



Electrical (EMC)

DATE: 09 July 2000

I.T.L. (PRODUCT TESTING) LTD.

FCC EMC Test Report

for

ELPAS - Electro-optic Systems Ltd.

Equipment under test:

**Wrist/Equipment IR/RF 433, Tamper
Sensor, Tag**

WSE00433

Approved by: _____

L. Barry, Test Engineer

Approved by: _____

I. Raz, EMC Laboratory Manager

This report must not be reproduced, except in full, without the written permission of I.T.L. (Product Testing) Ltd.

This report relates only to items tested.

Measurement/Technical Report for ELPAS - Electro-optic Systems Ltd.

Equipment under test:

Wrist/Equipment IR/RF 433, Tamper Sensor, Tag

P/N WSE00433

FCC ID: O4XB08

DATE: 09 July 2000

This report concerns: Original Grant Class II change

Class B verification Class A verification Class I change

Equipment type: Radio Telemetry Transmitter

Request Issue of Grant:

Immediately upon completion of review

Limits used:

CISPR 22 Part 15

Measurement procedure used is ANSI C63.4-1992.

Application for Certification

prepared by:

Ishaiahou Raz

ITL (Product Testing) Ltd.

POB 211

Or Yehuda 60251

Israel

Tel: 972-3-533 9022

Fax: +972-3-5339019

Applicant for this device:

(different from "prepared by")

Shlomo Yasur

ELPAS–Electro-optic Systems
Ltd.

11 Hasadna St.

Raanana 43650

Israel

Tel: 972-9-776 0200

Fax: 972-9-746 0593

TABLE OF CONTENTS

1.	GENERAL INFORMATION -----	4
1.1	Product Description.....	4
1.2	Test Methodology	5
1.3	Test Facility	5
1.4	Measurement Uncertainty	5
2.	PRODUCT LABELING -----	6
3.	SYSTEM TEST CONFIGURATION-----	7
3.1	Justification.....	7
3.2	EUT Exercise Software	7
3.3	Special Accessories	7
3.4	Equipment Modifications	7
	Configuration of Tested System.....	7
4.	BLOCK DIAGRAM -----	8
4.1	Schematic Block/Connection Diagram.....	8
5.	RADIATED EMISSION DATA -----	9
5.1	Radiated Emission 10KHz-1000 MHz, Below 1GHz.....	9
5.2	Measured Data.....	9
5.3	Test Instrumentation Used, Radiated Measurements	12
5.4	Field Strength Calculation	13
6.	RADIATED EMISSION DATA -----	14
6.1	Radiated Emission Above 1 GHz.....	14
6.2	Test Data	14
6.3	Test Instruments used, Radiated Measurement Above 1 GHz	17
6.4	Field Strength Calculation	18
7.	FUNDAMENTAL EMISSION BANDWIDTH-----	19
7.1	Test Specification.....	19
7.2	Test Procedure	19
7.3	Measured Data.....	19
7.4	Test Instrumentation Used, Fundamental Emission Band Width.....	23
8.	PHOTOGRAPHS OF TESTED E.U.T. -----	24
9.	SIGNATURES OF THE E.U.T'S TEST ENGINEERS -----	27
10.	APPENDIX A - CORRECTION FACTORS-----	28
10.1	Correction factors for CABLE.....	28
10.2	Correction factors for CABLE.....	29
10.3	Correction factors for LOG PERIODIC ANTENNA	30
10.4	Correction factors for BICONICAL ANTENNA.....	31
10.5	Correction factors for BICONICAL ANTENNA Type 3109.....	32
10.6	Correction factors for BICONICAL ANTENNA Type 3109.....	33
10.7	Correction factors for SAS ANTENNA, 3 meter range	34

1. General Information

1.1 Product Description

Wrist / Equipment IR/RF 433 Tags –

P/N WSE00433

Equipment tags can be attached to mobile equipment directly or using an attachment device. Equipment tags are used to keep track of valuable mobile equipment or other assets in the workplace.

Users

Normally, equipment tags are placed on mobile equipment. For example: computers, fetal monitors, laboratory equipment, and so on. However, they may also be worn or carried by people.

- ◆ A sticker on the back of the equipment tag indicates the identification number of the tag.

Battery Type and Replacement

The equipment tag contains a standard Lithium battery of type CR2032.

The battery is located inside the equipment tag. In order to replace the battery, you need to open the back side of the equipment tag with a Phillips screwdriver (preferably an electric one) with point size "0". For example, the APEX #4910. A new battery can then be inserted, after which the screws must be replaced.

IR Emission

Infra-red signals are emitted from the upper black surface of the equipment tag.

Therefore, when attaching the equipment tag, it is necessary to keep the upper surface free from obstruction.

Operation

The equipment tag transmits IR signals periodically. The default time period is every four seconds . However, ELPAS can reconfigure the default time period. When the tag is static, the badge transmits every 60 seconds. This time period can also be reconfigured by ELPAS.

The equipment tag transmits RF signals periodically. The default time period is 10 seconds . However, ELPAS can reconfigure the default time period. When the tag is static, the badge transmits every 60 seconds. This time period can also be reconfigured by ELPAS.

The equipment tag, like all EIRIS™ badges, should be placed externally, facing outward. Otherwise, the range of transmission is reduced because infra-red signals do not travel through non-transparent objects.

Button Press

A push button is located on the side of the tag. Pressing the push button initiates a special message in a similar way to that of the personal badge.

1.2 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.

1.3 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 the FCC office, and accepted in a letter dated July 23, 1998 (31040/SIT 1300F2).

1.4 Measurement Uncertainty

Radiated Emission

The Open Site complies with the ± 4 dB Normalized 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.

2. Product Labeling

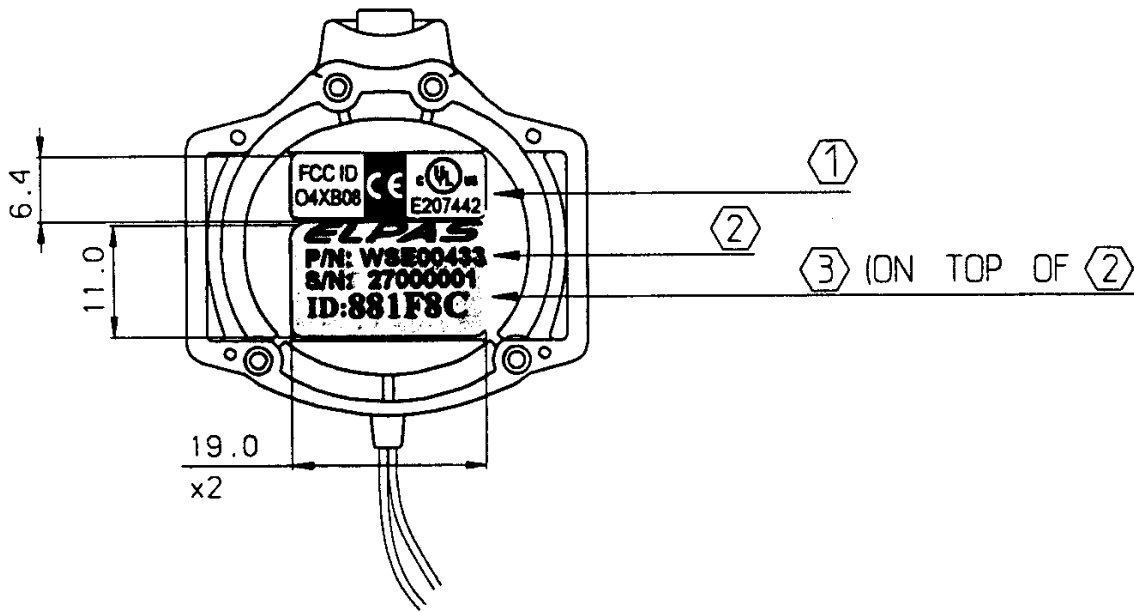


Figure 1. FCC Label



Figure 2. Location of Label on EUT

3. System Test Configuration

3.1 *Justification*

The E.U.T was configured for testing in a typical fashion. In this typical mode of operation, the E.U.T. transmits an ID message of 4 bytes (one start bit, 8bits data, none parity, one stop bit per byte) every in sec. at 19200 BPS on OOK (On/Off Keying) modulation.

3.2 *EUT Exercise Software*

The software version (Ver. Tst 1) that was used for the emission test is auto starting on battery installation and transmitting continuously non stop random data on OOK modulation at 19200 BPS rate. This mode of operation enables better detection of the emission.

3.3 *Special Accessories*

No special accessories were needed to achieve compliance.

3.4 *Equipment Modifications*

No special modifications were needed to achieve compliance.

3.5 *Configuration of Tested System*

The configuration of the tested system is described below.

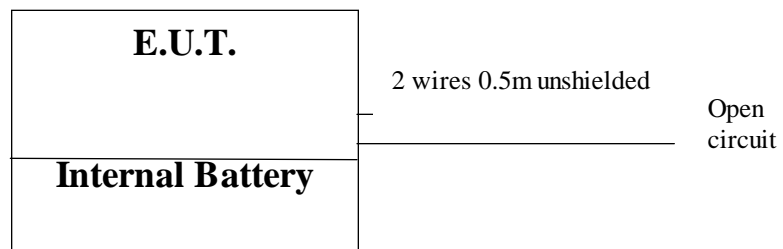


Figure 3. Configuration of Tested System

4. Block Diagram

4.1 Schematic Block/Connection Diagram

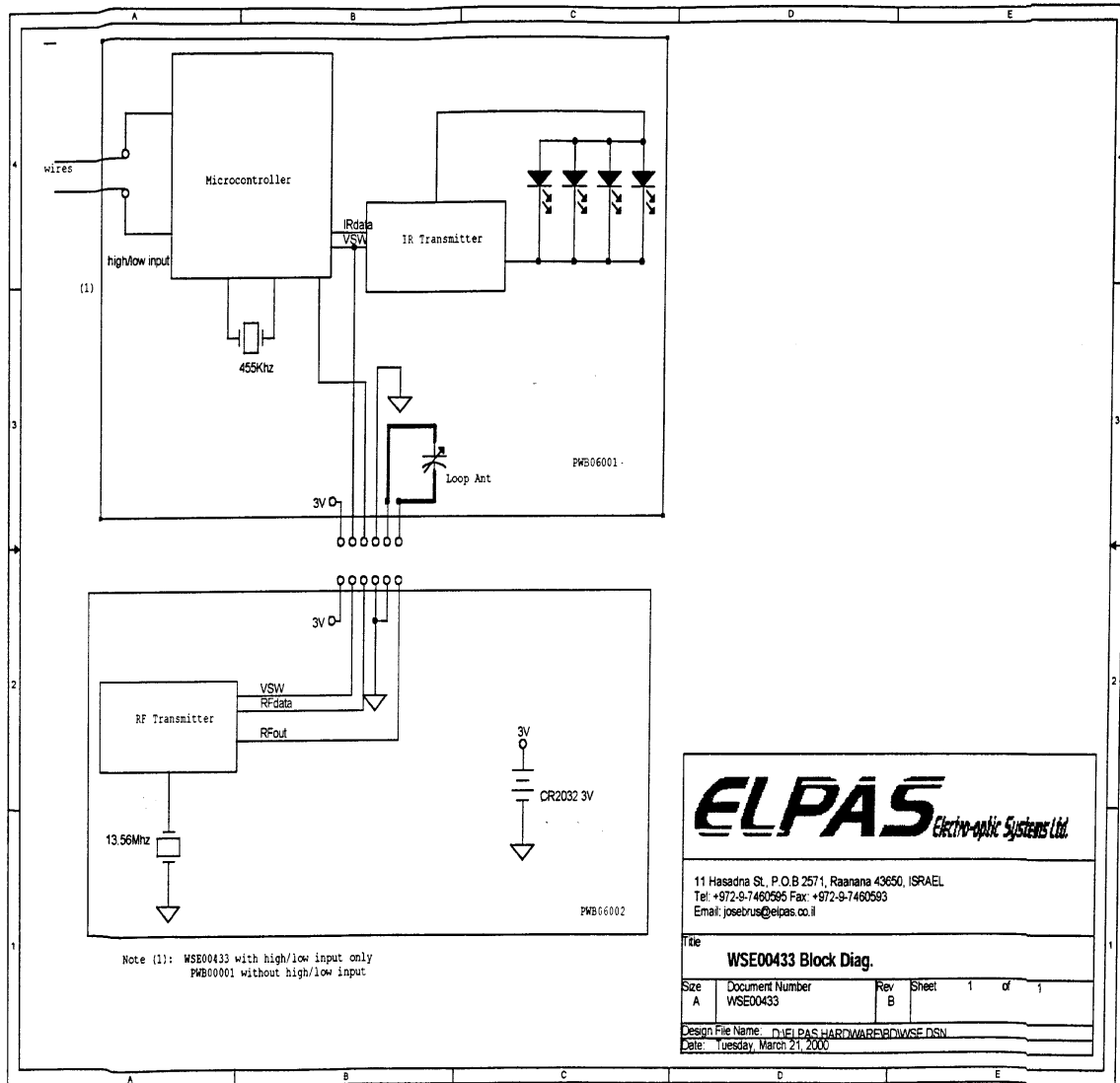


Figure 4. Block Diagram

5. Radiated Emission Data

5.1 Radiated Emission 10KHz-1000 MHz, Below 1GHz

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

A preliminary measurement to characterize 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 10KHz-1000 MHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The emissions were measured using a computerized 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 maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

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.

During this test the E.U.T. was operated in continuous transmission to enable better detection of signals.

A correction factor of $20 \log 100(\text{ms})/2(\text{msec})^* = 34\text{dB}$ was applied for the fundamental and harmonics.

*Note: Actual E.U.T. transmission on time is 2msec.

5.2 Measured Data

JUDGEMENT: Passed by 16.0 dB μ V/m

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Class B specification.

The worst case was for 650.9 MHz, horizontal polarization.

The details of the highest emissions are given in Figure 5 to Figure 6.

Radiated Emission

E.U.T Description Wrist/Equipment IR/RF 433,
 Tamper Sensor, Tag
 Type WSE00433
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C:
 Class B, Section 15.231(e)

Antenna Polarization: Horizontal Frequency range: 10 KHz to 1000 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 TX operation Frequency 433.92MHz

Freq. (MHz)	QP Amp (dBμV/m)	QP Result (dBμV/m)	Spec. (dB μV/m)	Margin (dBμV/m)	Correction Factors		
					Antenna (db)	Cable (db)	(2) (db)
35.3	20.6	20.6	52.8	-32.2	13.3	1.1	N/A
45.2	13.9	13.9	52.8	-38.9	11.1	1.2	N/A
54.2	13.9	13.9	52.8	-38.9	9.8	1.3	N/A
58.2	12.9	12.9	52.8	-39.9	9.2	1.4	N/A
83.8	12.7	12.7	52.8	-40.1	9.2	1.7	N/A
433.9	81.9	47.9	72.8	-24.9	14.8	4.2	-34
650.9	36.8	36.8	52.8	-16.0	18.2	5.2	N/A
867.8	52.5	18.5	52.8	-34.3	20.2	6.1	-34

**Figure 5. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Quasi-peak**

- Notes: 1. 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.
 2. Duty Cycle correction factor

Radiated Emission

E.U.T Description Wrist/Equipment IR/RF 433,
 Tamper Sensor, Tag
 Type WSE00433
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C:
 Class B, Section 15.231(e)

Antenna Polarization: Vertical Frequency range: 10 KHz to 1000 MHz
 Test Distance: 3 meters Detector: Quasi-peak
 TX operation Frequency 433.92MHz

Freq. (MHz)	QP Amp (dBμV/m)	QP Result (dBμV/m)	Spec. (dB μV/m)	Margin (dBμV/m)	Correction Factors		
					Antenna (db)	Cable (db)	(2) (db)
48.6	19.9	19.9	52.8	-32.9	10.4	1.3	N/A
59.9	13.5	13.5	52.8	-39.3	9.1	1.5	N/A
67.2	16.1	16.1	52.8	-36.7	8.6	1.6	N/A
84.2	12.8	12.8	52.8	-40.0	9.2	1.7	N/A
257.9	29.0	29.0	46.0	-17.0	18.2	3.0	N/A
433.9	74.9	40.9	72.8	-31.9	14.7	4.2	-34
650.9	34.7	34.7	52.8	-18.1	18.2	5.1	N/A
867.8	56.2	22.2	52.8	-30.6	20.1	6.4	-34

**Figure 6. Radiated Emission. Antenna Polarization: HORIZONTAL.
 Detector: Quasi-peak**

- Note:
1. Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
 2. Duty Cycle correction factor

5.3 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	8542E	3427A00103/34	December 24, 1999	1 year
Loop Antenna	EMCO	6507	2950	January 1 2000	1 year
Antenna - Biconical HP	ARA	BCD-235/B	1041	April 11, 1999	1 year
Antenna - Log Periodic	ARA	LPD-2010/A	1038	March 14, 1999	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	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

5.4 **Field Strength Calculation**

In the frequency range below 2.9GHz the field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, (except for the DCF factor) using the following equation:

$$[\text{dB}\mu\text{v}/\text{m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF} + \text{DCF}^*$$

- FS: Field Strength [dBμv/m]
- RA: Receiver Amplitude [dBμv]
- AF: Receiving Antenna Correction Factor [dB/m]
- CF: Cable Attenuation Factor [dB]
- DCF: Duty Cycle Factor (dB) $\text{DCF} = 20\log 2/100 = -34\text{dB}$

*Note: applicable for Fundamental and Harmonics

No external pre-amplifiers are used.

In the frequency range above 2.9GHz, the field strength is manually calculated using the following equation

$$[\text{dB}\mu\text{v}/\text{m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF} + \text{PRAF} + \text{DCF}$$

PRAF: Preamplifier Gain Factor

6. Radiated Emission Data

6.1 Radiated Emission Above 1 GHz

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, 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.

In the frequency range 1-2.9 GHz, a computerized EMI receiver complying to CISPR 16 requirements was used. The test distance was 3 meters.

In the frequency range 2.9-4.4 GHz, a spectrum analyzer including a low noise amplifier was used. The test distance was 3 meters. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz.

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

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.)

6.2 Test Data

JUDGEMENT: Passed by 24.6dB μ V/m

The EUT met the requirements of the specification. The worst case was: 25.8 dB μ V/m for 2603 MHz, vertical polarization

The details of the highest emissions are given in Figure 7 to Figure 8.

Radiated Emission Above 1 GHz

E.U.T Description Wrist/Equipment IR/RF 433,
 Tamper Sensor, Tag
 Type WSE00433
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C:
 Class B, Section 15.231(e)

Antenna Polarization: Horizontal
 Test Distance: 3 meters

Frequency range: 1 GHz to 4.4 GHz
 Detector: Peak

Freq. (MHz)	(2) Peak Amp (dBµV/m)	(3) Peak Result (dBµV/m)	(4) Spec. (dB µV/m)	(1) Margin (dBµV/m)	Correction Factor			
					Ant.	Cable	Gain	Duty cycle
1301	53.4	19.4	52.8	-33.4	27.8	7.9	N/A	-34
1736	55.8	21.8	52.8	-31.0	29.3	9.4	N/A	-34
2168	60.1	26.1	52.8	-26.7	30.8	10.8	N/A	-34
2603	61.3	27.3	52.8	-25.5	31.7	11.8	N/A	-34
3037	42.7	8.7	52.8	-44.1	32.8	3.9	-31.1	-34
3905	39.7	5.7	52.8	-47.1	34.2	4.6	-31.1	-34

**Figure 7. Radiated Emission above 1 GHz Antenna Polarization: HORIZONTAL.
 Detector: Peak**

Note:

1. Margin refers to the test peak results obtained, minus the specification requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
2. This level includes the reading plus all correction factors except the duty cycle factor.
3. This level is equal to “peak amp” plus duty cycle factor.
4. Limit for average detector.

Radiated Emission Above 1 GHz

E.U.T Description Wrist/Equipment IR/RF 433,
 Tamper Sensor, Tag
 Type WSE00433
 Serial Number: Not designated

Specification: F.C.C., Part 15, Subpart C
 Class B, Section 15.231(e)

Antenna Polarization: Vertical
 Test Distance: 3 meters

Frequency range: 1 GHz to 4.4 GHz
 Detector: Peak

Freq. (MHz)	(2) Peak Amp (dBμV/m)	(3) Peak Result (dBμV/m)	(4) Spec. (dB μV/m)	(1) Margin (dBμV/m)	Correction Factor			
					Ant.	Cable	Gain	Duty cycle
1301	54.6	20.6	52.8	-32.2	27.8	7.9	N/A	-34
1736	56.9	22.9	52.8	-29.9	29.3	9.4	N/A	-34
2168	60.0	26.0	52.8	-26.8	30.8	10.8	N/A	-34
2603	62.2	28.2	52.8	-24.6	31.7	11.8	N/A	-34
3037	41.6	7.6	52.8	-45.2	32.8	3.9	-31.1	-34
3905	40.7	6.7	52.8	-46.1	34.2	4.6	-31.1	-34

**Figure 8. Radiated Emission above 1 GHz Antenna Polarization:VERTICAL.
 Detector: Peak**

Note:

1. Margin refers to the test peak results obtained, minus the specification requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
2. This level includes the reading plus all correction factors except the duty cycle factor.
3. This level is equal to “peak amp” plus duty cycle factor.
4. Limit for average detector.

6.3 Test Instruments used, Radiated Measurement Above 1 GHZ

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	August 2, 1999	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	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
Antenna – Log Periodic	A.H. System	SA5-200/511	253	January 27, 2000	1 year
Low Noise Amplifier	DBS	0411N313	003	December 24, 1999	1 year
Receiver	HP	8542E	3427A00103/34	December 24, 1999	1 year

6.4 **Field Strength Calculation**

In the frequency range below 2.9GHz the field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, (except for the DCF factor) using the following equation:

$$[\text{dB}\mu\text{v}/\text{m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF} + \text{DCF}^*$$

- FS: Field Strength [dBμv/m]
- RA: Receiver Amplitude [dBμv]
- AF: Receiving Antenna Correction Factor [dB/m]
- CF: Cable Attenuation Factor [dB]
- DCF: Duty Cycle Factor (dB) $\text{DCF} = 20\log 2/100 = -34\text{dB}$

*Note: applicable for Fundamental and Harmonics

No external pre-amplifiers are used.

In the frequency range above 2.9GHz, the field strength is manually calculated using the following equation

$$[\text{dB}\mu\text{v}/\text{m}] \text{ FS} = \text{RA} + \text{AF} + \text{CF} + \text{PRAF} + \text{DCF}$$

PRAF: Preamplifier Gain Factor

7. Fundamental Emission Bandwidth

7.1 *Test Specification*

433.92 MHz, FCC Part 15, Subpart C, Section 15.231(c)

7.2 *Test Procedure*

The E.U.T. operation mode is described in Section .3

The test used the same set-up as was used for the Radiated Emission Test (Section 6).

One of the receiver markers was placed on the peak of the fundamental frequency, and the delta marker was moved to a level lower than the 20dB from the fundamental marker. The Frequency of the delta marker was recorded.

7.3 *Measured Data*

Judgement: Passed by 0.399MHz

The E.U.T. met the requirements of FCC Part 15, Subpart C, Section 15.231 (c)

See additional details in Figure 9 to Figure 11.

Fundamental Emission

E.U.T Description Wrist/Equipment IR/RF 433,
 Tamper Sensor, Tag
 Type WSE00433
 Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Section 15.231 (c):
 Class B

Operation Frequencies (MHz)	Reading		Margin (MHz)
	(•) (KHz)	* Specification (MHz)	
433.92	+105	+0.504	0.499
	-90	-0.504	0.414

Figure 9. Fundamental Emission

Note: *Band width not greater than 0.25% of the center frequency.

Fundamental Emission

E.U.T Description Wrist/Equipment IR/RF 433,
 Tamper Sensor, Tag
 Type WSE00433
 Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Section 15.231 (c):
 Class B

15:19:30 MAR 09, 2000

ACTV DET: PEAK
 MEAS DET: PEAK QP
 MKR Δ -90 kHz
 -20.6B dB

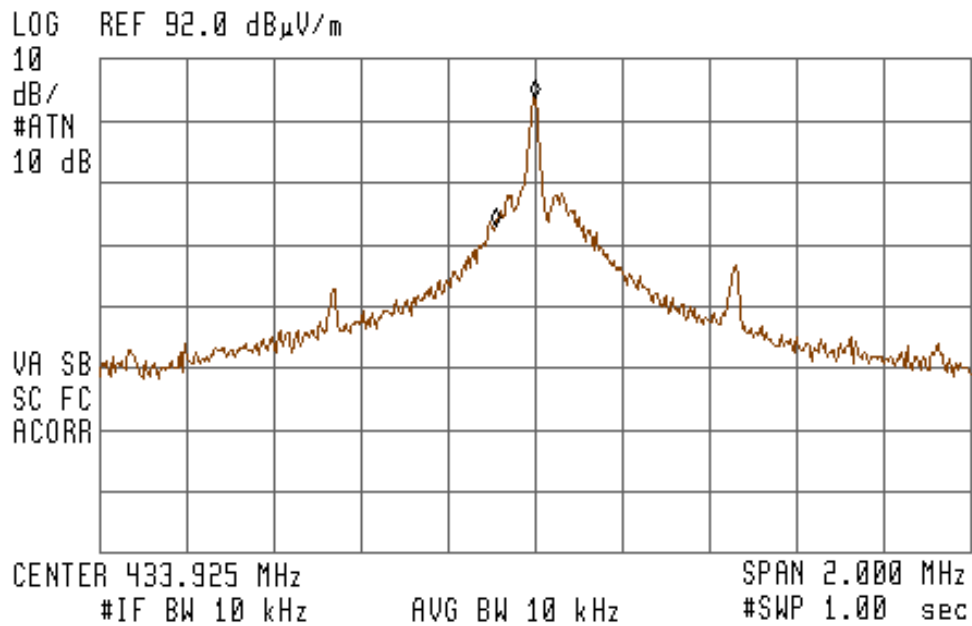


Figure 10. Fundamental Emission

Fundamental Emission

E.U.T Description Wrist/Equipment IR/RF 433,
 Tamper Sensor, Tag
 Type WSE00433
 Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Section 15.231 (c):
 Class B

15:28:35 MAR 09, 2000

ACTV DET: PEAK
 MEAS DET: PEAK QP
 MKR Δ 105 kHz
 -20.87 dB

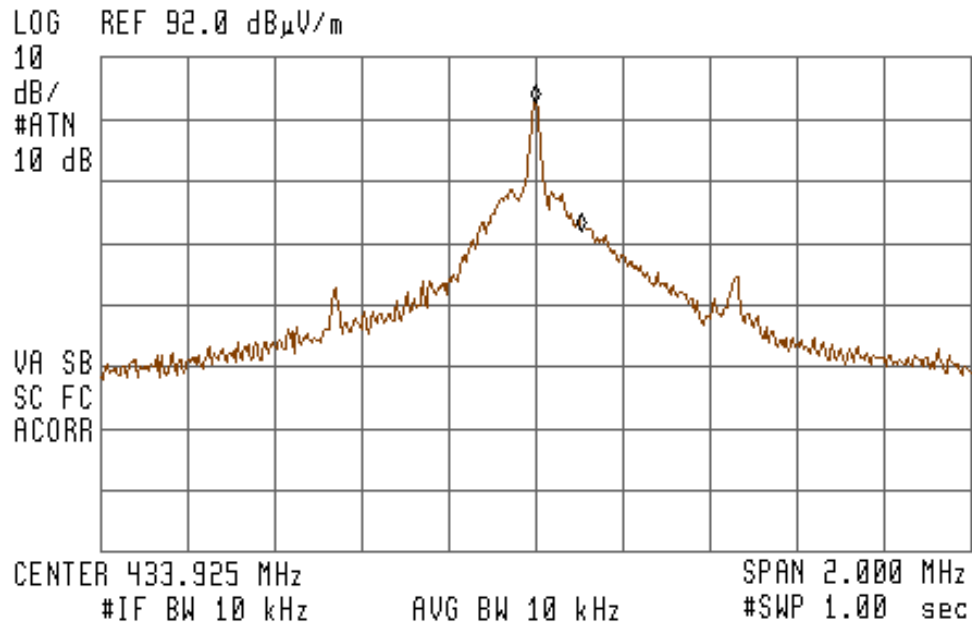


Figure 11. Fundamental Emission

7.4 Test Instrumentation Used, Fundamental Emission Band Width

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Receiver	HP	8542E	3427A00103/34	December 24, 1999	1 year
Antenna - Biconical HP	ARA	BCD-235/B	1041	April 11, 1999	1 year
Antenna - Log Periodic	ARA	LPD-2010/A	1038	March 14, 1999	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	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

8. Photographs of Tested E.U.T.



Figure 12 Front/Top View



Figure 13 Side View

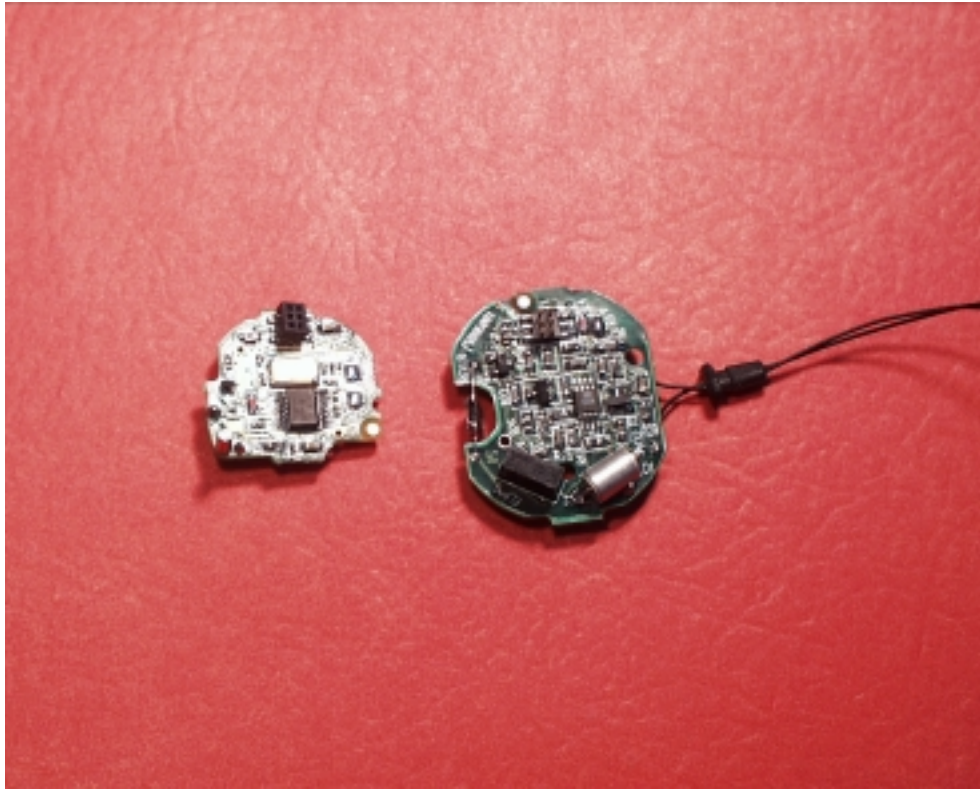


Figure 14 PCB

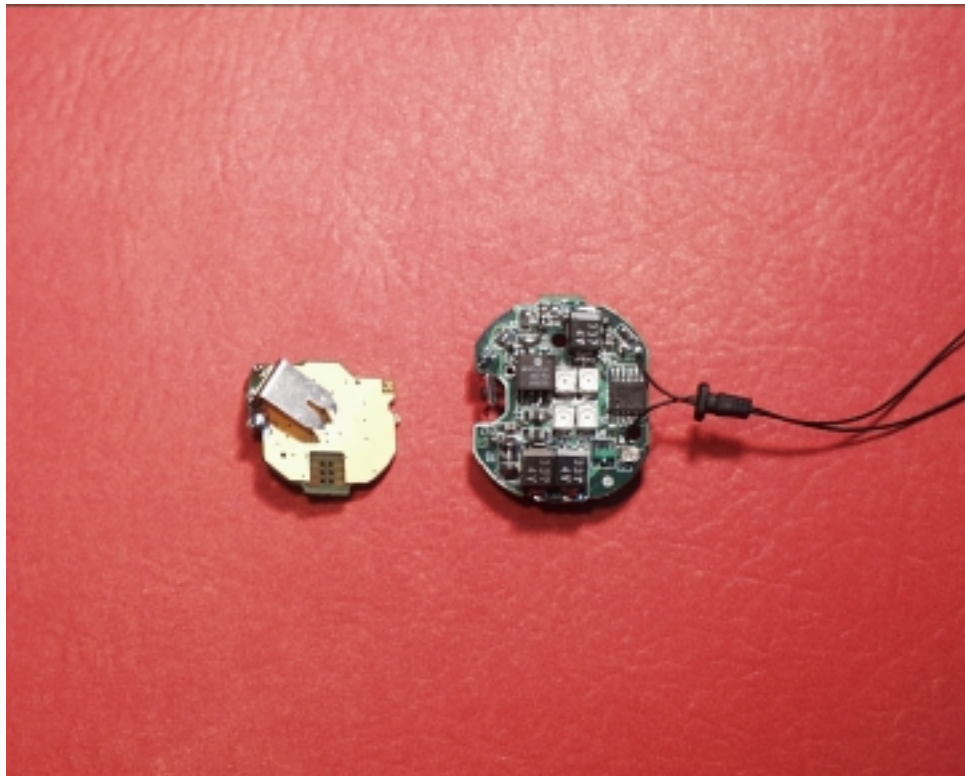


Figure 15 PCB



Figure 16 External Photo Top View

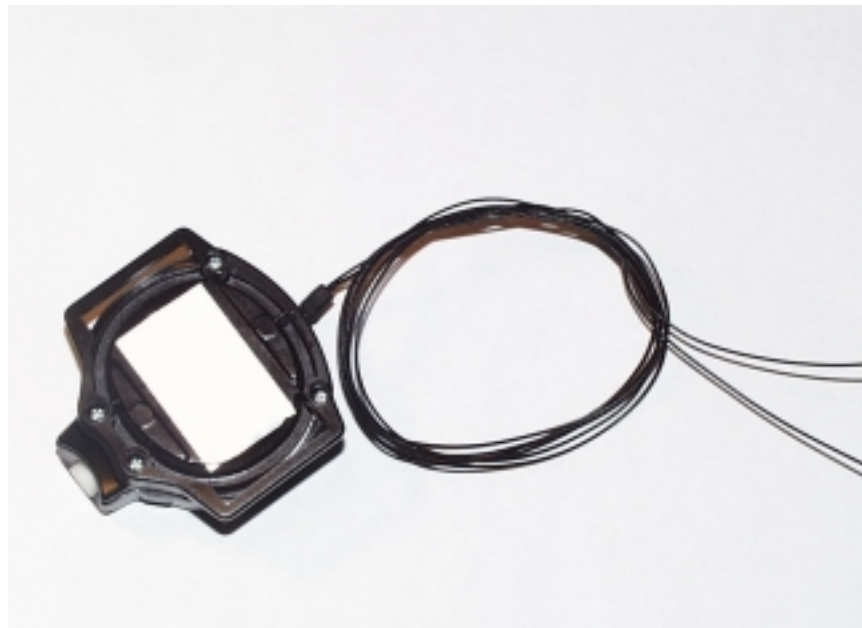


Figure 17 External Photo Bottom View

9. Signatures of the E.U.T's Test Engineers

Test	Test Engineer Name	Signature	Date
Radiated Emissions	L. Barry		
Fundamental Emissions Band Width	L. Barry		

10. APPENDIX A - CORRECTION FACTORS

10.1 Correction factors for CABLE

from EMI receiver
to test antenna
at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.5	1200.0	7.5
20.0	0.7	1400.0	8.2
30.0	1.0	1600.0	9.0
40.0	1.2	1800.0	9.6
50.0	1.3	2000.0	10.7
60.0	1.5	2300.0	11.1
70.0	1.6	2600.0	11.8
80.0	1.7	2900.0	12.8
90.0	1.8		
100.0	1.9		
150.0	2.4		
200.0	2.7		
250.0	3.0		
300.0	3.3		
350.0	3.7		
400.0	4.0		
450.0	4.3		
500.0	4.7		
600.0	4.9		
700.0	5.4		
800.0	5.8		
900.0	6.3		
1000.0	6.7		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

10.2 Correction factors for CABLE

**from EMI receiver
to test antenna
at 10 meter range.**

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.6	1200.0	9.7
20.0	1.1	1400.0	10.5
30.0	1.3	1600.0	11.5
40.0	1.6	1800.0	12.6
50.0	1.7	2000.0	13.5
60.0	1.9	2300.0	14.3
70.0	2.0	2600.0	15.5
80.0	2.2	2900.0	16.4
90.0	2.3		
100.0	2.4		
150.0	3.1		
200.0	3.6		
250.0	4.2		
300.0	4.5		
350.0	4.8		
400.0	5.2		
450.0	5.5		
500.0	6.2		
600.0	6.4		
700.0	7.0		
800.0	7.5		
900.0	8.1		
1000.0	8.6		

NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 34 meters.
3. The above data is located in file 34M10MO.CBL on the disk marked "Radiated Emissions Tests EMI Receiver".

10.3 Correction factors for LOG PERIODIC ANTENNA

**Type LPD 2010/A
at 3 and 10 meter ranges.**

Distance of 3 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	11.4
400.0	14.5
500.0	15.2
600.0	17.3
700.0	19.0
850.0	20.1
1000.0	22.2

Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.2
400.0	14.4
500.0	15.2
600.0	17.2
700.0	19.0
850.0	20.1
1000.0	22.1

NOTES:

1. *Antenna serial number is 1038.*
2. *The above lists are located in file number 38M30.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.*
3. *The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".*

10.4 Correction factors for BICONICAL ANTENNA

**Type BCD-235/B,
at 3 and 10 meter ranges**

3 meter range

FREQUENCY (MHz)	AFE (dB/m)
30.0	14.8
40.0	11.9
50.0	10.2
60.0	9.1
70.0	8.5
80.0	8.9
90.0	9.6
100.0	10.3
110.0	11
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13
180.0	13.5
190.0	14
200.0	14.8
210.0	15.3
220.0	15.8
230.0	16.2
240.0	16.6
250.0	17.6
260.0	18.2
270.0	18.4
280.0	18.7
290.0	19.2
300.0	19.9

10 meter range

FREQUENCY (MHz)	AFE (dB/m)
30.0	12.1
40.0	10.6
50.0	10.6
60.0	8.9
70.0	8.5
80.0	9.6
90.0	9.4
100.0	9.6
110.0	10.3
120.0	10.7
130.0	12.6
140.0	12.7
150.0	12.7
160.0	13.8
170.0	13.7
180.0	14.9
190.0	13.4
200.0	13.1
210.0	14.0
220.0	14.5
230.0	15.8
240.0	16.0
250.0	16.6
260.0	16.7
270.0	18.3
280.0	18.5
290.0	19.3
300.0	20.9

NOTES:

1. Antenna serial number is 1041.
2. The above list is located in file 41BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".

**10.5 Correction factors for BICONICAL ANTENNA Type 3109
3 meter range**

FREQUENCY (MHz)	AFE (dB/m)
20.0	18.4
30.0	14.0
40.0	12.3
50.0	10.6
60.0	8.3
70.0	8.7
80.0	7.2
90.0	8.6
100.0	10.1
110.0	11.2
120.0	11.8
130.0	12.3
140.0	12.7
150.0	12.5
160.0	12.4
170.0	12.1
180.0	12.2
190.0	12.8
200.0	13.7
210.0	14.5
220.0	15.4
230.0	15.9
240.0	16.3
250.0	16.7
260.0	17.1
270.0	17.2
280.0	17.5
290.0	18.1
300.0	18.9

NOTES:

1. Antenna serial number is 3244.
2. The above list is located in file 44BIC3M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

**10.6 Correction factors for BICONICAL ANTENNA Type 3109
10 meter range**

FREQUENCY (MHz)	AFE (dB/m)
20.0	16.4
30.0	13.2
40.0	11.9
50.0	10.4
60.0	8.6
70.0	9.0
80.0	6.8
90.0	7.5
100.0	9.4
110.0	10.8
120.0	11.7
130.0	12.2
140.0	12.5
150.0	12.3
160.0	12.1
170.0	12.2
180.0	12.5
190.0	13.2
200.0	14.0
210.0	14.4
220.0	14.8
230.0	15.0
240.0	15.1
250.0	15.2
260.0	15.7
270.0	15.9
280.0	16.5
290.0	17.0
300.0	17.8

NOTES:

1. Antenna serial number is 3244.
2. The above list is located in file 44BIC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"

10.7 Correction factors for SAS ANTENNA, 3 meter range
Type SAS-200/511

FREQUENCY (MHz)	AFE (dB/m)	FREQUENCY (MHz)	AFE (dB/m)
1.0	24.9	7.0	38.6
1.5	27.8	7.5	39.2
2.0	29.9	8.0	39.9
2.5	31.2	8.5	40.4
3.0	32.8	9.0	40.8
3.5	33.6	9.5	41.1
4.0	34.3	10.0	41.7
4.5	35.2	10.5	42.4
5.0	36.2	11.0	42.5
5.5	36.7	11.5	43.1
6.0	37.2	12.0	43.4
6.5	38.1	12.5	44.4

NOTES:

1. Antenna serial number is 253.
2. The above list is located in file SASLP3M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver"