this application as a separate attachment.

Test Methods

15.231 (b) Fundamental & Spurious Radiated Emissions

The test sample was placed on a 80cm high wooden test stand which was located 3 meters from the test antenna on an FCC listed open area test site. Emissions from the EUT were maximized by rotating the test sample and adjusting the test sample orientation and antenna polarization. The maximized peak field strength of each emission was measured and recorded and compared to the limit specified in 15.35 (b) (peak limit corresponds to 20dB above the maximum permitted average limit). The duty cycle factor was applied to the peak readings in order to determine the average field strength of the emissions for comparison to the specified average limits.

Test Results: The worst case maximum peak field strength of the fundamental frequency at 344.05MHz was 91.7dBuV/M which met the peak limit of 97.21dBuV. The maximum average field strength at 344.05MHz was 51.66dBuV which met the specified average limit of 77.21dBuV. The worst case maximum peak field strength of the fundamental frequency at 354MHz was 91.3dBuV/M which met the peak limit of 97.69dBuV. The maximum average field strength at 354MHz was 56.79dBuV which met the specified average limit of 77.69dBuV. No harmonic/spurious frequencies were observed.

15.231 (c) Occupied Bandwidth

The test sample was placed on a test bench with nominal AC power applied and configured to transmit its normal modulated signal. The spectrum analyzers resolution bandwidth, sweep rate and span were adjusted for the frequency being measured. The upper and lower frequency points corresponding to levels 20dB down from the peak of the modulated carrier frequency were used to determine the occupied bandwidth.

Test Results: The bandwidth of the emission at 344.05MHz and at 354.0MHz was less than 0.25% of the center frequency and met the requirements of 15.231 (c).

15.207 (a) AC Line Conducted Emissions

The test sample was placed on a 0.8m high wooden test stand above the floor of the test area (ground plane). The rear of the test sample was aligned flush with the rear of the test stand. The test stand was situated such that the test sample was located 0.4m from all other grounded surfaces. The power cord of the test sample was connected to an artificial mains network (LISN). The spectrum analyzer was connected to the RF port of the LISN and peak/quasipeak and average measurements were taken in the frequency range of 150kHz to 30MHz on each the hot and neutral leads.

Test Results: The AC line conducted emissions met the limit specified in 15.207 (a).

RADIATED EMISSIONS SETUP PHOTOGRAPHS

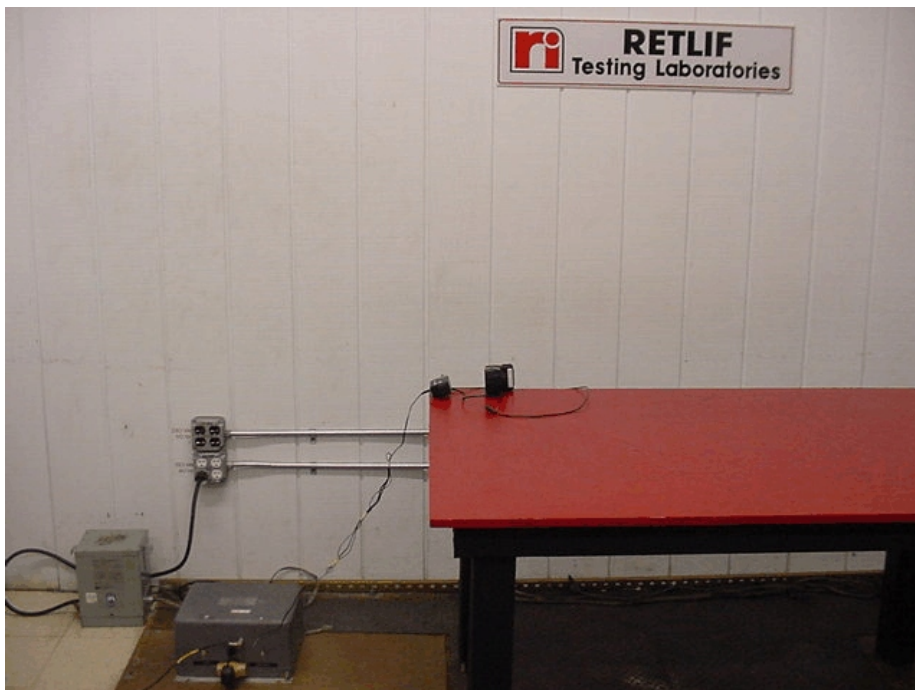


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OCCUPIED BANDWIDTH & DUTY CYCLE SETUP PHOTOGRAPH



CONDUCTED EMISSIONS SETUP PHOTOGRAPH



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EQUIPMENT LISTS

RADIATED EMISSIONS

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
3119A	Pre-Amplifier	Retlif	10 kHz - 1 GHz	RET-PA-SW	8/21/2005	8/21/2006
3258	Double Ridge Guide	EMCO	1 - 18GHz	3115	8/21/2005	8/21/2006
4029B	Test Site Attenuation	Retlif	3 / 10 Meters	RNH	12/3/2004	2/3/2006
4202	Biconilog	EMCO	26 MHz - 2 GHz	3142	12/14/2005	12/14/2006
4895	Spectrum Analyzer	Hewlett Packard	9kHz - 22GHz	8593EM	9/20/2005	9/20/2006

CONDUCTED EMISSIONS

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
4027	LISN	Solar Electronics	10 KHz - 30 MHz	9252-50-R-24BNC	11/21/2005	11/21/2006
4028	Isolation Transformer	Acme	N/A	120x240	2/1/2006	2/1/2007
4895	Spectrum Analyzer	Hewlett Packard	9kHz - 22GHz	8593EM	9/20/2005	9/20/2006
5030	10 DB Atten. (50 ohm)	Narda	DC - 12.4 GHz	757C-10	2/7/2005	2/7/2006

Occupied Bandwidth & Duty Cycle

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due
5037	6 DB Atten. (50 ohm)	Fluke	DC - 12.4 GHz	Y9303	02/08/2005	02/08/2006
713	EMI Test Receiver	Rohde & Schwarz	20 Hz - 26.5 GHz	ES126	03/22/2005	03/22/2006