

**DATE: 28 September 2008**

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

**FCC Radio Test Report**


for

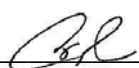
**Visonic Technologies (1993) Ltd.**

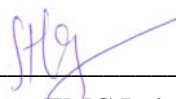
**Equipment under test:**

**Elpas Low Frequency Exciter**

**RLE**

Written by:   
D. Shidlow, Documentation

Approved by:   
A. Sharabi, Test Engineer

Approved by: For/   
I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



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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-a-lone 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

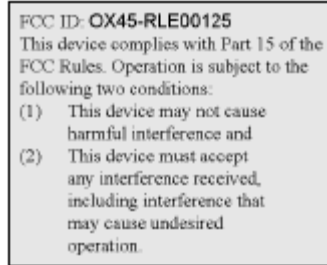


Figure 1. FCC Label



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

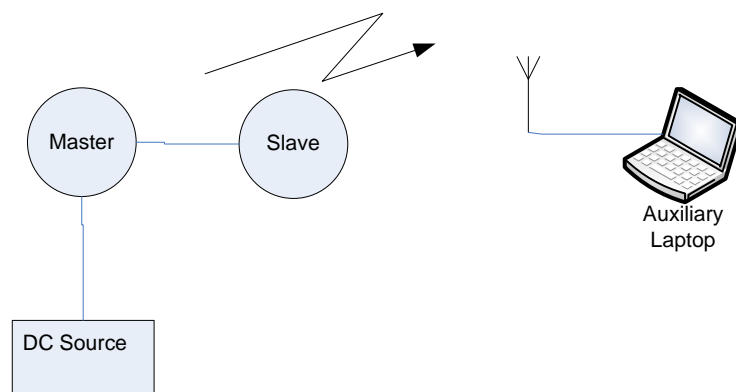


Figure 3. Configuration of Tested System

## 4. Periodic Operation

### 4.1 Specification

F.C.C., Part 15, Subpart C, Section 15.231(a)

### 4.2 Requirements


Requirement	Rationale	Verdict
Continuous transmissions are not permitted.	See information in User Manual.	Complies
A manually operated transmitter shall be deactivated within not more than 5 seconds after releasing the switch.	N/A	Complies
An automatically operated transmitter shall cease operation within 5 seconds after activation.	N/A	Complies
Periodic transmissions at regular predetermined intervals are not permitted.	See information in User Manual.	Complies
Polling or supervised transmissions to determine system integrity of transmitter used in security or safety applications shall not exceed more than 2 seconds per hour.	See plots in Figure 4 to Figure 5	Complies

### 4.3 Results

JUDGEMENT: Passed

The EUT met the FCC Part 15, Subpart C, Section 15.231(a) specification requirements.

TEST PERSONNEL:

Tester Signature:  \_\_\_\_\_

Date: 10.09.08

Typed/Printed Name: A. Sharabi





## 5. Field Strength of Fundamental

### 5.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.231(b)

### 5.2 Test Procedure

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

The E.U.T. was placed on a non-conductive table, 0.8 meters above the O.A.T.S. ground plane.

The EMI receiver was set to the E.U.T. Fundamental Frequency (433.92MHz) and Peak Detection.

The turntable and antenna mast were adjusted for maximum level reading on the EMI receiver.

The measurement was performed for vertical and horizontal polarizations of the test antenna.

The average result is:

Peak Level(dB $\mu$ V/m) + E.U.T. Duty Cycle Factor, in 100msec time window (dB)

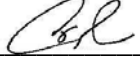
### 5.3 Measured Data

JUDGEMENT: Passed by 34.47 dB

The EUT met the FCC Part 15, Subpart C, Section 15.231(b) specification requirements.

The details of the highest emissions are given in Figure 6 to Figure 10.

TEST PERSONNEL:

Tester Signature:  Date: 10.09.08

Typed/Printed Name: A. Sharabi

## Field Strength of Fundamental

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

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal/Vertical

Test Distance: 3 meters

Detector: Peak

Freq.	Pol.	Peak Amp	Average Factor	AVG Result	AVG Specification	Margin
(MHz)	V/H	(dB $\mu$ V/m)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
433.92	H	76.96	-34.0	42.96	80.0	-37.04
433.92	V	79.53	-34.0	45.53	80.0	-34.47

**Figure 6. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Peak**

Notes:

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. "Peak Amp." (dB $\mu$ V/m) included the "Correction Factors".
3. "Correction Factors" (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. "Average Factor =  $20 \log [(burst\ duration/100msec)*Num\ of\ burst\ within\ 100msec]$  =  $20 \log [(2/100)*1]$  = -34.0
5. "Average Result" (dB $\mu$ V/m) = Peak Amp. (dB $\mu$ V/m) + D.C.F. (dB)







# Field Strength of Fundamental

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

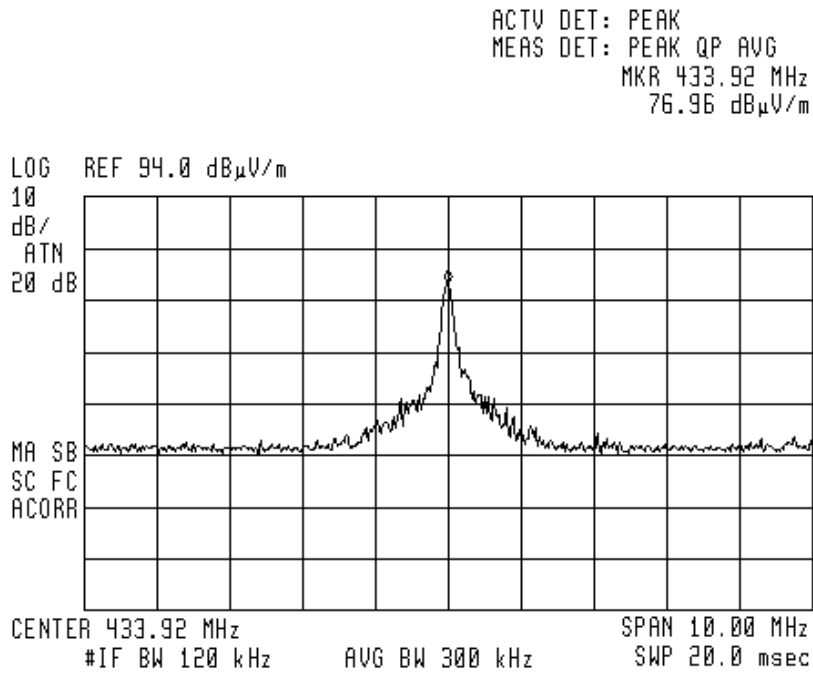
Specification: F.C.C., Part 15, Subpart C, 15.231(b)

Antenna Polarization: Horizontal

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average

17:50:46 MAR 17, 2008



**Figure 9. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL.  
 Detectors: Peak, Quasi-peak, Average**

# Field Strength of Fundamental

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

Specification: F.C.C., Part 15, Subpart C, 15.231(b)

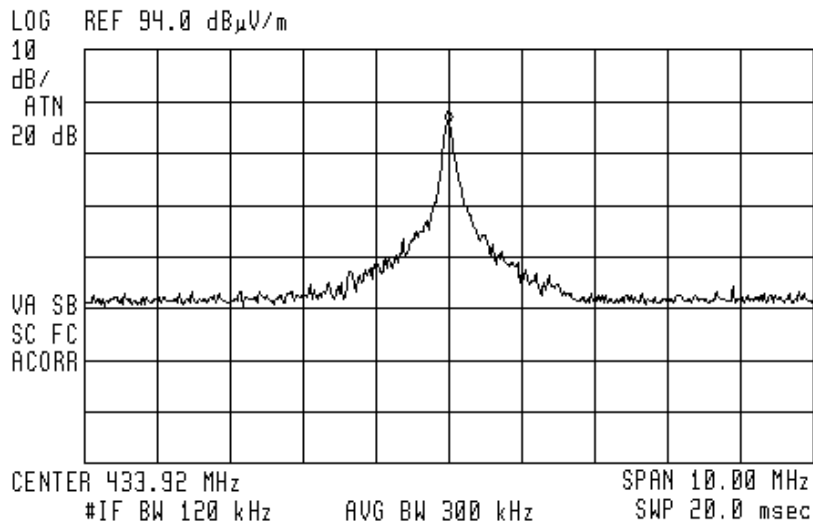
Antenna Polarization: Vertical

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average

17:53:26 MAR 17, 2008

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 433.92 MHz  
 79.53 dB $\mu$ V/m



**Figure 10. Field Strength of Fundamental. Antenna Polarization: VERTICAL. Detectors: Peak, Quasi-peak, Average**

#### 5.4 Test Instrumentation Used, Field Strength of Fundamental

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
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 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
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

## 6. Radiated Measurement Test Set-up Photo



Figure 11. Radiated Emission Test



Figure 12. Radiated Emission Test

## 7. Bandwidth

### 7.1 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 120 kHz resolution BW and center frequency of the transmitter fundamental. The spectrum bandwidth of the transmitter unit was measured and recorded.

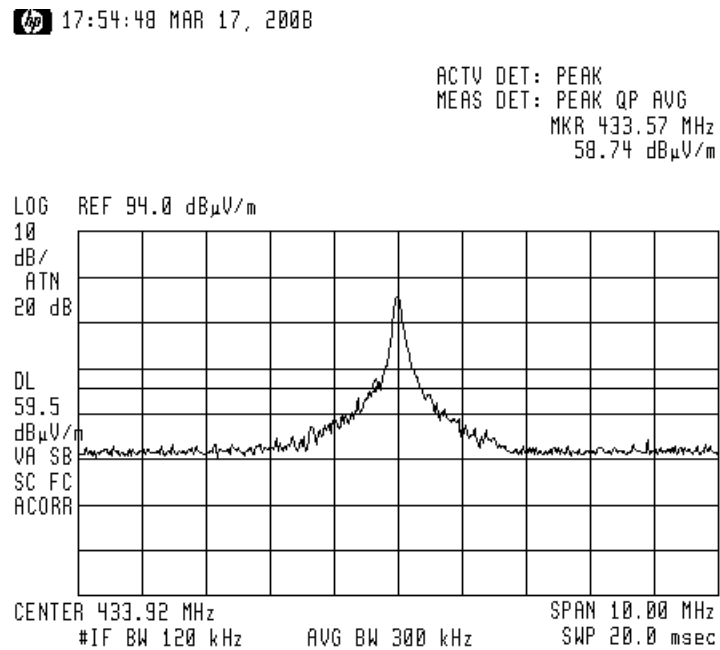


Figure 13  $F_{Low}$

17:55:34 MAR 17, 2008

ACTV DET: PEAK  
 MEAS DET: PEAK QP AVG  
 MKR 434.27 MHz  
 59.55 dB $\mu$ V/m

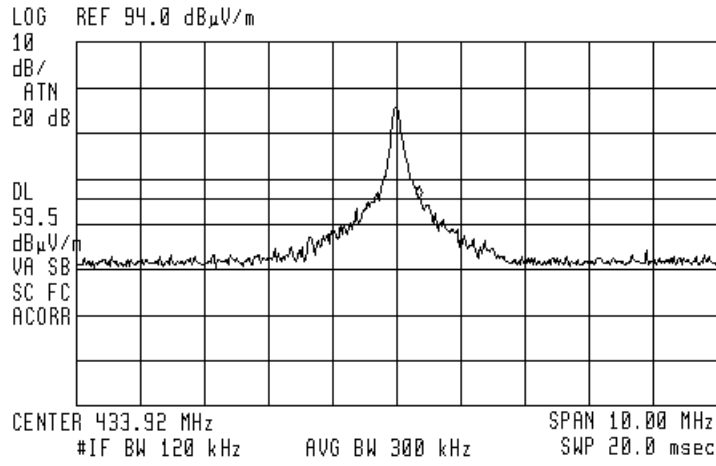


Figure 14 F<sub>High</sub>

**7.2 Results table**


E.U.T Description: Elpas Low Frequency Exciter  
 Model: RLE  
 Serial Number: Not Designated  
 Specification: F.C.C. Part 15, Subpart C: (15.231(c))

Bandwidth Reading (kHz)	Specification (1) (kHz)	Margin (kHz)
700	1084.8	-384.8

**Figure 15 Bandwidth**

JUDGEMENT: Passed by 384.8 kHz

TEST PERSONNEL:

Tester Signature: \_\_\_\_\_  Date: 10.09.08

Typed/Printed Name: A. Sharabi

(1) 0.25% of the E.U.T. fundamental frequency, Section 15.231(c).

### 7.3 Test Equipment Used.

#### Bandwidth

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
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 22, 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
Printer	HP	LaserJet 2200	JPKG19982	N/A	N/A

**Figure 16 Test Equipment Used**



## 8. 11. APPENDIX A - CORRECTION FACTORS

**8.1 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".

## 8.2 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.*

**8.3 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".

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

<b>FREQUENCY (MHz)</b>	<b>AFE (dB/m)</b>
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".

**8.5 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".

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

<b>FREQUENCY</b> (MHz)	<b>Magnetic Antenna Factor</b> (dB)	<b>Electric Antenna Factor</b> (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