DATE: 27 December 1998

EMC Test Report

from

ITL (Product Testing) Ltd.

for

Aladdin Knowledge Systems

Equipment under test:

Software Security Device

USB-HASP Key

Prepared by:

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ITL (Product Testing) Ltd.

Approved by:

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ITL (Product Testing) Ltd.

Measurement/Technical Report for

Aladdin Knowledge Systems

Equipment under test:

Software Security Device

USB-HASP Key

This report concerns: Original Grant _X_ Class II change_

Class B verification _ Class A verification_ Class I change_

Request Issue of Grant: __X___Immediately upon completion of review

Limits used: CISPR 22 ___ Part 15 _X_

Measurement procedure used is ANSI C63.4-1992.

Application for Certification

Applicant for this device: Aladdin Knowledge Systems

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(different from "prepared by")

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1 General Information

1.1 Product Description

USB-HASP Key is a software protection key using Universal Serial Bus (USB) technology. It can be installed on any available PC USB port. USB-HASP Key is based on ASIC technology, and supports current USB standards. It uses an advanced microcontroller and has features such as 496 bytes of internal read/write memory for customer use.

The Aladdin Knowledge Systems Model USB-HASP is a member of the HASP software protection line (please refer to www.aks.com).

The HASP products are used in order to enforce legal software distribution and control the use of software by means of licensing.

The USB-HASP Key is a newly developed key which introduced the HASP features to computers (PC & MAC) equipped with the new USB type A port (please refer to www.usb.org).

The USB-HASP key is based on a Cypress Model CY7C63001A, 6MHz clock microcontroller with 1 to 8 eprom memory.

1.2 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Description	Model No.	Serial No.	FCC ID	Cable Description
EUT USB-HASP Key			LMLAKSUSB	none
AC Power Adapter	AD-74OV-1160	942573 Made in Taiwan		unshielded, 2 m.
Laptop PC IBM Thinkpad 560	2640700	559325P		unshielded, 2 m.
Mouse Microsoft	PS/2, Part No. 68874	00759215	C3KKZB1	unshielded, 2 m.
Printer Panasonic Japan	KX-P1180			unshielded, 2 m.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:1992. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the data is located at Kfar Bin Nun, Israel. This site has been fully described in reports dated April 10, 1995 and May 8, 1995, submitted to your office, and accepted in a letter dated May 23, 1995 (31040/SIT 1300F2).

1.5 Measurement Uncertainty

a) Radiated Emission

The Open Site complies with the ±4dB Normalised Site Attenuation requirements of ANSI C63.4-1992. In accordance with Paragraph 5.4.6.2 of this standard this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

b) Conducted Emission

The uncertainty for this test is ±2dB.

3 System Test Configuration

3.1 Justification

The system was configured for testing in a typical fashion as a customer would normally use it, i.e. with the key connected to the PC's or Mac's USB socket.

While the key is accessed by the software for protection mode, the E.U.T. is accessed for memory R/W using the microcontroller.

The test equipment is comprised of a USB approved port and an FCC compliant computer, bearing FCC ID number.

The above testing scheme reflects normal and worst case conditions.

3.2 EUT Exercise Software

The E.U.T. exercise program used during radiated and conducted emission testing was designed to exercise the system components in a manner similar to a typical use. The software was contained on the host computer's hard disk.

The software used was based on a loop that accesses the USB-HASP key and activates the key features. This simulates actual use of the key. Each loop prompted on the PC screen success or failure status.

3.3 Special Accessories

No special accessories were needed to achieve compliance.

3.4 Equipment Modifications

No equipment modifications were needed to achieve compliance.

3.5 Configuration of Tested System

The configuration of the tested system is described in Figure 3.1.

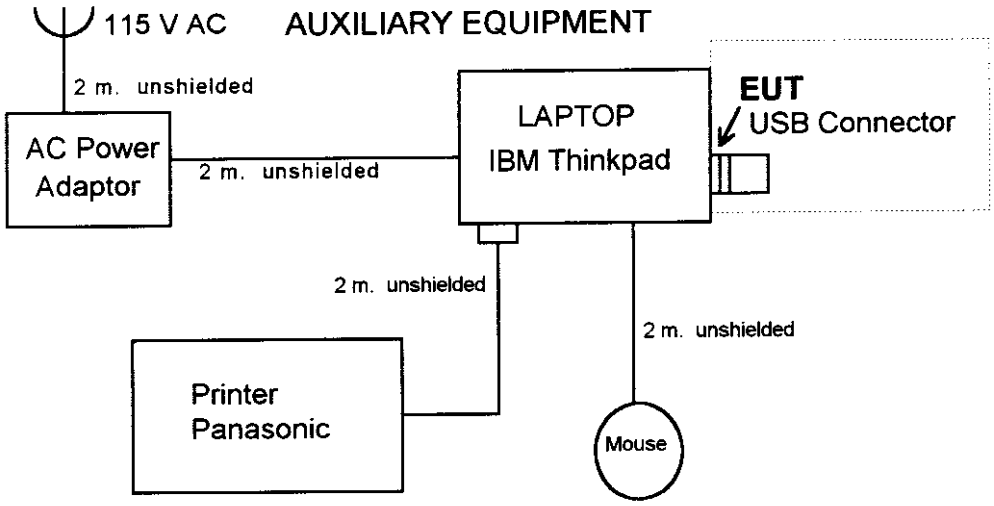

Figure 3.1 Configuration of Tested System

4 Block Diagram

4.1 Schematic Block/Connection Diagram

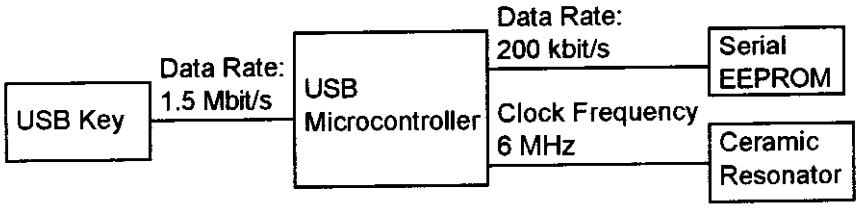

Figure 4.1 Block Diagram

6 Conducted Emission Data

6.1 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimise background noise interference, the conducted emission testing was performed inside a shielded room (see section 3), with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 µHn Line Impedance Stabilisation Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The centre of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The emission voltages at the LISN's outputs were measured using a computerised receiver, complying to CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.45 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak detector.

6.2 Measured Data

JUDGEMENT: Passed by 11.5 dbµV

The EUT met the requirements of the specification.

The details of the highest emissions are given in Figures 6.1 to 6.4

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12.98

Typed/Printed Name L. Barry

Conducted Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart B: Class B

Lead: **Phase**. Detectors: **Peak, Quasi-peak**

Remarks:

Frequency (MHz)	Meas. Level (dBμV)		Specification (dB μV)	Pass/Fail	Margin (dB)
	Peak	Quasi- Peak			
0.58	33.3	28.0	48.0	Pass	-20.0
0.93	31.3	26.5	48.0	Pass	-21.5
2.16	35.9	30.9	48.0	Pass	-17.1
9.19	36.5	27.6	48.0	Pass	-20.4
12.45	44.1	36.5	48.0	Pass	-11.5
23.71	36.2	28.6	48.0	Pass	-19.4

Figure 6.1 Conducted Emission: Phase.

Detectors: Peak, Quasi-peak

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12.98

Typed/Printed Name: L. Barry

Conducted Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial number: Not designated

Specification: F.C.C., Part 15, Subpart B: Class B

Lead: **Neutral**. Detectors: **Peak, Quasi-peak**

Remarks:

Frequency (MHz)	Meas. Level (dBµV)		Specification (dB µV)	Pass/Fail	Margin (dB)
	Peak	Quasi- Peak			
0.53	28.3	25.4	48.0	Pass	-22.6
0.84	31.3	24.6	48.0	Pass	-23.4
2.05	32.7	27.4	48.0	Pass	-20.6
9.67	36.2	29.1	48.0	Pass	-19.0
23.23	35.0	27.8	48.0	Pass	-20.2
28.81	26.3	20.0	48.0	Pass	-28.0

Figure 6.2 Conducted Emission: Neutral.

Detectors: Peak, Quasi-peak.

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12-98

Typed/Printed Name: L. Barry

Conducted Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial number: Not designated

Specification: F.C.C., Part 15, Subpart B: Class B

Lead: **Phase** Detectors: **Peak, Quasi-peak**

REMARKS:

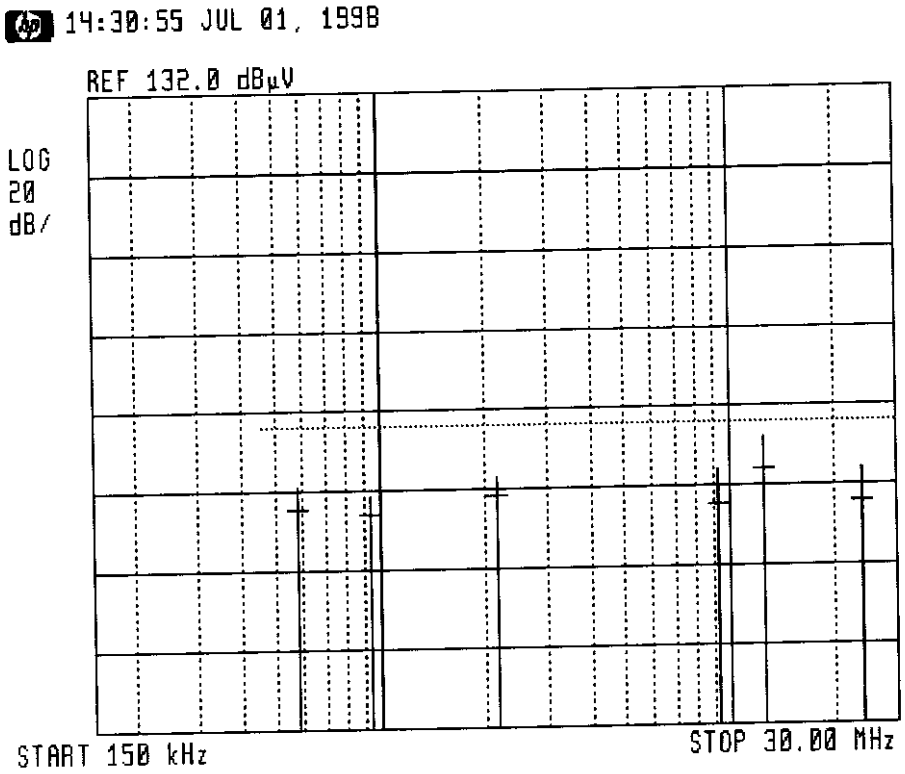

Figure 6.3 Conducted Emission: Phase. Detectors: Peak, Quasi-peak

Notes:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

Conducted Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial number: Not designated

Specification: F.C.C., Part 15, Subpart B: Class B

Lead: **Neutral**. Detectors: **Peak, Quasi-peak**

REMARKS:

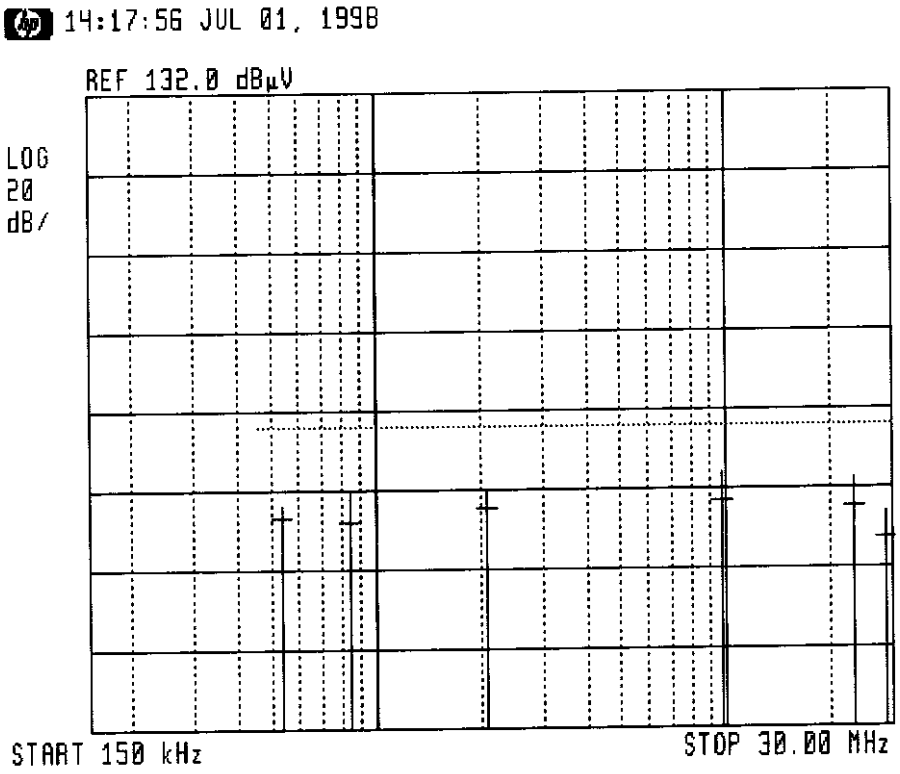

Figure 6.4 Conducted Emission: Neutral. Detectors: Peak, Quasi-peak

Notes:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

6.3 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Calibration	
				Last Cal.	Period
LISN	Fischer	FCC-LISN-2A	127	May 18, 1998	1 year
LISN	Fischer	FCC-LISN-2A	128	May 18, 1998	1 year
Receiver	HP	85420E/85422E	3427A00103/34	November 5, 1998	1 year
Printer	HP	ThinkJet2225	2738508357	N/A	N/A

7 Radiated Emission Data

7.1 Radiated Emission 30-1000 MHz F.C.C., Part 15, Subpart B: CLASS B

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterise the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in Figure 3.1.

The frequency range 30-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The emissions were measured using a computerised EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

The readings were maximised by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarisation.

Verification of the E.U.T emissions was based on the following methods:

Turning the E.U.T on and off.

Using a frequency span less than 10 MHz.

Observation of the signal level during turntable rotation. Background noise is not affected by the rotation of the E.U.T.

7.2 Measured Data

JUDGEMENT: Passed by 8.2 dB.

The EUT met the requirements of the specification.

The details of the highest emissions are given in Figures 7.1 to 7.8.

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12.98

Typed/Printed Name: L. Barry

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Horizontal** Detector: **Quasi-peak**

REMARKS: Antenna at 3 meters distance, Frequency range: 30 MHz to 300 MHz.

Freq (MHz)	**QP Amp** (dBμV/m)	**Specification** (dB μV/m)	**Margin** (dB μV/m)	**Correction Factor (dB)**	
				Ant	**Cable**
36.32	18.3	40.0	-21.7	11.6	1.0
48.43	20.9	40.0	-19.1	10.6	1.4
66.65	23.1	40.0	-16.9	10.2	1.7
84.83	10.9	40.0	-29.1	10.2	1.8
109.19	26.2	43.5	-17.3	2.1	10.0
115.32	25.2	43.5	-18.3	2.1	10.0

Figure 7.1 Radiated Emission. Antenna Polarisation: Horizontal. Detectors: Quasi-peak

Note: Margin refers to the test results obtained minus specified requirement; thus a negative result indicates that the product passes the test, and a positive number indicates failure.

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12.98

Typed/Printed Name: L. Barry

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Horizontal** Detector: **Quasi-peak**

REMARKS: Antenna at 3 meters distance, Frequency range: 30 MHz to 300 MHz.

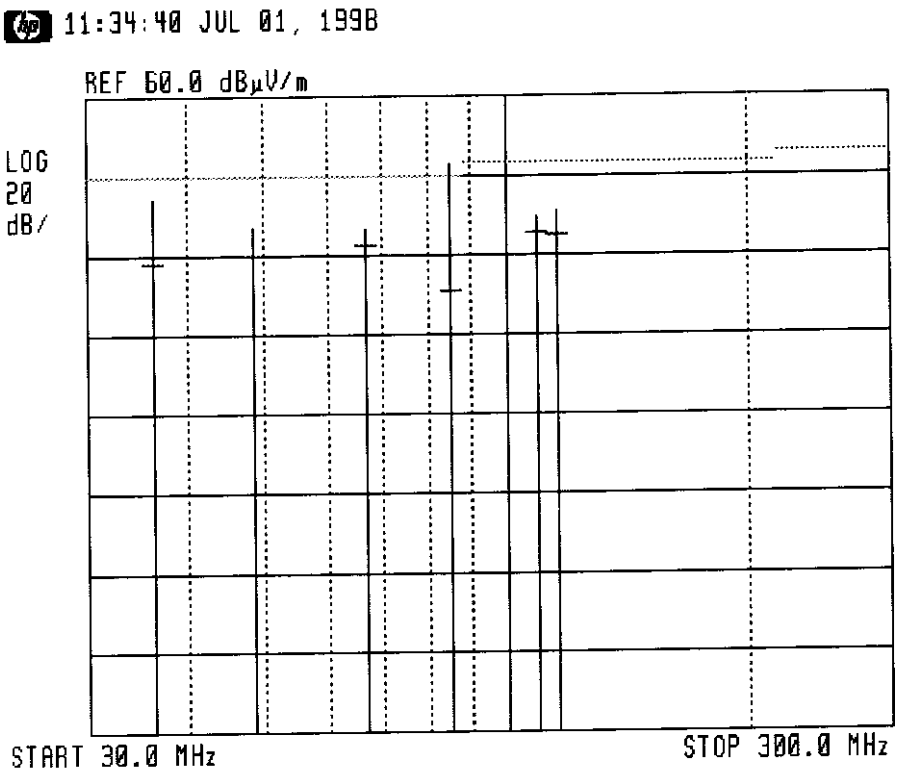

Figure 7.2 Radiated Emission. Antenna Polarisation: Horizontal. Detector: Quasi-peak

Note:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV/m).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Horizontal** Detector: **Quasi-peak**

REMARKS: Antenna at 3 meters distance, Frequency range: 300 MHz to 1 GHz.

Freq	**QP Amp**	**Specification**	**Margin**	**Correction Factor (dB)**	
(MHz)	(dBμV/m)	(dB μV/m)	(dB μV/m)	**Ant**	**Cable**
320.00	25.2	46.0	-20.9	12.0	4.0
360.05	25.6	46.0	-20.4	13.3	4.2
403.09	30.1	46.0	-15.9	14.5	4.5
453.59	32.7	46.0	-13.3	14.9	4.8
495.24	30.8	46.0	-15.2	15.1	5.1
503.25	35.6	46.0	-10.4	15.3	5.1

Figure 7.3 Radiated Emission. Antenna Polarisation: Horizontal. Detectors: Quasi-peak

Note: Margin refers to the test results obtained minus specified requirement; thus a negative result indicates that the product passes the test, and a positive number indicates failure.

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12.98

Typed/Printed Name: L. Barry

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Horizontal** Detectors: **Peak, Quasi-peak**

REMARKS: Antenna at 3 meters distance, Frequency range: 300 MHz to 1 GHz.

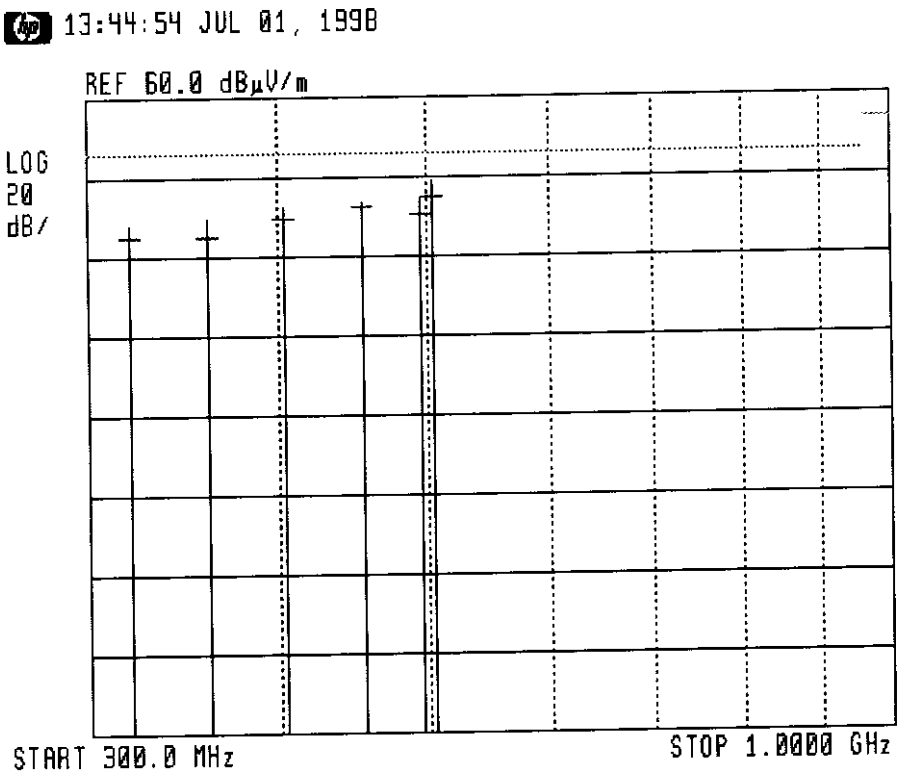

Figure 7.4 Radiated Emission. Antenna Polarisation: Horizontal. Detector: Quasi-peak

Note:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV/m).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Vertical** Detector: **Quasi-peak**

Remarks: Antenna at 3 meters distance, Frequency range: 30 MHz to 300 MHz.

Freq.	**QP Amp**	**Specification**	**Margin**	**Correction Factor (dB)**	
(MHz)	(dBμV/m)	(dB μV/m)	(dB μV/m)	**Ant**	**Cable**
31.92	30.4	40.0	-9.6	11.9	1.1
36.46	29.1	40.0	-10.9	11.6	1.0
38.78	31.8	40.0	-8.2	11.6	1.0
48.11	31.5	40.0	-8.5	10.6	1.4
84.30	22.9	40.0	-17.1	10.2	1.8
192.65	30.2	43.5	-13.3	15.1	3.0
204.04	28.3	43.5	-15.2	15.7	3.0
216.01	28.4	46.0	-17.6	16.1	3.2
252.01	29.2	46.0	-16.8	14.6	3.5

Figure 7.5 Radiated Emission. Antenna Polarisation: Vertical.

Detectors: Quasi-peak

Note: Margin refers to the test results obtained minus specified requirement; thus a negative result indicates that the product passes the test, and a positive number indicates failure.

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12.98

Typed/Printed Name: L. Barry

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Vertical** Detector: **Quasi-peak**

Remarks: Antenna at 3 meters distance, Frequency range: 30 MHz to 300 MHz.

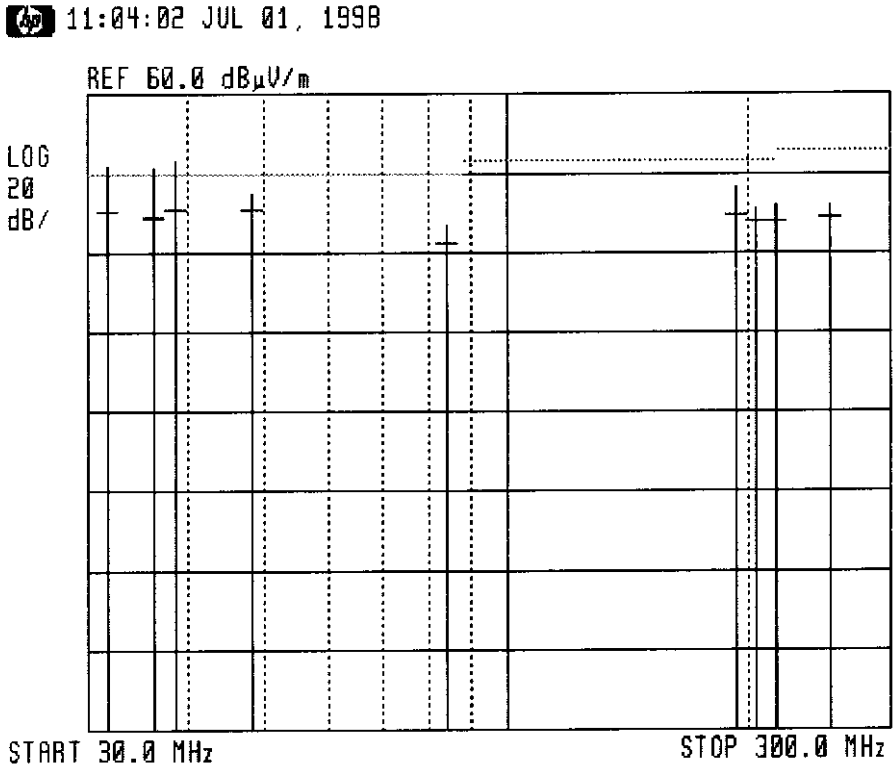

Figure 7.6 Radiated Emission. Antenna Polarisation: Vertical. Detectors: Quasi-peak

Note:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV/m).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Vertical** Detector: **Quasi-peak**

Remarks: Antenna at 3 meters distance, Frequency range: 300 MHz to 1 GHz.

Freq	**QP Amp**	**Specification**	**Margin**	**Correction Factor (dB)**	
(MHz)	(dBμV/m)	(dB μV/m)	(dB μV/m)	**Ant**	**Cable**
320.00	29.2	46.0	-16.8	12.0	4.0
350.38	25.3	46.0	-20.7	12.9	4.2
453.60	35.4	46.0	-10.6	14.9	4.8
543.26	29.7	46.0	-16.3	16.1	5.3
615.71	27.8	46.0	-18.2	17.5	5.7
744.54	34.5	46.0	-11.5	18.8	6.9

Figure 7.7 Radiated Emission. Antenna Polarisation: Vertical. Detectors: Quasi-peak

Note: Margin refers to the test results obtained minus specified requirement; thus a negative result indicates that the product passes the test, and a positive number indicates failure.

TEST PERSONNEL:

Tester Signature: L Barry DATE: 30.12.98

Typed/Printed Name: L. Barry

Radiated Emission

E.U.T Description: Software Security Device

Type: USB-HASP Key

Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart B: CLASS B

Antenna Polarisation: **Vertical** Detectors: Quasi-peak

Remarks: Antenna at 3 meters distance, Frequency range: 300 MHz to 1 GHz.

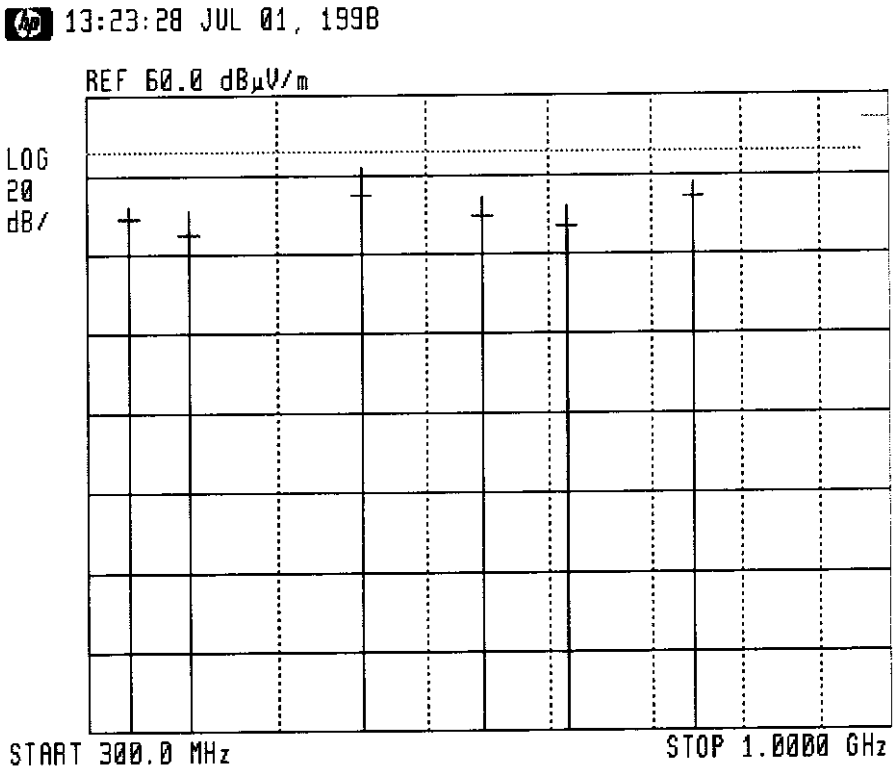

Figure 7.8 Radiated Emission. Antenna Polarisation: Vertical. Detector: Quasi-peak

Note:

1. Horizontal axis shows logarithmic frequency scale.

2. The vertical axis shows amplitude (in dB µV/m).

3. Peak detection is designated by the top of each vertical line.

4. Quasi-peak detection is designated by the first dash mark (from the top) of each vertical line.

7.3 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Cal..	Period
Receiver	HP	85420E/85422E	3427A00103/34	November 5, 1998	1 year
Antenna - Biconical HP	ARA	BCH-2030/A	1019	April 2, 1998	1 year
Antenna - Log Periodic	ARA	LPD-2010/A	1038	March 12, 1998	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001.0	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet2225	2738508357.0	N/A	N/A

7.4 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$[dB\mu v/m]\ FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

No external pre-amplifiers are used.