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FCC PART 95 LOW POWER RADIO SERVICE TEST REPORT

APPLICANT	LoJack SafetyNet, Inc.
ADDRESS	200 Lowder Brook Drive Suite 100
	Westwood, MA 02090
FCC ID	YXV16K
MODEL NUMBER	L6
PRODUCT DESCRIPTION	TRANSMITTER
DATE SAMPLE RECEIVED	8/12/2010
DATE TESTED	8/24/2010
TESTED BY	Nam Nguyen
APPROVED BY	Mario de Aranzeta
TIMCO REPORT NO.	208AT11TestReport.doc
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Certificate # 0955-01

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ATTESTATION STATEMENT

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.



Certificate #0955-01

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

Authorized by: Mario de Aranzeta



Signature:

Function: Engineer

Date: 9/15/2010

Applicant: LoJack SafetyNet, Inc.
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REPORT SUMMARY

Disclaimer	The test results relate only to the items tested.
Purpose of Test	To show the DUT in compliance with FCC CFR 47, Part 95 requirements for Low Power Radio
Test Standards	ANSI/TIA 603-C: 2004, FCC CFR 47 Part 95G, ANSI C63.4: 2003

TEST ENVIRONMENT AND TEST SETUP

Test Facility	All tests were conducted by Timco Engineering Inc. located at 849 NW State Road 45, Newberry, FL 32669 USA
Laboratory Test Condition	The temperature was 26°C with a relative humidity of 50%.
Deviation from the standards	No deviation
Modification to the DUT	No modification was made.
Test Exercise (software etc.)	The DUT was placed in continuous transmitting mode of operation.
System Setup	Stand alone device.

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DUT DESCRIPTION

Manufactured by	LoJack SafetyNet, Inc.
Product Description	TRANSMITTER
FCC ID	YXV16K
M/N	L6
S/N	N/A
Operating Freq	216.0125 – 216.9875 MHz
Max. Output Pwr	0.010 W ERP
Emission Designator(s)	L1D
Modulation	on off keying (OOK)
Power Source	Battery coin cell
Test Item	Pre-production
Type of DUT	Portable
Antenna Spec	Permanently attached antenna
Calculation of Designator(s)	$B_n = BK$ $B = 1400$ $K = 5$ $B_n = 5(1400) = 7000$

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TEST EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 3/10/10	3/10/12
AC Voltmeter	HP	400FL	2213A14499	CAL 3/23/09	3/23/11
Antenna: Dipole Kit	Electro-Metrics	TDA-30/1-4	153	CHAR 6/10/09	6/10/11
Frequency Counter	HP	5385A	3242A07460	CAL 5/26/09	5/26/11
Hygro-Thermometer	Extech	445703	0602	CAL 1/30/09	1/30/11
Modulation Analyzer	HP	8901A	3435A06868	CAL 5/26/09	5/26/11
Digital Multimeter	Fluke	FLUKE-77-3	79510405	CAL 5/18/09	5/18/11
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 11/21/09	11/21/11
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 11/22/09	11/22/11
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 11/21/09	11/21/11
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 11/24/09	11/24/11
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 4/25/10	4/25/12

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TEST PROCEDURE

Power Line Conducted Interference

The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed with the DUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

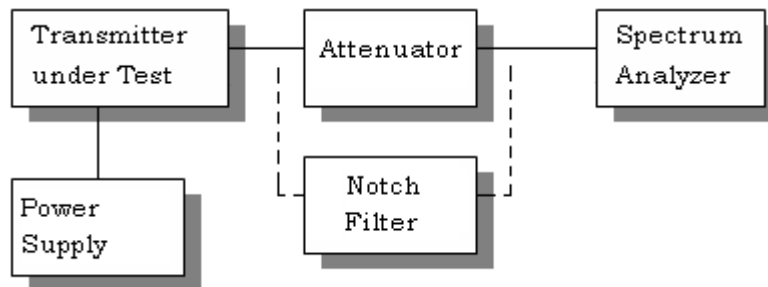
RF Power Output

The RF power output was measured at the antenna feed point using a peak power meter. A 50-ohm, resistive wattmeter was connected to the RF output connector. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:



Spurious Emissions At Antenna Terminals (Conducted)

The carrier was modulated 100% using a Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz. The measurements were made in accordance with standard ANSI/TIA-603-C: 2004



Radiation Interference

The test procedure used was ANSI/TIA-603-C: 2004 and ANSI C63.4-2003 using an Agilent spectrum receiver with preselector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

Modulation Characteristics

Audio frequency response

The audio frequency response was measured in accordance with ANSI/TIA 603-C: 2004.

Audio Low Pass Filter

The audio low pass filter for voice-modulated equipment was measured in accordance with ANSI/TIA 603-C: 2004.

Audio Input versus modulation

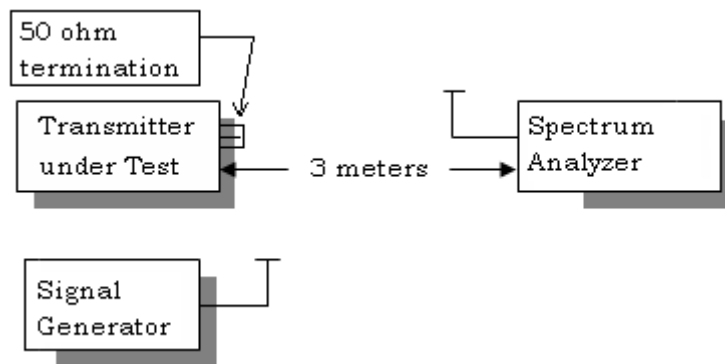
The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C: 2004. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

Frequency Stability

The frequency stability was measured per ANSI/TIA 603-C: 2004.

Field Strength of Spurious Emissions

The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-C: 2004 using the substitution method.

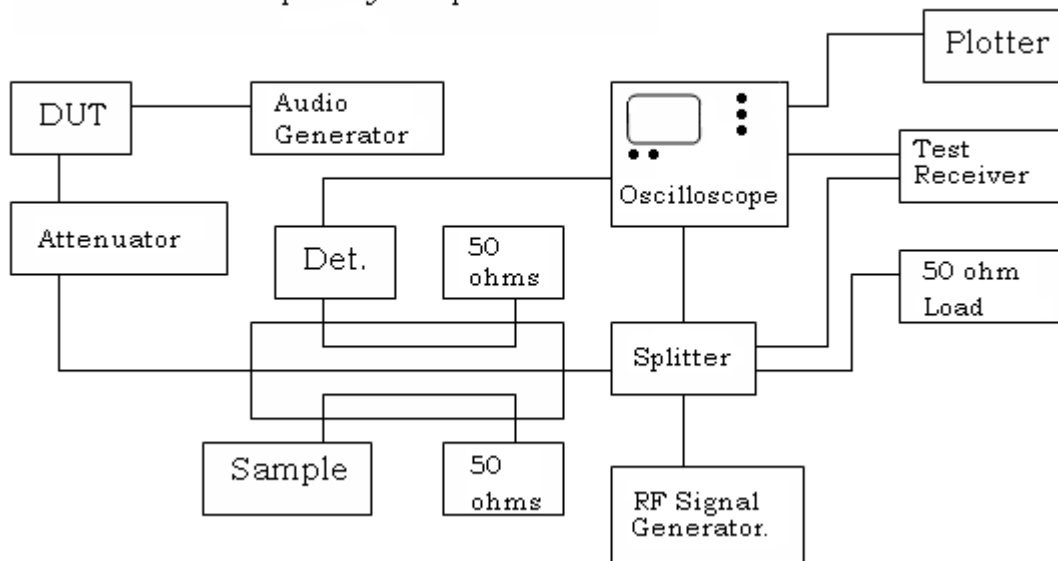


Transient Frequency Behavior

The test procedure was ANSI/TIA 603-C: 2004 Para 2.2.19.

- Using the variable attenuator. The transmitter level was set to 40 dB below the test receivers maximum input level,
- Then the transmitter was turned off.
- With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
- Reduce the attenuation between the transmitter and the RF detector by 30 dB.
- With the levels set as above the transient frequency behavior was observed & recorded.

Transient Frequency Response Test



TEST RESULT

RF POWER OUTPUT

Rule Part No.: Part 2.1046(a), Part 95

Requirements: Part 2.1046

Test Data:

Frequency	Power Watts ERP
216.5 MHz	0.010

MODULATION CHARACTERISTICS

Rule Parts No.: Part 2.1047(a)(b), Part 95

Requirements: A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted.

For voice modulated communication equipment, a curve or equivalent data showing audio low pass filter shall be submitted.

Audio input versus modulation cannot exceed 100%.

Test Data: Not applicable. The DUT is a data radio.

OCCUPIED BANDWIDTH

Rule Parts No: 2.1049 (c), Pt 95.635 (c)

Test Requirement: Emissions for LPRS transmitters operating on narrowband channels (5 kHz) shall be attenuated below the power (P) of the highest emission, measured in peak values, contained within the authorized bandwidth (4 kHz) in accordance with the following:

- a. On any frequency within the authorized bandwidth: Zero dB;
- b. On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 2 kHz up to and including 3.75 kHz: The lesser of $30 + 20(f-2)$ dB, or $55 + 10\log(P)$, or 65 dB; and
- c. On any frequency beyond 3.75 kHz removed from the center of the authorized bandwidth: At least $55 + 10\log(P)$ dB.

Emissions for LPRS transmitters operating on standard channels (25 kHz) shall be attenuated below the unmodulated carrier in accordance with the following:

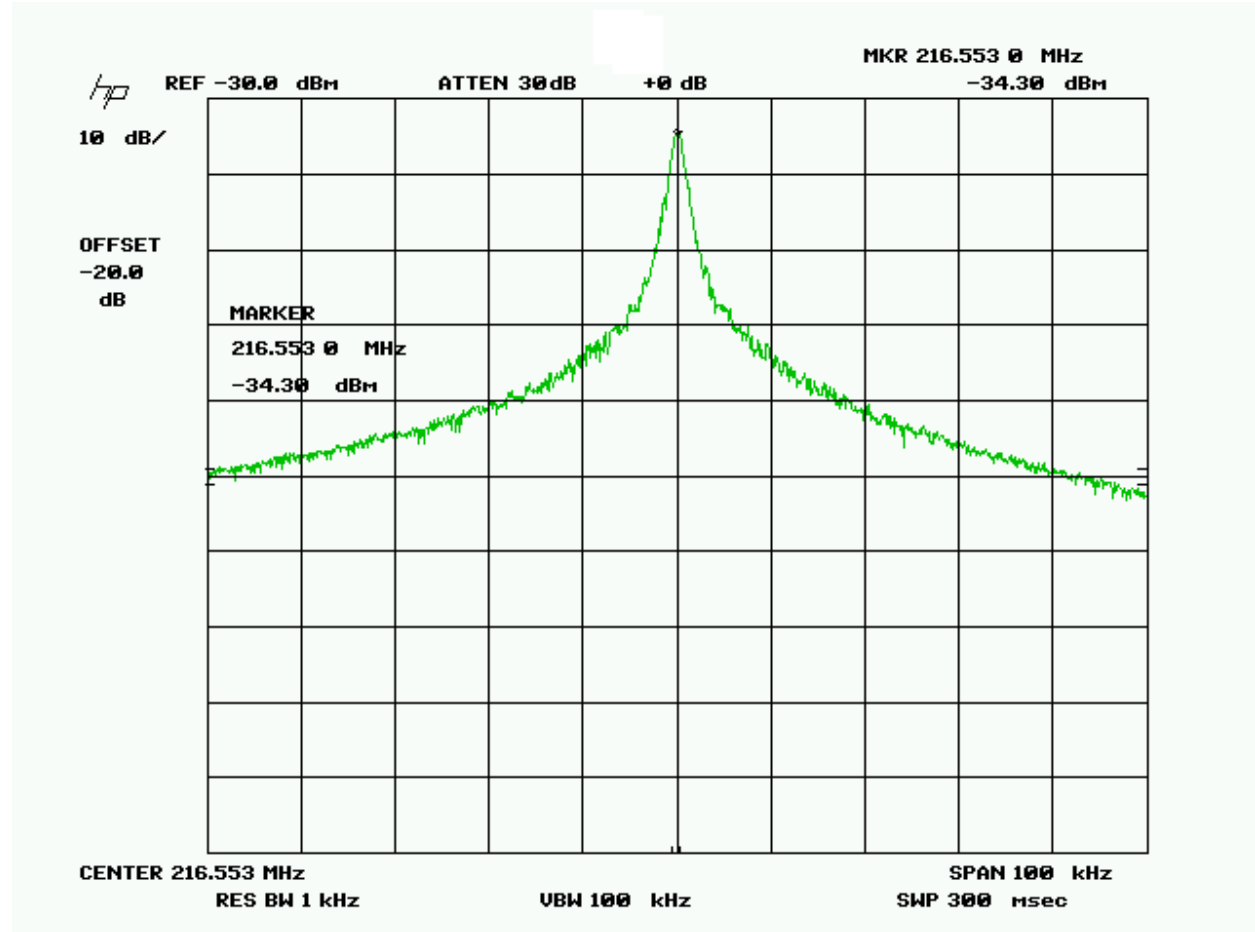
- (i) Emissions 12.5 kHz to 22.5 kHz away from the channel center frequency at least 30 dB; and
- (ii) Emissions more than 22.5 kHz away from the channel center frequency at least $43 + 10\log(P)$.

Emissions for LPRS transmitters operating on standard channels (50 kHz) shall be attenuated below the unmodulated carrier in accordance with the following:

- (i) Emissions 25 kHz to 35 kHz away from the channel center frequency at least 30 dB; and
- (ii) Emissions more than 35 kHz away from the channel center frequency at least $43 + 10\log(P)$.

Test Data: Refer to the following plot

Test Data - Plot



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SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a)

Requirements: 12.5 kHz Spacing $= 43 + 10\log(P_o) = 43 + 10\log(.010) = 23.0$ dB

Test Data:

No antenna terminals available

FIELD STRENGTH OF SPURIOUS EMISSIONS (RADIATED)

Rule Parts. No.: Part 2.1053

Requirements: $43 + 10\log(.010) = 23.0$ dB

Test Data: As indicated in the table

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
216.59	V	0
433.18	V	36.6
649.77	V	37.21
866.36	V	28.99
1082.96	V	33.15
1299.55	H	35.93
1516.14	0	*
1732.73	0	*
1949.32	0	*
2165.91	0	*

* Emissions at noise level are not reported.

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 95

Requirements: Temperature range requirements: -30 to +50° C.
 Voltage Variation +, -15%
 ± 50 ppm for 25 and 50 kHz band width devices
 ± 1.5 PPM for narrow band devices

Test Data: Test Voltage: 3.0Vdc , Reference Frequency: 216.590314 MHz.

Test Temperature (°C)	Frequency [MHz]	Unit PPM
-30	216.587053	-15.06
-20	216.588734	-7.29
-10	216.589788	-2.43
0	216.590345	0.14
10	216.590513	0.92
20	216.590442	0.59
30	216.590274	-0.18
40	216.590159	-0.72
50	216.590223	-0.42

Voltage variation (%)	Frequency [MHz]	Unit PPM
-15	216.590191	-0.57
0	216.590314	0
15	216.590372	0.27

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POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: Part 15.207

Requirements:

Frequency (MHz)	Quasi Peak Limits (dB μ V)	Average Limits (dB μ V)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

Test Data: Not applicable DUT is battery operated.