

**DATE: 28 September 2008**

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

# **FCC Radio Test Report**

**for**

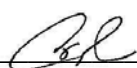
**Visonic Technologies (1993) Ltd.**

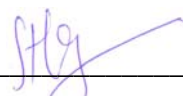
**Equipment under test:**

**Elpas Low Frequency Exciter**

**RLE**

Written by:   
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Approved by:   
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Approved by: For/   
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This report relates only to items tested.

# Measurement/Technical Report for Visonic Technologies (1993) Ltd.

# Elpas Low Frequency Exciter

## RLE

**FCC ID: O4X5-RLE00125**

28 September 2008

This report concerns:	Original Grant:	x
	Class I change:	
	Class II change:	

Equipment type: Part 15 Security/Remote Control Transceiver

47CFR15 Section 15.209

Measurement procedure used is ANSI C63.4-2003.

Application for Certification  
prepared by:  
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Applicant for this device:  
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# 1. General Information

## 1.1 Administrative Information

Manufacturer: Visonic Technologies (1993) Ltd.

Manufacturer's Address: 30 Habarzel St.  
Tel-Aviv, 69710  
Israel  
Tel: +972-3—768-1400  
Fax: +972-3-768-1415

Manufacturer's Representative: Gaby Shugol

Equipment Under Test (E.U.T): Elpas Low Frequency Exciter

Equipment Model No.: RLE

Equipment Serial No.: Not Designated

Date of Receipt of E.U.T: 02.03.08

Start of Test: 02.03.08

End of Test: 05.06.08

Test Laboratory Location: I.T.L (Product Testing) Ltd.  
Kfar Bin Nun,  
ISRAEL 99780

Test Specifications: FCC Part 15 Sub-part C

## **1.2 List of Accreditations**

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), File No. IC 4025.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

### 1.3 **Product Description**

Elpas Low Frequency (LF) Exciters from Visonic Technologies are supervised\*, short-range, wireless emitters that add pin point detection functionality to EIRISTM based RFID installations.

Elpas Low Frequency (LF) Exciters can be installed surface mounted on walls or on fixed or in dropped (false) ceilings. Elpas LF Exciters are deployable in either a basic stand-alone configuration designed to cover normal size single doorways or in a master-slave configuration (1 master and 1 slave unit) for accurate, synchronized coverage of large indoor, open complex-shaped areas. Elpas LF Exciters emit harmless, adjustable low power, low frequency; sphere shaped magnetic (125 KHz) fields up to 3m (10ft) in radius. The emitted fields are user tunable so that they can precisely cover any indoor doorway or restricted entrance/exit area. As a result, whenever an active Elpas RFID tag or badge (i.e. ETC, WTA, Baby Tag, Personnel Badge) enters the magnet field; the corresponding LF Exciter automatically triggers the moving RFID device to transmit special data messages (including the Exciter ID code). The messages are immediately received and relayed by strategically located Elpas RF readers for monitoring, alert notification and subsequent event logging. LF

Transmissions

LF Transmission Rate: Continuous bursts of LF transmissions (each about 12ms in duration).

Supervision RF Transmissions

The Exciter also emits a low power 433MHz message (similar to the messages transmitted from Elpas tags) for the purpose of supervision. Should the device be removed or broken, then the monitoring software shall detect the absence of these messages and will alarm on a tamper of the exciter.

Transmission Rate: 1 RF transmission (about 2ms in duration), 10 seconds apart.

Transmitted Message Type: 433.9 MHz Elpas Tag (badge) protocol including ID LF Exciter code (ID code = OOODXX where XX is ID number of the LF exciter).

#### **1.4 Test Methodology**

Radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

#### **1.5 Test Facility**

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing August 22, 2006).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

#### **1.6 Measurement Uncertainty**

Radiated Emission

The Open Site complies with the  $\pm 4$  dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

## 2. Product Labeling

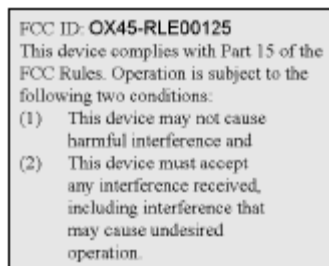


Figure 1. FCC Label



Figure 2. Location of Label on EUT



### 3. System Test Configuration

#### 3.1 Justification

The E.U.T. can be installed surface mounted on walls or on fixed or in dropped (false) ceilings. The E.U.T. can be deployed in either a basic stand-a-lone configuration designed to cover normal size single doorways or in a master-slave configuration (1 master and 1 slave unit). The E.U.T. was tested in a Master-Slave configuration.

To determine the E.U.T. antenna orientation for the spurious radiated emissions tests, the product carrier field level was measured with the E.U.T. in 2 positions (ceiling mounted and wall mounted). The ceiling mounting position was selected as the worst case final orientation position.

#### 3.2 EUT Exercise Software

In normal operation mode the RLE transmits a single 2 msec transmission every 10 seconds.

In order to perform the test the firmware was modified so that the RLE transmits a message 20 times per second.

#### 3.3 Special Accessories

No special accessories were needed.

#### 3.4 Equipment Modifications

No modifications were needed in order to achieve compliance

#### 3.5 Configuration of Tested System

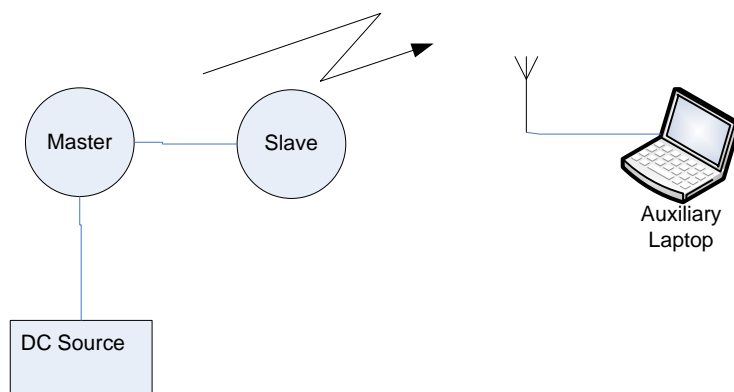


Figure 3. Configuration of Tested System

#### 4. Radiated Measurement Test Set-up Photo



**Figure 4. Radiated Emission Test**



**Figure 5. Radiated Emission Test**

## 5. Radiated Emission, 9 kHz – 30 MHz 125kHz Transmitter

### 5.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

### 5.2 Test Procedure

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 configuration tested is shown in Figure 3.1.

The frequency range 9 kHz-30 MHz was scanned.

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.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was operated at the frequency of 125 kHz. This frequency was measured using a peak detector.

### 5.3 Measured Data

JUDGEMENT: Passed by 8.2 dB

The EUT was tested and it met the requirements of the FCC Part 15, Subpart C, specification.

.

TEST PERSONNEL:

Tester Signature: 

Date: 28.09.08

Typed/Printed Name: A. Sharabi

## Radiated Emission

E.U.T Description Elpas Low Frequency Exciter  
Type RLE  
Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna: 3 meters distance

Frequency range: 9 kHz to 30 MHz

Detectors: Peak

Frequency (MHz)	Peak Amp (dB $\mu$ V/m)	Average Amp (dB $\mu$ V/m)	Correction (dB)	Average Specification (dB $\mu$ V/m)	Margin (dB)
0.125	104.52	97.0	11.5	105.2	-8.2
0.250	53.5	43.1	11.6	99.6	-56.5
0.375	55.9	46.9	11.6	96.1	-49.2

**Figure 6. Radiated Emission. Antenna Polarization: HORIZONTAL.  
Detectors: Peak, Quasi-peak**

*Note: 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.*

## Radiated Emission

E.U.T Description    Elpas Low Frequency Exciter  
 Type                    RLE  
 Serial Number:        Not Designated

Specification: FCC Part 15, Subpart C

Antenna: 3 meters distance

Frequency range: 9 kHz to 30 MHz

Detectors: Peak

09:18:34 JUN 30, 2008

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 125.05 kHz  
 104.52 dB $\mu$ V/m

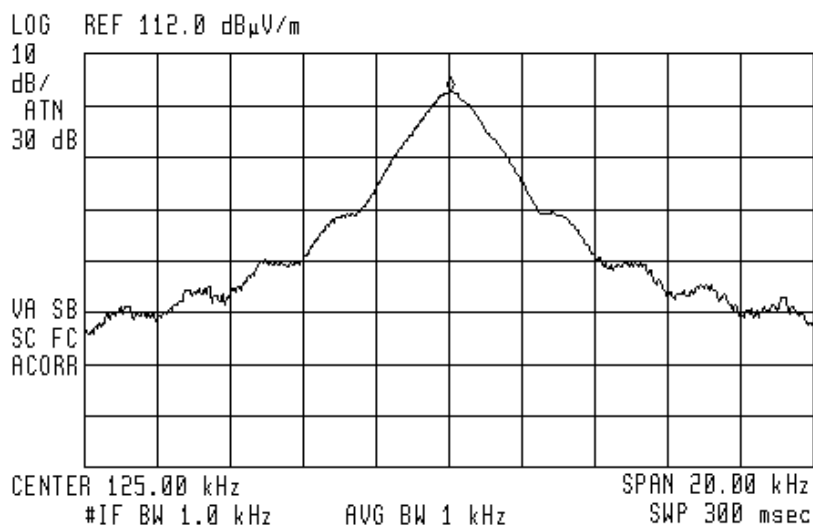


Figure 7. Radiated Emission. Detectors: Peak

#### 5.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 year
RF Section	HP	85420E	3705A00248	November 12, 2007	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 15, 2007	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

### **5.5 Field Strength Calculation**

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

$$FS = RA + AF + CF$$

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

No external pre-amplifiers are used.

## 6. Spurious Radiated Emission

### 6.1 Test Specification

9 kHz - 4500 MHz, F.C.C., Part 15, Subpart C

### 6.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3. See Section 3.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

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 configuration tested is shown in Figure 3. The signals from the list of the highest emissions were verified and the list was updated accordingly.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.

The frequency range 9 kHz-4500 MHz was scanned.

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.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

In the frequency range 2.9 – 4.5 GHz, a spectrum analyzer including a low noise amplifier was used. During peak measurements, the I.F. bandwidth was 1 MHz, and video bandwidth 3 MHz. During average measurements, the I.F. bandwidth was 1 MHz and video bandwidth was 100 Hz.

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.)

The emissions were measured at a distance of 3 meters.



### 6.3 Test Data

JUDGEMENT: Passed by 12.4 dB


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

The margin between the emission level and the specification limit was 12.4 dB in the worst case at the frequency of 867.30 MHz, vertical polarization.

No signals were found in the frequency range of 1.0 GHz – 4.5 GHz for the 433 MHz transmitter.

No signals were found in the frequency range of 30 MHz – 4.5 GHz for the 125 kHz transmitter.

TEST PERSONNEL:

Tester Signature: 

Date: 28.09.08

Typed/Printed Name: A. Sharabi

## Radiated Emission

E.U.T Description Elpas Low Frequency Exciter  
Type RLE  
Serial Number: Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical Frequency range: 30 MHz to 300 MHz  
Antenna: 3 meters distance Detectors: Peak, Quasi-peak

Frequency (MHz)	Peak Amp (dB $\mu$ V/m)	QP Amp (dB $\mu$ V/m)	Antenna Polarity (H/V)	Specification (dB $\mu$ V/m)	Margin (dB)
91.70	26.5	26.3	H	43.5	-17.2
92.80	30.2	29.9	V	43.5	-13.6
101.70	26.1	25.2	V	43.5	-18.3
124.30	30.2	30.0	V	43.5	-13.5
867.30	35.5	33.6	V	46.0	-12.4

**Figure 8. Radiated Emission. Antenna Polarization: VERTICAL.  
Detectors: Peak, Quasi-peak**

*Note: 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.*

#### 6.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 12, 2007	1 year
RF Section	HP	85420E	3705A00248	November 12, 2007	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS- 0411N313	013	November 2, 2007	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	March 5, 2008	1 Year
Antenna Bioconical	ARA	BCD 235/B	1041	March 23, 2008	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 2007	1 year
Antenna-Log Periodic	A.H.System	SAS-200/511	253	February 4, 2007	2 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	LaserJet 2200	JPKG19982	N/A	N/A

## 7. 11. APPENDIX A - CORRECTION FACTORS

### 7.1 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	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
90.0	1.6		
100.0	1.7		
150.0	2.0		
200.0	2.3		
250.0	2.7		
300.0	3.1		
350.0	3.4		
400.0	3.7		
450.0	4.0		
500.0	4.3		
600.0	4.7		
700.0	5.3		
800.0	5.9		
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".

## 7.2 Correction factors for CABLE

from EMI receiver  
to test antenna  
at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

### NOTES:

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.

### 7.3 Correction factors for CABLE

from spectrum analyzer  
to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

**NOTES:**

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.
2. The cable is used for measurements above 2.9 GHz.
3. The overall length of the cable is 10 meters.

## 12.6 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	12.5
400.0	15.4
500.0	16.1
600.0	19.2
700.0	19.4
800.0	19.9
900.0	21.2
1000.0	23.5

### Distance of 10 meters

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.8
400.0	15.3
500.0	15.6
600.0	18.7
700.0	19.1
800.0	20.2
900.0	21.1
1000.0	23.2

#### 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".

**7.4 Correction factors for BICONICAL ANTENNA  
Type BCD-235/B,  
at 3 meter range**

<b>FREQUENCY</b> (MHz)	<b>APE</b> (dB/m)
20.0	19.4
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	11.0
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13.0
180.0	13.5
190.0	14.0
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
310	20.7
320	21.9
330	23.4
340	25.1
350	27.0

**NOTES:**

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".



## 7.5 Correction factors for LOG PERIODIC ANTENNA

**Type SAS-200/511  
at 3 meter range.**

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

### NOTES:

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".

**7.6 Correction factors for ACTIVE LOOP ANTENNA**  
**Model 6502**  
**S/N 9506-2950**

<b>FREQUENCY</b>	<b>Magnetic Antenna Factor</b>	<b>Electric Antenna Factor</b>
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2