



## TEST REPORT

Report Number: 101220625MPK-007

Project Number: G101220625

July 30, 2013

Testing performed on the  
Livescribe 3 Smartpen  
Model Number: V1110  
to

FCC Part 15, Subpart B  
Industry Canada ICES-003

Class: B

for

Livescribe, Inc.

Test Performed by:

Intertek

1365 Adams Court

Menlo Park, CA 94025 USA

Test Authorized by:

Livescribe, Inc.

7677 Oakport St. 12th Floor

Oakland, CA 94621 USA

Prepared by:

  
Krishna K Vemuri

Date: July 30, 2013

Reviewed by:

  
Ram Shrestha

Date: July 30, 2013

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## VERIFICATION OF COMPLIANCE

### Report No. 101220625MPK-007

Verification is hereby issued to the named APPLICANT and is VALID ONLY for the equipment identified hereon for use under the rules and regulations listed below.

<b>Equipment Under Test:</b>	Livescribe 3 Smartpen
<b>Trade Name:</b>	3 SMARTPEN
<b>Model No:</b>	V1110
<b>Serial No:</b>	61
<b>Applicant:</b>	Livescribe, Inc.
<b>Contact:</b>	Thomas L Davenport
<b>Address:</b>	Livescribe, Inc. 7677 Oakport St. 12th Floor Oakland, CA 94621
<b>Country</b>	USA
<b>Tel. number:</b>	(510) 553-4925
<b>email:</b>	tdavenport@livescribe.com
<b>Applicable Regulation:</b>	FCC Part 15, Subpart B Industry Canada ICES-003
<b>Equipment Class:</b>	Class B
<b>Date of Test:</b>	July 14 to 20, 2013

*We attest to the accuracy of this report:*

Krishna K Vemuri  
EMC Senior Staff Engineer

Ram Shrestha  
EMC Team Leader



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## EXECUTIVE SUMMARY

Test Description	Class	Pass/Fail Comments
Radiated Emissions		
• FCC Part 15	B	Complies
• ICES 003	B	
Conducted Emissions (AC Mains)		
• FCC Part 15	B	Complies
• ICES 003	B	



## 1.0 Job Description

### 1.1 Client Information

The EUT has been tested at the request of:

**Company:** Livescribe, Inc.  
7677 Oakport St. 12th Floor  
Oakland, CA 94621 USA

**Name of contact:** Thomas L Davenport  
**Telephone:** (510) 553-4925  
**Email:** tdavenport@livescribe.com

### 1.2 Test Plan Reference

Tests were performed to the following standards:

- FCC Part 15, Subpart B
- Industry Canada ICES-003

### 1.3 Equipment Under Test (EUT)

Equipment Under Test		
Description	Model Number	Serial Number
Livescribe 3 Smartpen	V1110	61

**EUT receive date:** July 05, 2013

**EUT receive condition:** The EUT was received in good condition with no apparent damage.

**Test start date:** July 14, 2013

**Test completion date:** July 20, 2013

The test results in this report pertain only to the item tested.

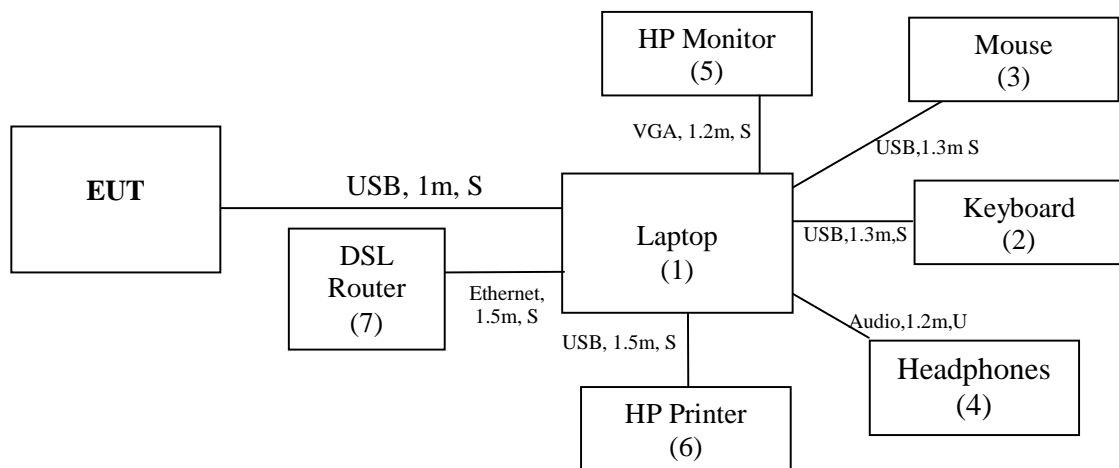
The model: V1110 is a Livescribe 3 Smartpen. It consists of one Bluetooth Low Energy (LE) transmitter operating at 2.4GHz.



#### 1.4 System Support Equipment

Item #	Description	Model No.	Serial No.
1	Lenova Laptop	ThinkPad T410	3000990
2	KeyTronic Keyboard	TAG-A-LONG-U2	C03000313
3	Logitech Mouse	M-B0001	Not Labeled
4	KOSS Headphones	KOSS	Not Labeled
5	Samsung Monitor	Sync Master 710V	GS17H9NXA09783P
6	HP Printer	Deskjet VCVRA-0510	CB055A-003
7	LINKSYS DSL Router	BEFSR81	C2241G800561

#### 1.5 System Block Diagram



**S** = Shielded  
**U** = Unshielded

**m** = Length in Meters



#### 1.6 Justification

The EUT was configured for testing in a table-top configuration, as specified by Livescribe, Inc.

Highest Clock or Oscillator Frequency used is 192 MHz; therefore according to FCC Rule, radiated emissions should be verified up to 2 GHz.

#### 1.7 Mode(s) of Operation

EUT was powered on via a USB cable that drew power from a laptop to charge the batteries. EUT was continuously exercising digital parts and receiver functions.

#### 1.8 Modifications Required for Compliance

No modifications were made during compliance testing in order to bring the product into compliance.



## 2.0 Test Environment for Emissions Testing

### 2.1 Test Facility

The test facility is located at 1365 Adams Court, Menlo Park, California. The test site is a 10-meter semi-anechoic chamber. The site meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

The A2LA certificate number for this site is 1755-01.  
The Industry Canada (IC) Site Number is 2042L-1.

### 2.2 Test Equipment

**Table 2-1** contains a list of the test equipment used during the testing.

*Table 2-1 List of Test Equipment*

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	03/12/14
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	03/12/14
EMI Receiver	Rohde and Schwartz	ESU	100172	12	10/05/13
BI-Log Antenna	Teseq	CBL 6111D	31222	12	11/07/13
Horn Antenna	EMCO	3115	00126795	12	11/15/13
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	09/10/13
Pre-Amplifier	Sonoma Instrument	310	185634	12	12/12/13
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	02/28/14





### 2.3 Example Field Strength Calculation

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

$$FS = RA + AF + CF - PA + DCF$$

Where

- FS = Field Strength in dB ( $\mu$ V/m)
- RA = Receiver Amplitude (including preamplifier) in dB ( $\mu$ V)
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB (1/m)
- PA = Preamplifier Factor in dB
- DCF = Distance Correction Factor dB (for measurements made at 10 meters when compared to 3 meter limits)

Assume a receiver reading of 52.0 dB ( $\mu$ 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 and the Distance Correction Factor of 10.5 dB is added, giving field strength of 42.5 dB ( $\mu$ V/m).

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

$$AF = 7.4 \text{ dB (1/m)}$$

$$CF = 1.6 \text{ dB}$$

$$PA = 29.0 \text{ dB}$$

$$DCF = 10.5 \text{ dB}$$

$$FS = RF + AF + CF - PA + DCF$$

$$FS = 52.0 + 7.4 + 1.6 - 29.0 + 10.5$$

$$FS = 42.5 \text{ dB } (\mu\text{V/m})$$



## 2.4 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

### **Radiated Emission:**

The uncertainty in the measured field strength is estimated as follows, for a minimum confidence probability of 95 %

Freq. Range	Detection Mode	Uncertainty
30 MHz to 200 MHz	Quasi-peak	$\pm 4.4$ dB
200 MHz to 1000 MHz	Quasi-peak	- 3.7 dB
1 GHz to 18 GHz	Average/Peak	-4.4 / +4.70

### **Conducted Emission:**

The uncertainty in the measured voltage is estimated as follows, for a minimum confidence probability of 95 %

Freq. Range	Detection Mode	Uncertainty
9 kHz to 150 kHz	Average	$\pm 2.1$ dB
	Quasi-peak	$\pm 2.5$ dB
150 kHz to 30 MHz	Average	$\pm 2.4$ dB
	Quasi-peak	$\pm 2.6$ dB



### 3.0 Emissions Test Results

#### 3.1 Electromagnetic Radiated Disturbance

##### 3.1.1 Test Limits

###### *Limits for Electromagnetic Radiated Disturbance, FCC Section 15.109(b) and ICES 003*

Frequency (MHz)	Class A at 10m dB(μV/m)	Class B at 3m dB(μV/m)
30-88	39.0	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

*Note: Three sets of units are commonly used for EMI measurement, decibels below one milliwatt (-dBm), decibels above a microvolt (dBμV), and microvolts (μV). To convert between them, use the following formulas:  $20 \text{ LOG}_{10}(\mu V) = \text{dB}\mu V$ ,  $\text{dBm} = \text{dB}\mu V - 107$*

Alternative limits per Section 15.109(g):

###### *Radiated Emissions Limits, CISPR 22*

Frequency (MHz)	Class A at 10m dB(μV/m)	Class B at 10m dB(μV/m)
30-230	40.0	30.0
230-1000	47.0	37.0

*Note: The lower limit shall apply at the transition frequency.*



### 3.1.2 Test Procedure

Measurements of the radiated field in the frequency range of 30 MHz to 1000 MHz are made with the antenna located at a distance of 10 meters from the EUT and measurements in the frequency range above 1000 MHz are made with the antenna located at a distance of 3 meters from the EUT. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole.

Measurements of the radiated field below 1000 MHz are made with the antenna located at a distance of 10 meters from the EUT. If the field-strength measurements at 10m cannot be made because of high ambient noise level or for other reasons, measurements of Class B equipment may be made at a closer distance, for example 3m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4.

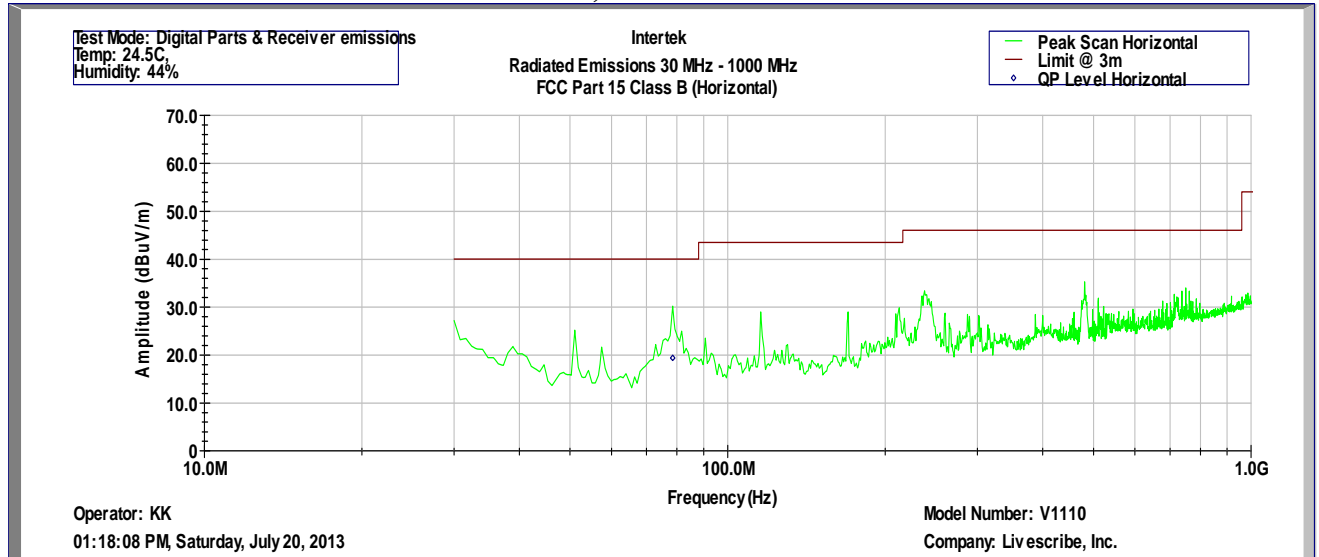
<b>Tested By:</b>	Krishna K Vemuri
<b>Test Date:</b>	July 14 & 20, 2013



### 3.1.3 Test Results

The EUT met the radiated disturbance requirements of FCC and ICES 003 for a Class B device.

#### FCC and ICES 003, Radiated Disturbance



Intertek Testing Services  
Radiated Emissions 30 MHz - 1000 MHz  
FCC Part 15 Class B (QP-Horizontal)

Operator: KK  
20-Jul-13

Model Number: V1110  
Company: Livescribe, Inc.

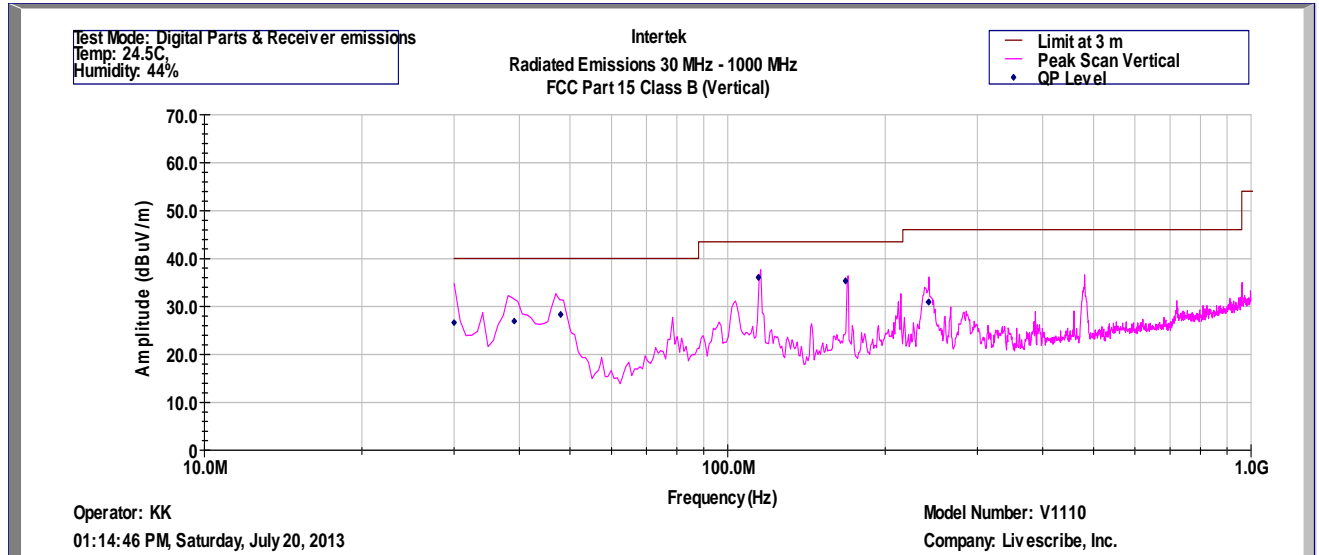
Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
7.850E+07	19.4	40.0	-20.6	33.0	1.0	32.1	10.5	7.4

Test Mode: Digital Parts & Receiver emissions  
Temp: 24.5C,  
Humidity: 44%



### 3.1.3 Test Results

#### FCC and ICES 003 Radiated Disturbance



Intertek Testing Services  
Radiated Emissions 30 MHz - 1000 MHz  
FCC Part 15 Class B (QP-Vertical)

Operator: KK  
20-Jul-13

Model Number: V1110  
Company: Livescribe, Inc.

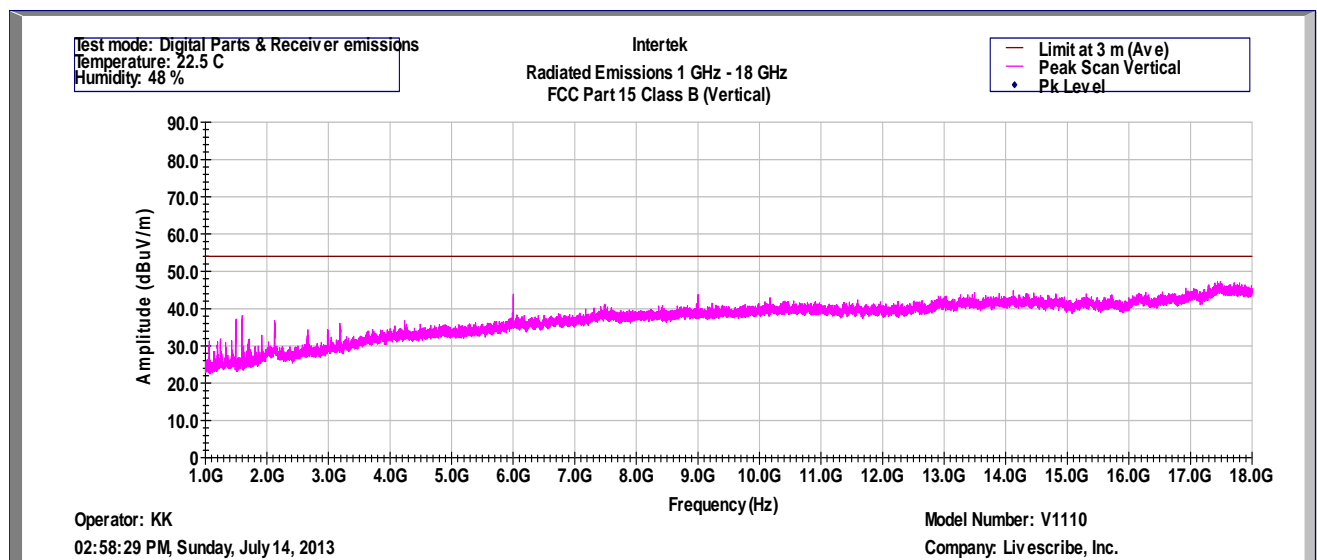
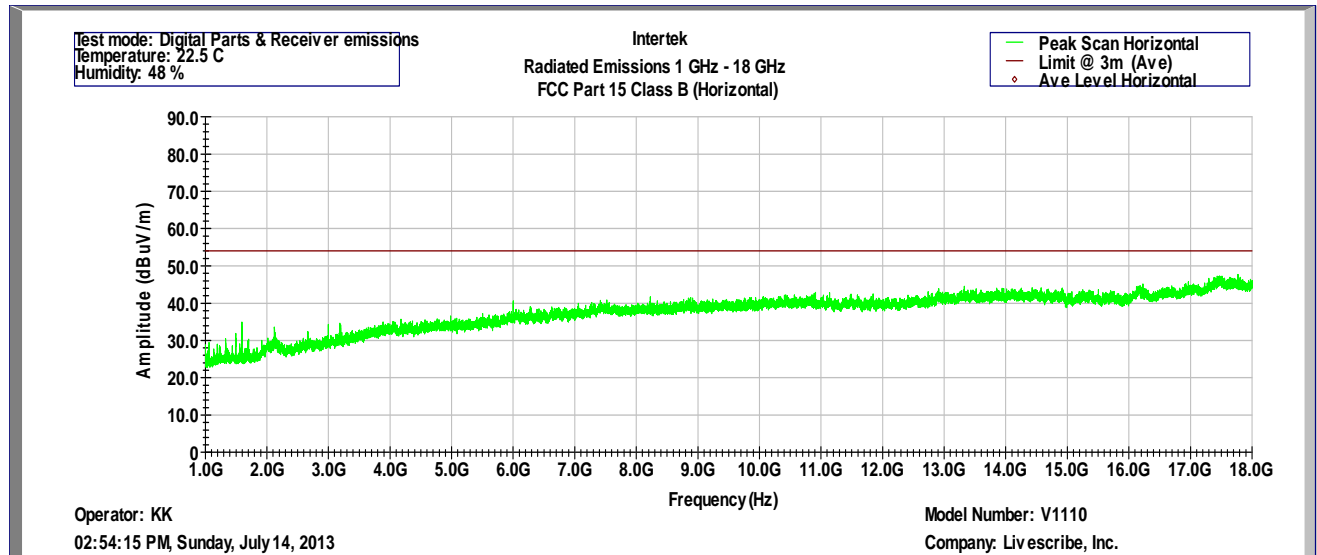
Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
Hz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
3.000E+07	26.6	40.0	-13.4	29.0	0.6	32.1	10.5	18.9
3.910E+07	26.9	40.0	-13.1	34.0	0.7	32.1	10.5	14.2
4.799E+07	28.3	40.0	-11.7	40.1	0.8	32.1	10.5	9.4
1.145E+08	36.1	43.5	-7.4	45.8	1.2	32.0	10.5	11.2
1.680E+08	35.3	43.5	-8.2	46.2	1.5	32.0	10.5	9.9
2.421E+08	30.9	46.0	-15.1	40.0	1.8	32.0	10.5	11.5

Test Mode: Digital Parts & Receiver emissions  
Temp: 24.5C,  
Humidity: 44%



### 3.1.3 Test Results

#### *FCC and ICES 003 Radiated Disturbance*



**Results:** Complies by 7.4dB

### 3.1.4 Test Configuration Photographs

**The following photographs** show the testing configurations used.



*Electromagnetic Radiated Disturbance Setup Photograph*



3.1.4 Test Configuration Photograph (Continued)



*Electromagnetic Radiated Disturbance Setup Photograph*



### 3.2 AC Mains Line-Conducted Disturbance

#### 3.2.1 Test Limits

**Table 3-1 FCC Part 15 Subpart B and ICES 003 Limits for Conducted Disturbance at the Mains Ports**

Frequency Band MHz	Class A Limit dB (μV)		Class B Limit dB (μV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	79	66	66 to 56 Decreases linearly with the logarithm of the frequency	56 to 46 Decreases linearly with the logarithm of the frequency
0.50-5.00	73	60	56	46
5.00-30.00	73	60	60	50

*Note: At the transition frequency the lower limit applies.*



### 3.2.2 Test Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4.

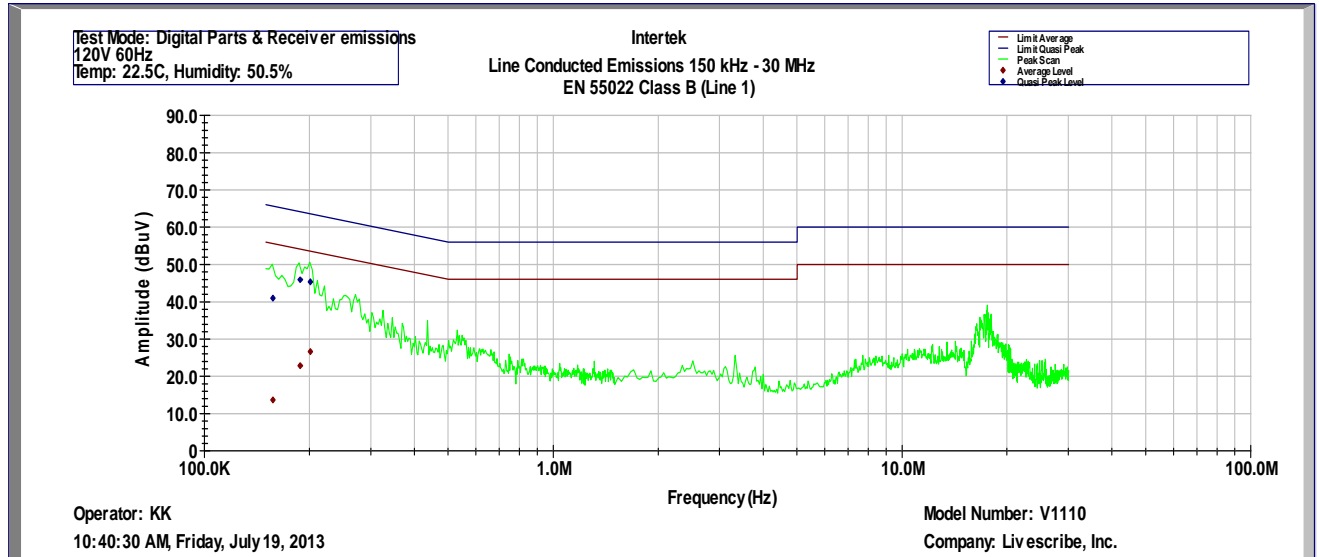
<b>Tested By:</b>	Krishna K Vemuri
<b>Test Date:</b>	July 19, 2013



### 3.2.3 Test Results

The EUT met the conducted disturbance requirement of FCC and ICES 003 for a Class B device.

#### FCC and ICES 003 Conducted Disturbance at AC Mains



Intertek Testing Services  
Line Conducted Emissions 150 kHz - 30 MHz  
EN 55022 Class B (Line 1)

Operator: KK  
19-Jul-13

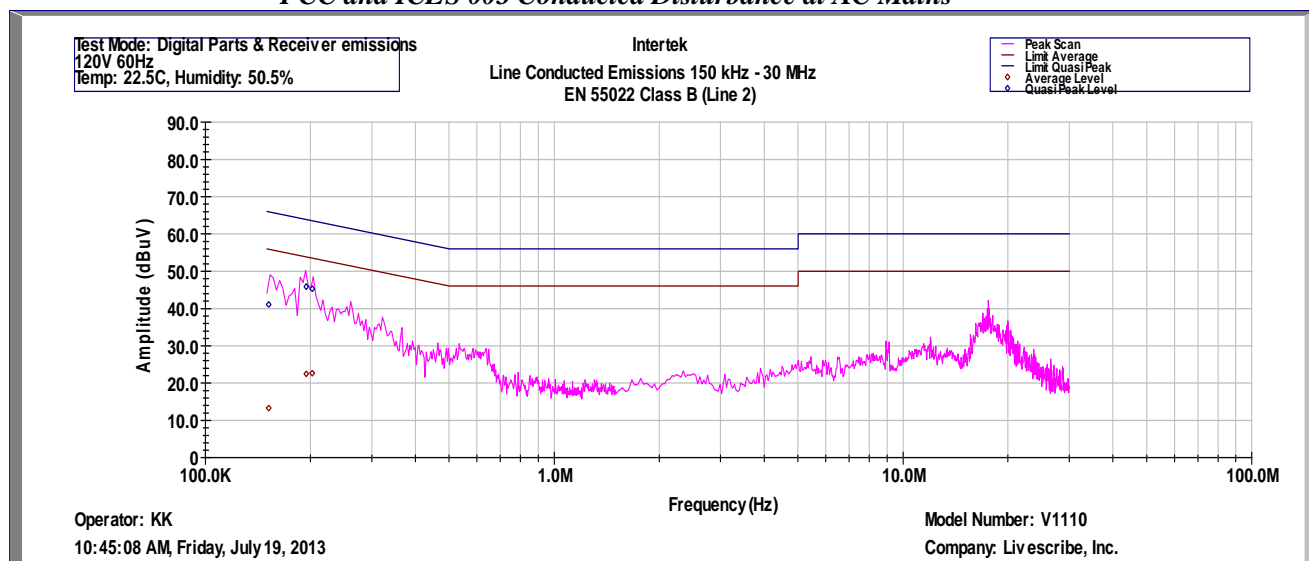
Model Number: V1110  
Company: Livescribe, Inc.

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
157330	13.7	41.0	55.8	65.8	-42.1	-24.8
188325	22.8	45.9	54.9	64.9	-32.1	-19.0
201488	26.6	45.4	54.5	64.5	-27.9	-19.2

Test Mode: Digital Parts & Receiver emissions  
120V 60Hz  
Temp: 22.5C, Humidity: 50.5%



### FCC and ICES 003 Conducted Disturbance at AC Mains



Intertek Testing Services  
Line Conducted Emissions 150 kHz - 30 MHz  
EN 55022 Class B (Line 2)

Operator: KK  
19-Jul-13

Model Number: V1110  
Company: Livscribe, Inc.

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
151914	13.3	41.1	55.9	65.9	-42.7	-24.9
194646	22.5	45.8	54.7	64.7	-32.3	-18.9
202579	22.6	45.3	54.5	64.5	-31.9	-19.2

Test Mode: Digital Parts & Receiver emissions  
120V 60Hz  
Temp: 22.5C, Humidity: 50.5%

**Results:** Complies by 9.5dB

### 3.2.4 Test Configuration Photographs

The following photographs show the testing configurations used.



*AC Mains Line-Conducted Disturbance Setup Photograph*



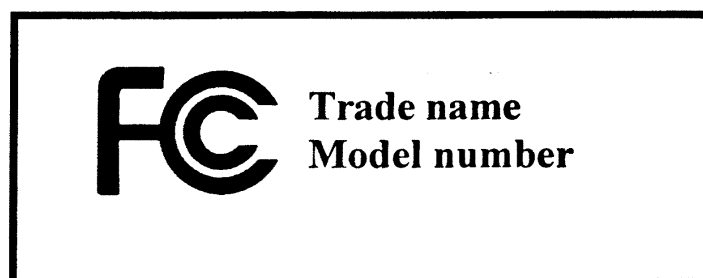
## 4.0 Labeling and Instruction Manual Requirements

### 4.1 Labeling - USA

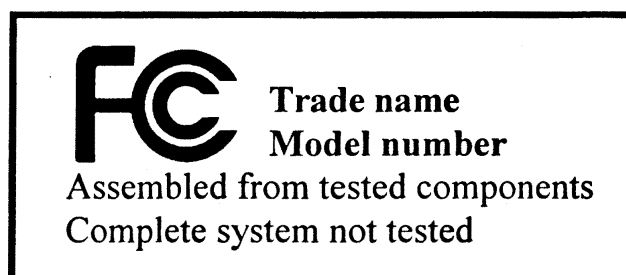
Products subject to Declaration of Conformity (DoC) shall be labeled as shown below. The label shall be located in a conspicuous location on the device and shall contain the unique identification described in FCC Section 2.1074.

The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as described in FCC Section 2.925(d). "Permanently affixed" means that the label is etched, engraved, stamped, silkscreened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

- (i) If the product is authorized based on testing of the product or system



- (ii) If the product is authorized based on assembly using separately authorized components and the resulting product is not separately tested:





## 4.2 Labeling - Canada

### Canadian Emissions and Labeling Requirements

The Canadian Government has announced an amendment of the radio act, which will require computing equipment to comply with EMI Specifications in Canada. The effective date for products imported into Canada is January 31, 1989.

The intent of the amendment is to establish Canadian Regulations, which are harmonized with the existing FCC Regulations. As such, no retesting is required and devices, which have been tested and comply with the FCC Specifications (Class A or B) also comply with the Canadian Specification (Class A or B).

A record of the measurements and results shall be retained by the manufacturer or importer for a period of at least five years and made available for examination on the request of the Canadian Government.

A written notice indicating compliance must accompany each unit of digital apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. Where because of insufficient space or other restrictions it is not feasible to affix a label to the apparatus, the notice may be in form of a statement included in the user's manual.

A suggested text for the notice, in English and French, is as follows:

**This Class [\*] digital apparatus meets all requirements of the  
Canadian Interference-Causing Equipment Regulations.**

**Cet appareil numérique de la classe [\*] respecte toutes les  
exigences du Règlement sur le matériel brouilleur du Canada.**

\*Insert either "A" or "B" but not both as appropriate for the equipment requirements.





#### 4.3 Compliance Information - USA

If a product must be tested and authorized under a Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

- (a) Identification of the product, e.g., names and model number.
- (b) A statement that the product complies with Part 15 of the regulations:

**This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

- (c) The identification, by name, address and telephone number, of the responsible party. The responsible party for a Declaration of Conformity must be located within the United States.

The compliance information statement shall be included in the user's manual or as a separate sheet.

The users manual or instruction manual shall also caution the user that:

**Changes or modifications not expressly approved the party responsible for compliance could void the user's authority to operate this equipment.**



#### 4.4 Manufacturer's Certification

##### **Declaration of Conformity**

Standard to which conformity is declared: \_\_\_\_\_

##### **Manufacturer/Importer's Information**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

##### **Equipment Information**

Type of Equipment: \_\_\_\_\_

Trade Name: \_\_\_\_\_

Model Number: \_\_\_\_\_

Test Report Reference: \_\_\_\_\_

I, the undersigned, hereby declare that the equipment specified above conforms to Part 15 of the FCC Rules.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name & Title)

\_\_\_\_\_  
(Date)



## 5.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / G101220625	KK	July 30, 2013	Original document