

## EMISSIONS TEST REPORT

Report Number: 3178496BOX-001

Project Number: 3178496

Testing performed on the

Vehicle Location Unit

Models: V7E-SP

To

CFR47 "Telecommunications" FCC Part 15 Subpart C "Intentional Radiators" 15.249  
"Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-  
24.25 GHz"

For  
LoJack Corporation

Test Performed by:  
Intertek – ETL SEMKO  
70 Codman Hill Road  
Boxborough, MA 01719

Test Authorized by:  
LoJack Corporation  
780 Dedham Street  
Canton, MA 02021

Prepared by:



Nicholas Abbondante

Date: 06/30/2009

Reviewed by:



Jeff Goulet

Date: 06/30/09

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## 1.0 Job Description

### 1.1 Client Information

This EUT has been tested at the request of:

**Company:** LoJack Corporation  
780 Dedham Street  
Canton, MA 02021

**Contact:** Mr. Bob White

**Telephone:** 781-302-7128

**Fax:** 781-302-7299

**Email:** [rwhite@lojack.com](mailto:rwhite@lojack.com)

### 1.2 Equipment Under Test

**Equipment Type:** Vehicle Location Unit

**Model Number(s):** V7E-SP

**Serial number(s):** 01120902900092 (V7E-SP)

**Manufacturer:** LoJack Corporation

**EUT receive date:** 06-18-2009 (V7E-SP)

**EUT received condition:** Prototype in Good Condition

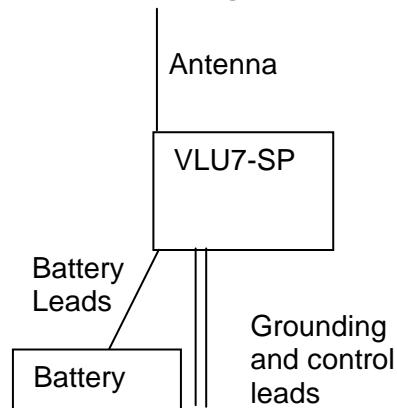
**Test start date:** 06-29-2009

**Test end date:** 06-30-2009

**1.3 Test Plan Reference:** Tested according to the standards listed and with the guidance of ANSI C63.4:2003.

### 1.4 Test Configuration

#### 1.4.1 Block Diagram



**1.4.2. Cables:**

Cable	Shielding	Connector	Length (m)	Qty.
Antenna	None	Wire	1.067	1
DC Ground	None	Wire	0.4	1
Control	None	Wire	0.4	1
Backup Battery Power And Return	None	Wire	0.31	2

**1.4.3. Support Equipment:**

Name: None

Model No.:

Serial No.:

**1.5 Mode(s) of Operation:**

The EUT was activated from a fresh battery throughout testing. Testing was performed with the 2.4 GHz EW transmitter set to normal burst lengths but configured to transmit the burst repetitively to aid in testing.

**1.6 Floor Standing Equipment:** Applicable:        Not Applicable: X

## 2.0 Test Summary

TEST STANDARD	RESULTS	
CFR47 FCC Part 15 Subpart C 15.249		
SUB-TEST	TEST PARAMETER	COMMENT
Fundamental Field Strength FCC §15.249(a),(e)	The fundamental field strength must not exceed an average limit of 94 dBuV/m and a peak limit of 114 dBuV/m, which is 20 dB higher than the average limit.	Pass
Radiated Spurious Emissions FCC §15.209, 15.249(a),(d)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation. Harmonic emissions must not exceed an average limit of 54 dBuV/m and a peak limit of 74 dBuV/m.	Pass
Occupied Bandwidth FCC §15.215	The 20 dB bandwidth of the fundamental must remain inside the band of operation, 2.4-2.4835 GHz.	Pass
Duty Cycle FCC §15.35	There is no limit on duty cycle.	N/A

REVISION SUMMARY – The following changes have been made to this Report:

<u>Date</u>	<u>Project</u>	<u>Project</u>	<u>Page(s)</u>	<u>Item</u>	<u>Description of Change</u>
<u>No.</u>		<u>Handler</u>			

### 3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where  $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

$RA$  = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$

$CF$  = Cable Attenuation Factor in dB

$AF$  = Antenna Factor in dB

$AG$  = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0  $\text{dB}\mu\text{V}$  is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32  $\text{dB}\mu\text{V}/\text{m}$ . This value in  $\text{dB}\mu\text{V}/\text{m}$  was converted to its corresponding level in  $\mu\text{V}/\text{m}$ .

$RA = 52.0 \text{ dB}\mu\text{V}$

$AF = 7.4 \text{ dB}/\text{m}$

$CF = 1.6 \text{ dB}$

$AG = 29.0 \text{ dB}$

$FS = 32 \text{ dB}\mu\text{V}/\text{m}$

$$\text{Level in } \mu\text{V}/\text{m} = [10(32 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where  $NF$  = Net Reading in  $\text{dB}\mu\text{V}$

$RF$  = Reading from receiver in  $\text{dB}\mu\text{V}$

$LF$  = LISN Correction Factor in dB

$CF$  = Cable Correction Factor in dB

$AF$  = Attenuator Loss Factor in dB

To convert from  $\text{dB}\mu\text{V}$  to  $\mu\text{V}$  or  $\text{mV}$  the following was used:

$$UF = 10^{(NF/20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

#### Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V}/20)} = 254 \mu\text{V}/\text{m}$$

### 3.1 Measurement Uncertainty

For radiated emissions,  $U_{lab}$  (4.9 dB at 3m and 4.2 dB at 10m)  $< U_{CISPR}$  (5.2 dB), which is the reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

For conducted emissions,  $U_{lab}$  (3.2 dB in worst case)  $< U_{CISPR}$  (3.6 dB), which is the reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

## 3.2 Site Description

### Test Site(s): 2

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

## Test Results: Pass

### Test Standard: FCC Part 15.249

#### Test: Fundamental Field Strength

**Performance Criterion:** The fundamental field strength must not exceed an average limit of 94 dBuV/m and a peak limit of 114 dBuV/m, which is 20 dB higher than the average limit.

#### Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	23	Humidity (%):	64	Pressure (hPa):	996	
Pretest Verification Performed	Yes		Equipment under Test:	V7E-SP			
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:	01120902900092 (V7E-SP)		
Engineer's Initials:	NNA	Date Test Performed:	06-30-2009	Reviewer's Initials:	JC	Date Reviewed:	06/30/09

#### Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Weather Station	Davis Instruments	7400	PE80529A39A	06/10/2010
2	HORN ANTENNA	EMCO	3115	9602-4675	10/13/2009
3	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	58014001001	05/26/2010
4	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	12/01/2009

#### Test Details:

##### Special Radiated Emissions

Company: LoJack Corporation  
 Model #: V7E-SP  
 Serial #: 01120902900092 (V7E-SP)  
 Engineers: Nicholas Abbondante  
 Project #: 3178496 Date(s): 06/30/09  
 Standard: FCC Part 15 Subpart C 15.249  
 Receiver: R&S FSEK-30 (ROS001) 12-01-09 Limit Distance (m): 3  
 PreAmp: PRE8 11-12-09.txt Test Distance (m): 3  
 PreAmp Used? (Y or N): N Voltage/Frequency: Fresh Battery Frequency Range: 1-4 GHz  
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)  
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
Note: Duty Cycle 17.7%, Duty Cycle Correction Factor 15 dB, Average obtained by applying duty cycle factor to peak reading											
PK	V	2401.349	55.68	28.06	2.93	0.00	0.00	86.68	114.00	-27.32	1/3 MHz
AVG	V	2401.349	40.68	28.06	2.93	0.00	0.00	71.68	94.00	-22.32	1/3 MHz

FCC

IC

**Test Results:** Pass

**Test Standard:** FCC 15.249

**Test:** Occupied Bandwidth

**Performance Criterion:** The 20 dB bandwidth of the fundamental must remain inside the band of operation, 2.4-2.4835 GHz.

**Test Environment:**

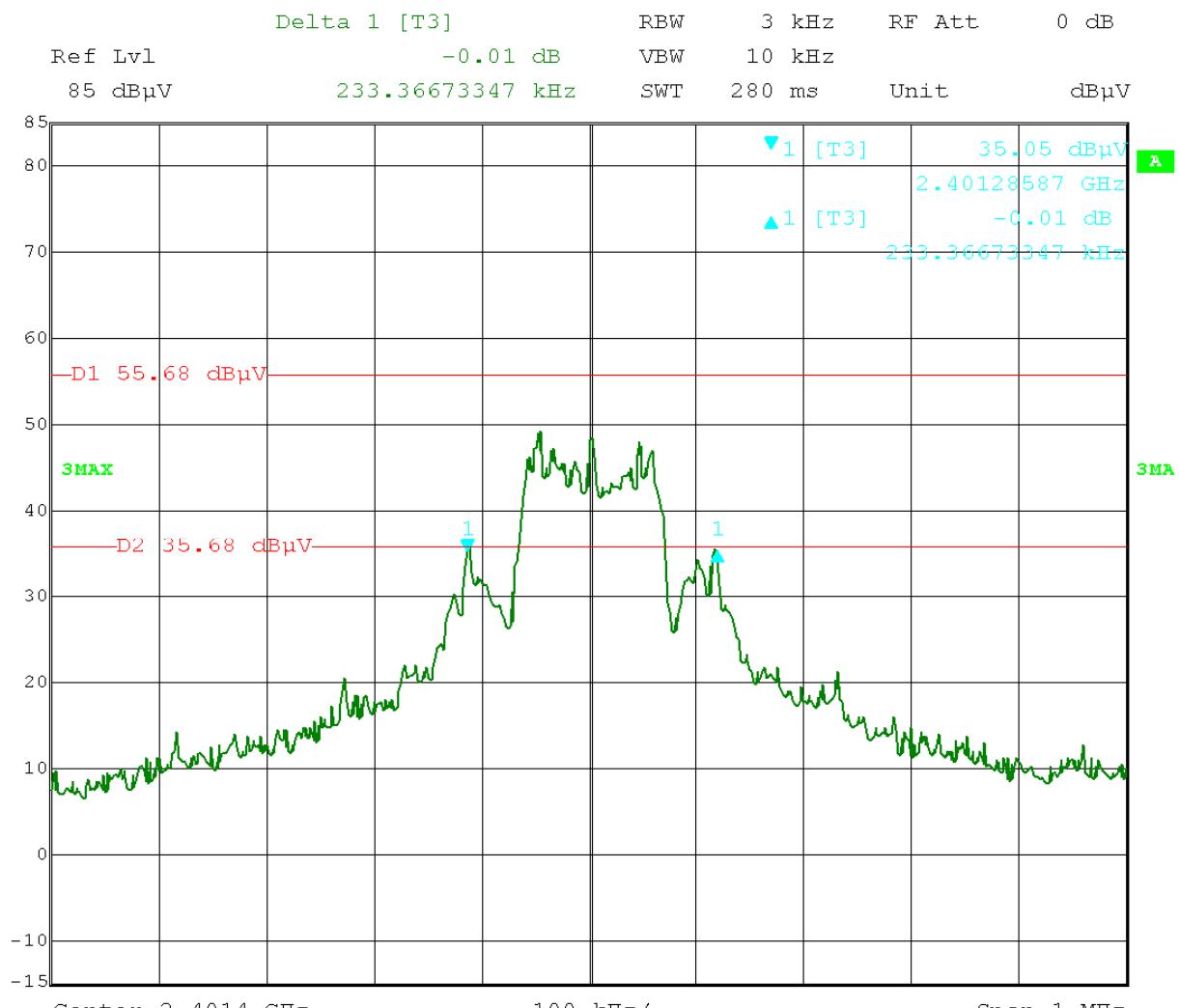
Environmental Conditions During Testing:	Ambient (°C):	23	Humidity (%):	64	Pressure (hPa):	996	
Pretest Verification Performed	Yes		Equipment under Test:	V7E-VP			
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:	01120902900092 (V7E-VP)		
Engineer's Initials:	NNA	Date Test Performed:	06/30/2009	Reviewer's Initials:	JC	Date Reviewed:	06/30/09

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Weather Station	Davis Instruments	7400	PE80529A39A	06/10/2010
2	HORN ANTENNA	EMCO	3115	9602-4675	10/13/2009
3	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	58014001001	05/26/2010
4	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	12/01/2009

**Test Details:**

Notes: The V7E-SP 20 dB bandwidth at 2401.4 GHz is 233.4 kHz. The 20 dB bandwidth measurement is a relative measurement and is referenced to the signal strength when viewed with a 1 MHz bandwidth in the same configuration.



Date: 30.JUN.2009 21:38:27  
 V7E-VP 2.4 GHz transmitter 20 dB Bandwidth, 233.4 kHz

**Test Results:** Pass

**Test Standard:** FCC Part 15.249

**Test:** Duty Cycle

**Performance Criterion:** There is no limit on duty cycle. It is used to determine the average value of the fundamental and its harmonics.

**Test Environment:**

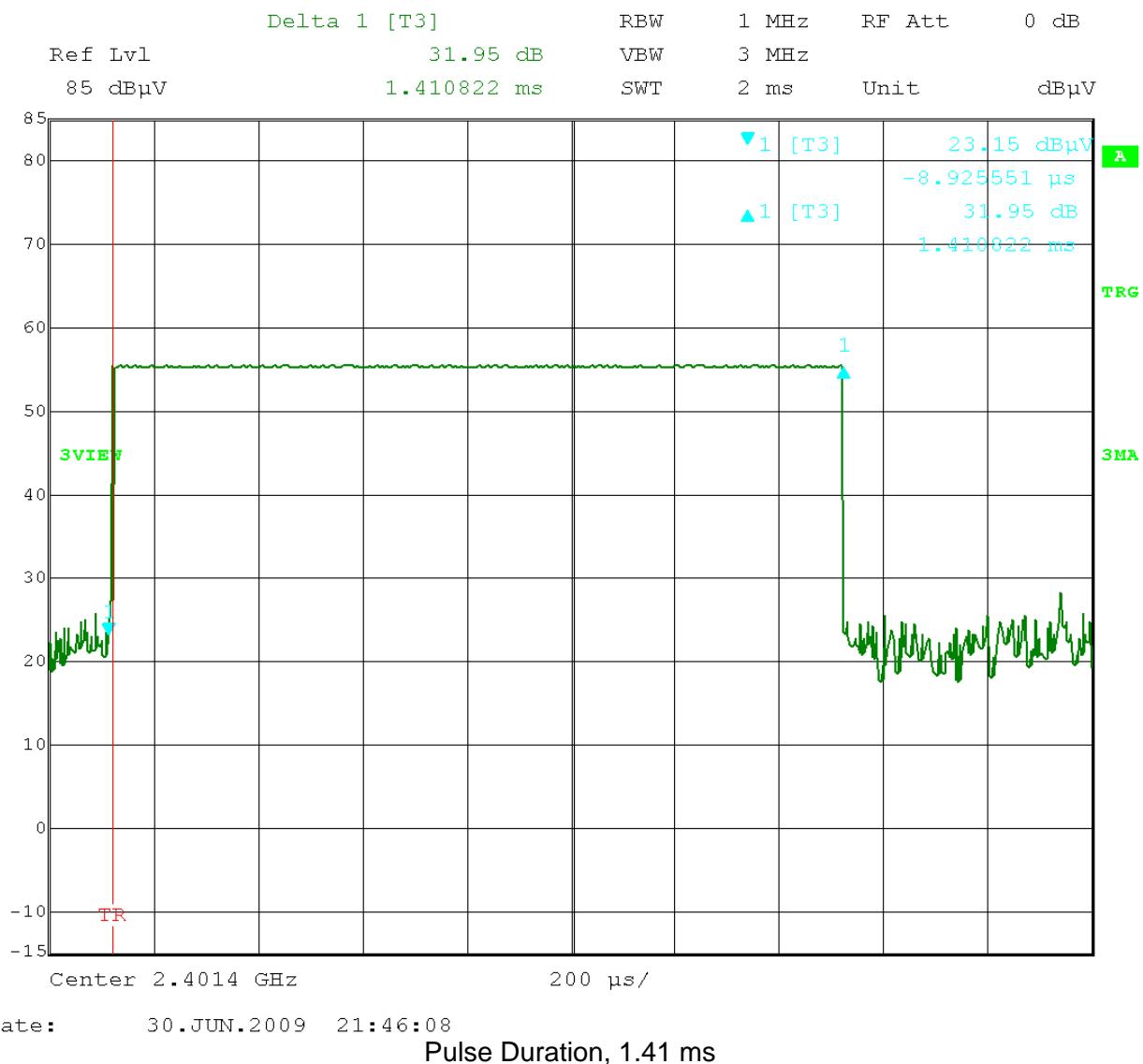
Environmental Conditions During Testing:	Ambient (°C):	23	Humidity (%):	64	Pressure (hPa):	996	
Pretest Verification Performed	Yes		Equipment under Test:	V7E-SP			
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:	01120902900092 (V7E-SP)		
Engineer's Initials:	NNA	Date Test Performed:	06-30-2009	Reviewer's Initials:	JC	Date Reviewed:	06/30/09

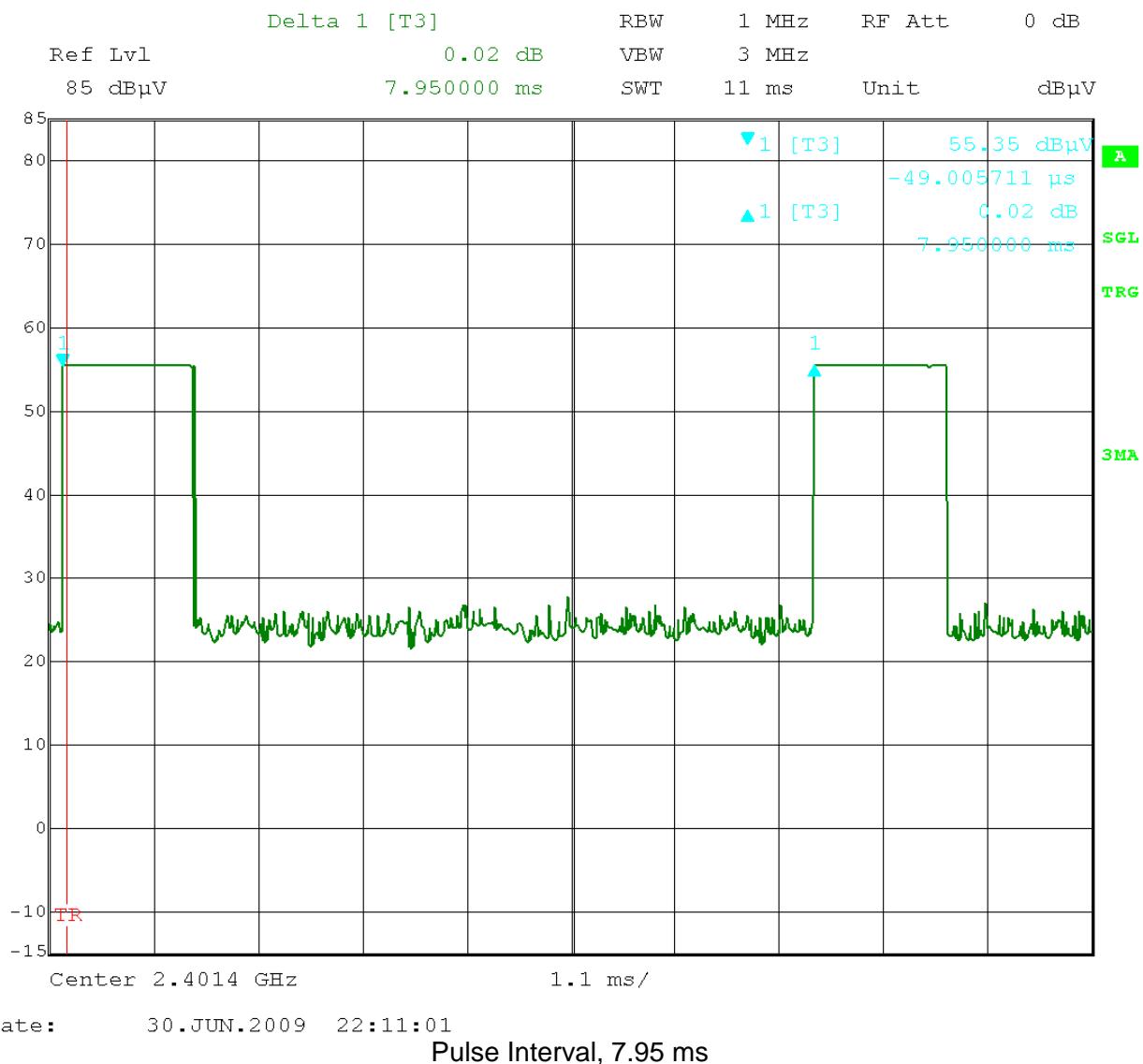
**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Weather Station	Davis Instruments	7400	PE80529A39A	06/10/2010
2	HORN ANTENNA	EMCO	3115	9602-4675	10/13/2009
3	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	58014001001	05/26/2010
4	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	12/01/2009

**Test Details:**

Notes: The 2.4 GHz signal pulse duration is 1.41 ms. The shortest pulse intervals are 7.95 ms long. This yields a duty cycle of 17.7% and a duty cycle correction factor of 15 dB.





**Test Results:** Pass

**Test Standard:** FCC Part 15.249

**Test:** Radiated Emissions

**Performance Criterion:** Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation. Harmonic emissions must not exceed an average limit of 54 dBuV/m and a peak limit of 74 dBuV/m.

**Test Environment:**

Environmental Conditions During Testing:		Ambient (°C):	21 23	Humidity (%):	48 64	Pressure (hPa):	987 996
Pretest Verification Performed		Yes		Equipment under Test:		V7E-SP	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		01120902900092 (V7E-SP)	
Engineer's Initials:	NNA	Date Test Performed:	06/29/2009 06/30/2009	Reviewer's Initials:	JB	Date Reviewed:	06/30/09

**Test Equipment Used:**

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Weather Station	Davis Instruments	7400	PE80529A39A	06/10/2010
2	HORN ANTENNA	EMCO	3115	9602-4675	10/13/2009
3	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	58014001001	05/26/2010
4	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwarz	FSEK-30	100225	12/01/2009
5	9kHz-3GHz EMI Receiver	Rohde & Schwarz	ESCI 1166.5950K03	100067	02/17/2010
6	ANTENNA	EMCO	3142	9711-1224	12/12/2009
7	Site 2 10m in floor cable	ITS	RG214B/U	S2 10M FLR	02/20/2010
8	100MHz-40GHz Preamp	MITEQ	NSP4000-NFG	1260417	04/03/2010
9	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 80	CBL030	12/10/2009
10	3GHz High Pass Filter	Reactel, Inc	7HSX-3G/18G-S11	06-1	10/15/2009
11	18GHz High Pass Filter	Reactel, Inc	7HS-18G/40G K11	(06)1	04/21/2010
12	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/27/2010
13	Filter, High Pass 250 MHz	Mini-Circuits	NHP-250	882414	09/24/2009
14	40 GHz Cable	Megaphase	TM40-K1K1-80	58013901001	05/26/2010

## Software Utilized:

Name	Manufacturer	Version
EXCEL 2003	Microsoft Corporation	11.5612.5606
EMI BOXBOROUGH	Intertek	4/17/09 Revision

## Test Results:

### Radiated Emissions

Company: LoJack Corporation  
 Model #: V7E-SP  
 Serial #: 01120902900092 (V7E-SP)  
 Engineers: Nicholas Abbondante  
 Project #: 3178496 Date(s): 06/29/09  
 Standard: FCC Part 15 Subpart C 15.249  
 Receiver: R&S ESCI (ROS002) 02-17-2010 Limit Distance (m): 3  
 PreAmp: PRE8 11-12-09.txt Test Distance (m): 10  
 PreAmp Used? (Y or N): N Voltage/Frequency: Fresh Battery Frequency Range: 30-1000 MHz  
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)  
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
QP	V	48.000	16.60	8.20	1.01	0.00	-10.46	36.27	40.00	-3.73	120/300 kHz		
QP	V	210.000	13.70	10.90	2.23	0.00	-10.46	37.29	43.50	-6.21	120/300 kHz		
QP	V	350.000	3.80	15.50	2.94	0.00	-10.46	32.69	46.00	-13.31	120/300 kHz		
QP	V	540.000	4.30	19.20	3.62	0.00	-10.46	37.58	46.00	-8.42	120/300 kHz		
QP	V	750.000	4.30	21.60	4.31	0.00	-10.46	40.67	46.00	-5.33	120/300 kHz		
QP	V	950.000	5.40	23.20	5.48	0.00	-10.46	44.54	46.00	-1.46	120/300 kHz		

## Special Radiated Emissions

Company: LoJack Corporation

Model #: V7E-SP

Serial #: 01120902900092 (V7E-SP)

Engineers: Nicholas Abbondante

Project #: 3178496

Date(s): 06/30/09

Location: Site 2

Antenna & Cables: HF Bands: N, LF, HF, SHF

Antenna: Horn2 V3m 10-13-09.txt Horn2 H3m 10-13-09.txt

Cable(s): CBL027 05-26-10.txt NONE.

Barometer: DAV003

Filter: NONE

Standard: FCC Part 15 Subpart C 15.249

Temp/Humidity/Pressure: 23c 64% 996mB

Receiver: R&S FSEK-30 (ROS001) 12-01-09 Limit Distance (m): 3

PreAmp: PRE8 11-12-09.txt

Test Distance (m): 3

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh Battery Frequency Range: 1-4 GHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
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Note: Noise Floor

PK	V	2899.000	28.40	29.56	3.30	0.00	0.00	61.26	74.00	-12.74	1/3 MHz
AVG	V	2899.000	17.39	29.56	3.30	0.00	0.00	50.25	54.00	-3.75	1/3 MHz

RB

RB

RB

RB

## Special Radiated Emissions

Company: LoJack Corporation

Model #: V7E-SP

Serial #: 01120902900092 (V7E-SP)

Engineers: Nicholas Abbondante

Project #: 3178496

Date(s): 06/30/09

Standard: FCC Part 15 Subpart C 15.249

Receiver: R&S FSEK-30 (ROS001) 12-01-09

PreAmp: PRE8 11-12-09.txt

PreAmp Used? (Y or N): Y

Limit Distance (m): 3

Test Distance (m): 3

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS: NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
Note: Duty Cycle 17.7%, Duty Cycle Correction Factor 15 dB, Average obtained by applying duty cycle factor to peak reading													
PK	V	4802.781	37.47	32.71	6.33	18.42	0.00	58.08	74.00	-15.92	1/3 MHz	RB	RB
AVG	V	4802.781	22.47	32.71	6.33	18.42	0.00	43.08	54.00	-10.92	1/3 MHz	RB	RB
PK	V	7204.172	29.57	35.57	8.10	17.38	0.00	55.86	74.00	-18.14	1/3 MHz		
AVG	V	7204.172	14.57	35.57	8.10	17.38	0.00	40.86	54.00	-13.14	1/3 MHz		
PK	V	9605.562	28.64	37.93	9.65	15.57	0.00	60.65	74.00	-13.35	1/3 MHz	RB	RB
AVG	V	9605.562	13.64	37.93	9.65	15.57	0.00	45.65	54.00	-8.35	1/3 MHz		
PK	V	12006.953	29.86	39.29	11.17	16.00	0.00	64.33	74.00	-9.67	1/3 MHz	RB	RB
AVG	V	12006.953	14.86	39.29	11.17	16.00	0.00	49.33	54.00	-4.67	1/3 MHz		
PK	V	14408.344	29.20	41.96	12.71	17.75	0.00	66.12	74.00	-7.88	1/3 MHz		
AVG	V	14408.344	14.20	41.96	12.71	17.75	0.00	51.12	54.00	-2.88	1/3 MHz		
PK	V	16809.734	28.50	39.70	14.17	20.26	0.00	62.11	74.00	-11.89	1/3 MHz		
AVG	V	16809.734	13.50	39.70	14.17	20.26	0.00	47.11	54.00	-6.89	1/3 MHz		
Note: Non-harmonic spurious													
PK	V	4754.000	33.94	32.61	6.29	18.39	0.00	54.45	74.00	-19.55	1/3 MHz	RB	RB
AVG	V	4754.000	26.82	32.61	6.29	18.39	0.00	47.33	54.00	-6.67	1/3 MHz	RB	RB
PK	V	4786.900	33.99	32.67	6.32	18.41	0.00	54.57	74.00	-19.43	1/3 MHz	RB	RB
AVG	V	4786.900	27.28	32.67	6.32	18.41	0.00	47.86	54.00	-6.14	1/3 MHz	RB	RB
PK	V	4790.500	34.96	32.68	6.32	18.41	0.00	55.55	74.00	-18.45	1/3 MHz	RB	RB
AVG	V	4790.500	29.26	32.68	6.32	18.41	0.00	49.85	54.00	-4.15	1/3 MHz	RB	RB
PK	V	4795.900	34.04	32.69	6.32	18.42	0.00	54.64	74.00	-19.36	1/3 MHz	RB	RB
AVG	V	4795.900	26.82	32.69	6.32	18.42	0.00	47.42	54.00	-6.58	1/3 MHz	RB	RB
PK	V	4807.300	34.44	32.71	6.33	18.43	0.00	55.06	74.00	-18.94	1/3 MHz	RB	RB
AVG	V	4807.300	28.02	32.71	6.33	18.43	0.00	48.64	54.00	-5.36	1/3 MHz	RB	RB
PK	V	4814.500	34.30	32.73	6.34	18.43	0.00	54.94	74.00	-19.06	1/3 MHz	RB	RB
AVG	V	4814.500	28.12	32.73	6.34	18.43	0.00	48.76	54.00	-5.24	1/3 MHz	RB	RB
PK	V	4821.300	34.34	32.74	6.34	18.44	0.00	54.99	74.00	-19.01	1/3 MHz	RB	RB
AVG	V	4821.300	29.43	32.74	6.34	18.44	0.00	50.08	54.00	-3.92	1/3 MHz	RB	RB

## Special Radiated Emissions

Company: LoJack Corporation

Model #: V7E-SP

Serial #: 01120902900092 (V7E-SP)

Engineers: Nicholas Abbondante

Project #: 3178496

Date(s): 06/30/09

Location: Site 2

Antenna & Cables: LF Bands: N, LF, HF, SHF

Antenna: EMC04 V1m 01-27-2010.txt EMC04 H1m 01-27-2010.txt

Cable(s): CBL030 12-10-09.txt MEG003 05-26-10.txt

Barometer: DAV003

Filter: REA006

Standard: FCC Part 15 Subpart C 15.249

Temp/Humidity/Pressure: 23c 64% 996mB

Receiver: R&S FSEK-30 (ROS001) 12-01-09 Limit Distance (m): 3

PreAmp: PRE8 11-12-09.txt Test Distance (m): 3

PreAmp Used? (Y or N): Y Voltage/Frequency: Fresh Battery Frequency Range: 18-25 GHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
Note: Duty Cycle 17.7%, Duty Cycle Correction Factor 15 dB, Average obtained by applying duty cycle factor to peak reading											
PK	V	19211.125	27.14	45.50	8.84	20.48	0.00	60.99	74.00	-13.01	1/3 MHz
AVG	V	19211.125	12.14	45.50	8.84	20.48	0.00	45.99	54.00	-8.01	1/3 MHz
PK	V	21612.515	29.16	45.80	9.64	18.30	0.00	66.29	74.00	-7.71	1/3 MHz
AVG	V	21612.515	14.16	45.80	9.64	18.30	0.00	51.29	54.00	-2.71	1/3 MHz
PK	V	24013.906	27.29	45.70	10.36	16.09	0.00	67.26	74.00	-6.74	1/3 MHz
AVG	V	24013.906	12.29	45.70	10.36	16.09	0.00	52.26	54.00	-1.74	1/3 MHz