

**DATE: 18 August 2009**

**I.T.L. (PRODUCT TESTING) LTD.**  
**FCC Radio Test Report**  
for  
**Visonic Technologies (1993) Ltd.**

**Equipment under test:**

**Elpas IR Reader RS-485**

**5-RRB008805-RRB00880-2**

Written by: E. Ever

E. Ever, Documentation

Approved by: E. Ever

E. Ever, Test Engineer

Approved by: I. Raz

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.

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

### Elpas IR Reader RS-485

5-RRB008805-RRB00880-2

**FCC ID: O4X5-RRB00880**

**IC ID: 1467G-RRB00880**

18 August 2009

This report concerns:

Original Grant:

Class I change:

Class II change:

Equipment type:

Part 15 Security/Remote Control Transceiver

47CFR15 Section 15.231 (a-d)

Measurement procedure used is ANSI C63.4-2003.

Application for Certification  
prepared by:

Ishaishou Raz

ITL (Product Testing) Ltd.

Kfar Bin Nun

D.N. Shimshon 99780

Israel

e-mail Sraz@itl.co.il

Applicant for this device:  
(different from "prepared by")

David Fensterheim

Visonic Technologies (1993) Ltd.

30 Habarzel Street

Tel-Aviv 69710

U.S.A.

Tel: +972-3-768-1410

Fax: +972-3-768-1415

e-mail: fensterheim@visonictech.com

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## 1. General Information

### 1.1 Administrative Information

Manufacturer: Visonic Technologies (1993) Ltd.

Manufacturer's Address: POB 13132 30 Habarzel St.  
Tel Aviv 69710 Israel  
Tel: +972-3-7681400  
Fax: +972-3-7681415

Manufacturer's Representative: Avi Manela

Equipment Under Test (E.U.T): Elpas IR Reader RS-485

Equipment Model No.: 5-RRB008805-RRB00880-2

Equipment Serial No.: Not Designated

Date of Receipt of E.U.T: 04/05/2009

Start of Test: 04/05/2009

End of Test: 06/05/2009

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), IC File No.: 46405-4025; Site No. IC 4025B-1.
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**

The Elpas2 High-Definition IR Reader is a supervised, fixed infrared locating device. The reader is designed to detect and relay sub-room 'Location' and 'State' data in real-time from Elpas Active RFID IR-Enabled Asset, Personnel or Infant Protection Tags to host applications.

The reader can be easily integrated anywhere onto wired or wireless Ethernet/Wi-Fi networks (using an Elpas2 RF Ethernet Reader as a RS-485 BUS master) to enable indoor, facility-wide sub-room monitoring and tracking of assets or personnel in real-time.

Architecturally attractive and unobtrusive, the reader is easily surface mounted on solid walls and ceilings or flush mounted into dropped (false) ceilings. The Elpas2 IR Reader supports large tag populations at read-distances up to 15m/50ft (360° coverage area) and is remotely configurable for customized applications. On-board I/O ports enable the monitoring of one general purpose analogue input and control of one open-collector digital switched output.

The Elpas2 High-Definition IR Reader also supports XML messaging technology via the Elpas2 RF Ethernet Reader for integration with external systems plus RS-485 data transmission with up to 15 other Elpas2 IR readers.

### **1.4 Test Methodology**

Both conducted and radiated testing were 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).

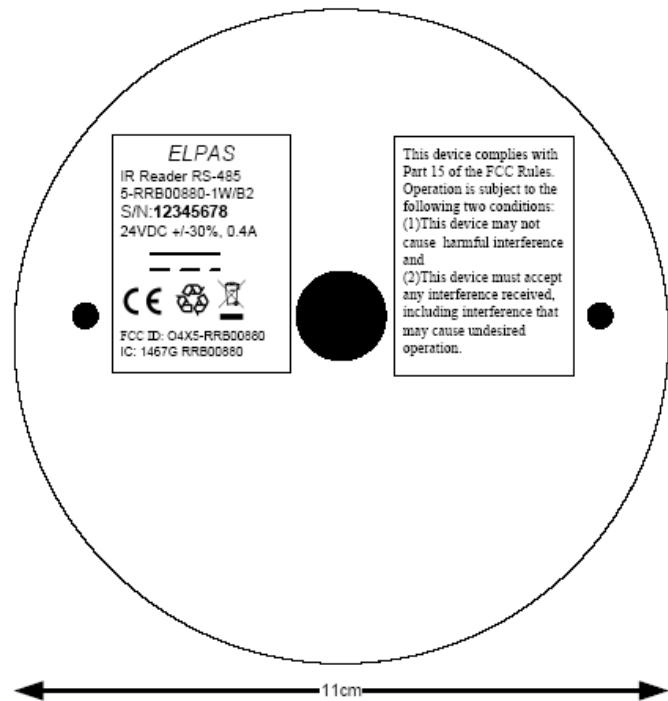
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

### **1.6 Measurement Uncertainty**

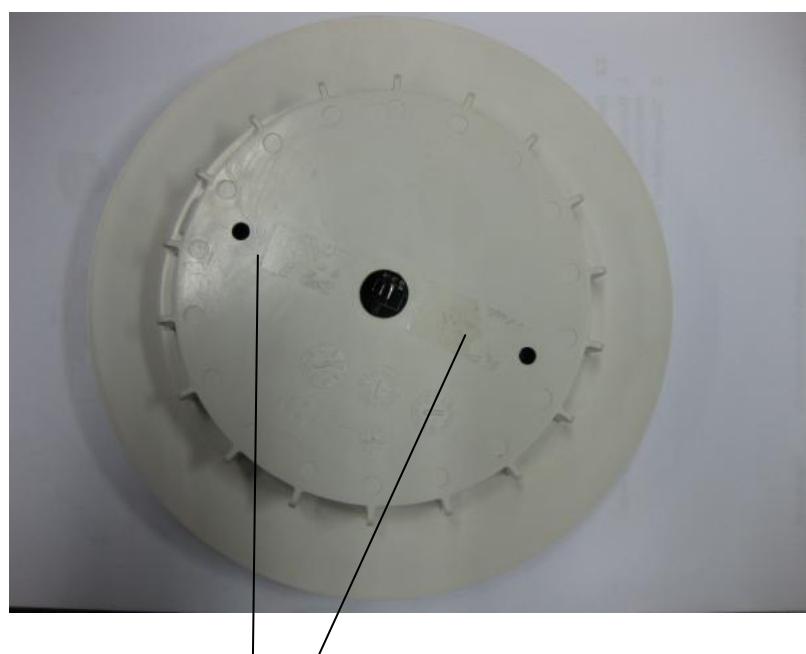
#### **Radiated Emission**

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 Sample and Label Location on EUT**



**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.

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 wall mounting position was selected as the worst case final orientation position.

#### 3.2 ***EUT Exercise Software***

The EUT was operated with the normal functional software.

#### 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

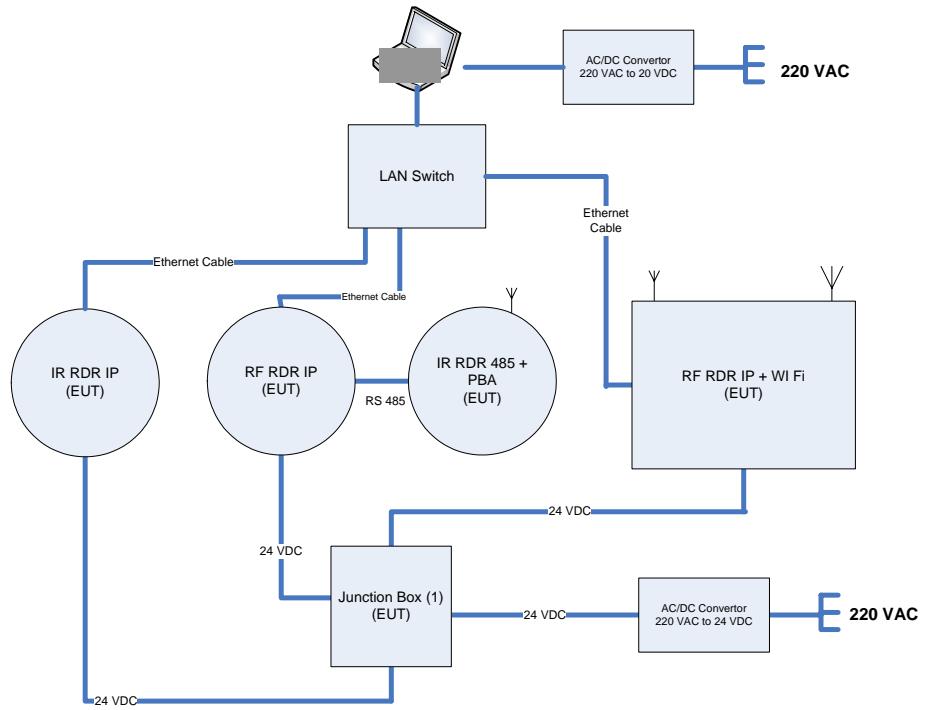


Figure 3. Configuration of Tested System

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



Figure 4. Table Top Radiated Emission Test



Figure 5. Open Site Radiated Emission Test

## 5. Average Factor Calculation

1. Burst duration = 2.25msec
2. Time between bursts = 10.5 sec. > 100ms

3. Average Factor =  $20 \log \left[ \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of bursts within 100msec} \right]$

$$\text{Average Factor} = 20 \log \left[ \frac{2.25}{100} \times 1 \right] = -33.0 \text{dB}$$

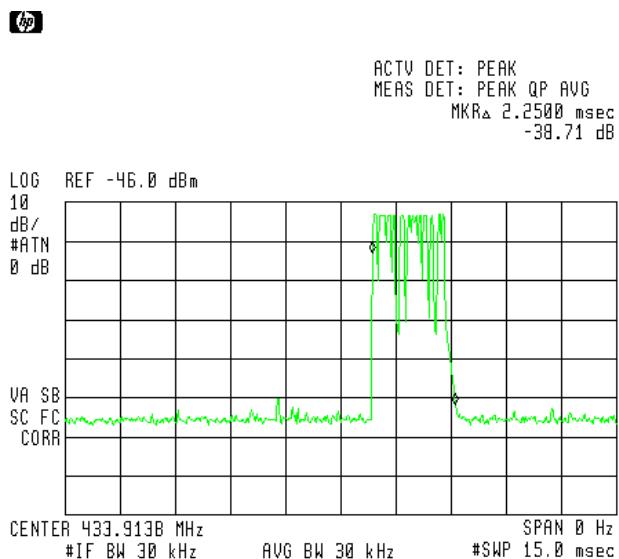
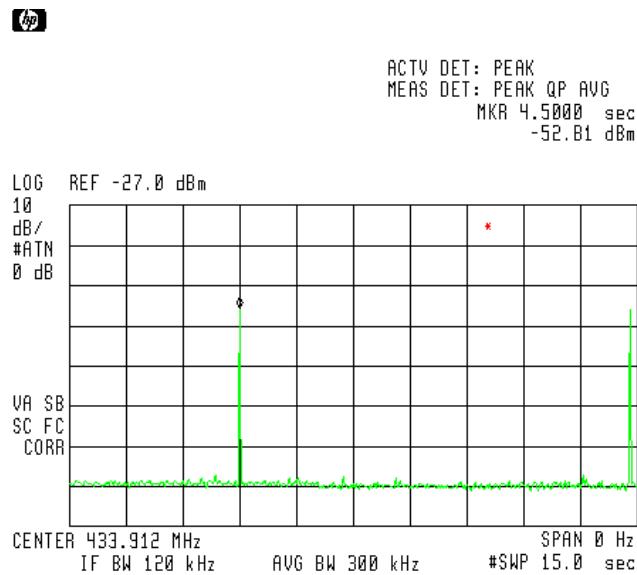


Figure 6. Burst Duration = 2.25 msec



**Figure 7. Number of burst within 100 msec.**  
**(time between transmissions is 10.5 sec.)**

### 5.1 ***Test Instrumentation Used***

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

## 6. Periodic Operation

### 6.1 Specification

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

### 6.2 Requirements

Requirement	Rationale	Verdict
Continuous transmissions are not permitted.	See information in user's 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's 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 8 and Figure 9.	Complies

### 6.3 Results

JUDGEMENT: Passed

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

TEST PERSONNEL:

Tester Signature: Evan Ever

Date: 18/08/2009

Typed/Printed Name: E. Ever

## Periodic Operation

E.U.T Description Elpas IR Reader RS-485  
Type 5-RRB008805-RRB00880-2  
Serial Number: Not Designated

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

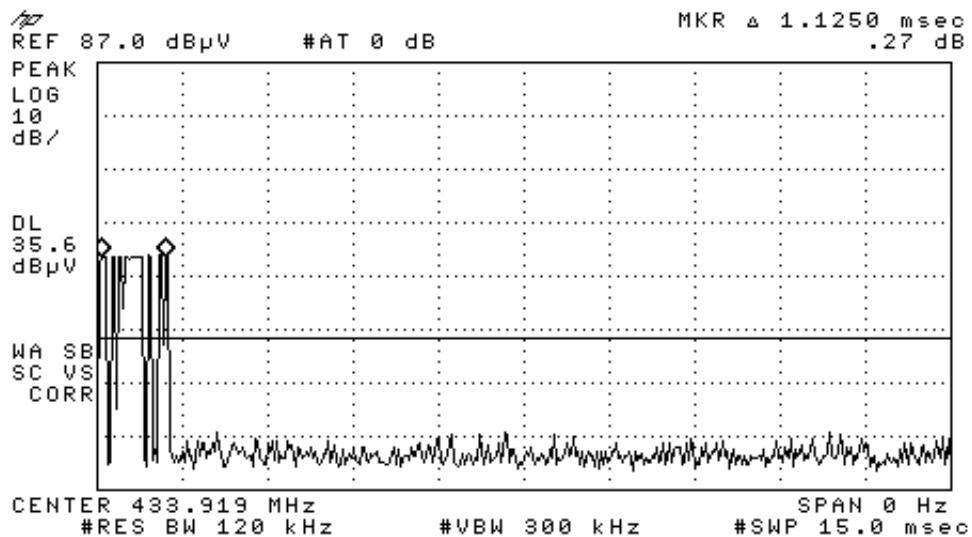
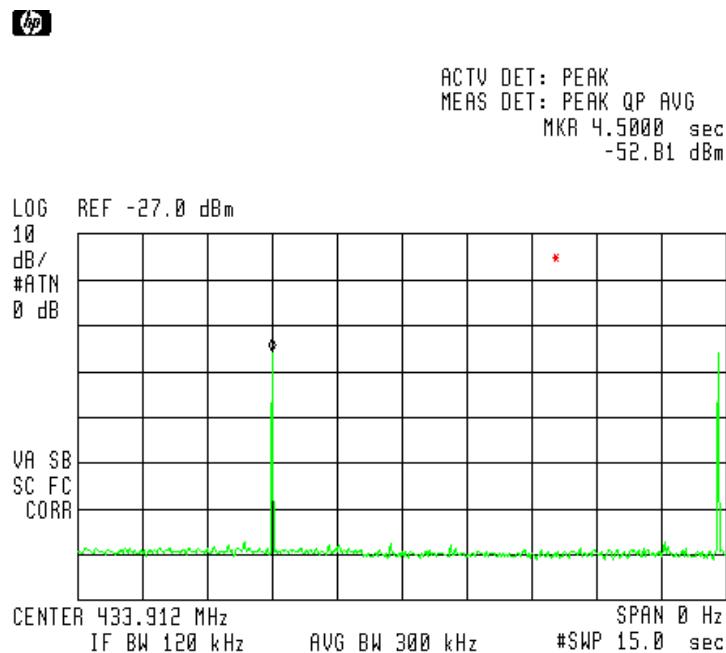


Figure 8. System Integrity Pulse Width

## Periodic Operation

E.U.T Description Elpas IR Reader RS-485  
 Type 5-RRB008805-RRB00880-2  
 Serial Number: Not Designated

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



**Figure 9. System integrity within 1 hour.**

### 6.1 **Test Instrumentation Used**

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

## 7. Field Strength of Fundamental

### 7.1 **Test Specification**

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

### 7.2 **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 (433.91MHz) 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)

### 7.3 **Measured Data**

JUDGEMENT: Passed by 39.2 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 10 to Figure 12.

TEST PERSONNEL:

Tester Signature: Evan Ever

Date: 18/08/2009

Typed/Printed Name: E. Ever

## Field Strength of Fundamental

E.U.T Description      Elpas IR Reader RS-485  
 Type                      5-RRB008805-RRB00880-2  
 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

<b>Freq.</b> (MHz)	<b>Pol.</b> V/H	<b>Peak Amp</b> (dB $\mu$ V/m)	<b>Average Factor</b> (dB)	<b>AVG Result</b> (dB $\mu$ V/m)	<b>AVG Specification</b> (dB $\mu$ V/m)	<b>Margin</b> (dB)
433.91	H	68.12	-33.0	35.1	80.0	-44.9
433.91	V	74.62	-33.0	41.6	80.0	-38.4

**Figure 10. 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 =  $20 \log [(burst\ duration/100msec)*Num\ of\ burst\ within\ 100msec]$ ” =  $20 \log [(2.25/100)*1] = -34.0$
5. “Average Result” (dB $\mu$ V/m)=Peak Amp. (dB $\mu$ V/m)+D.C.F. (dB)

## Field Strength of Fundamental

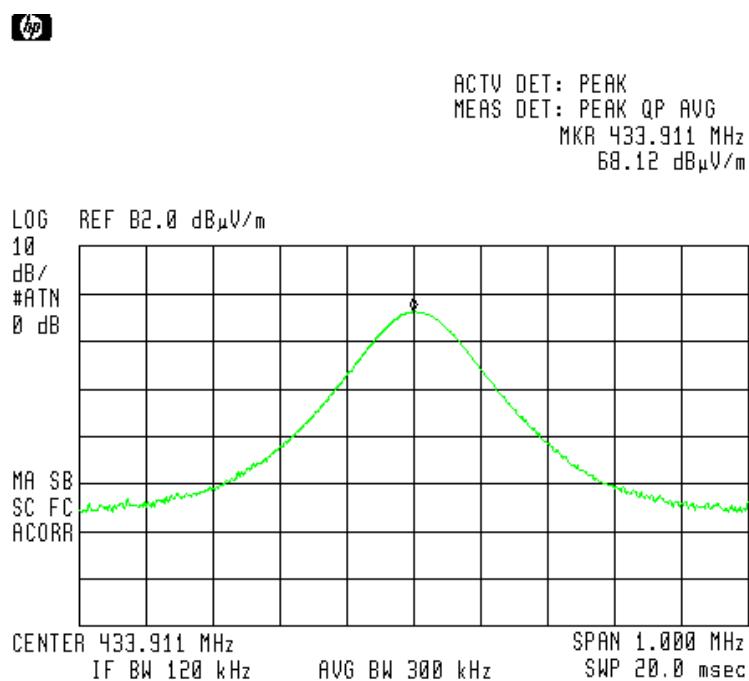
E.U.T Description      Elpas IR Reader RS-485  
 Type                      5-RRB008805-RRB00880-2  
 Serial Number:           Not Designated

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

Antenna Polarization: Horizontal

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average



**Figure 11. Average Factor Calculation**

## Field Strength of Fundamental

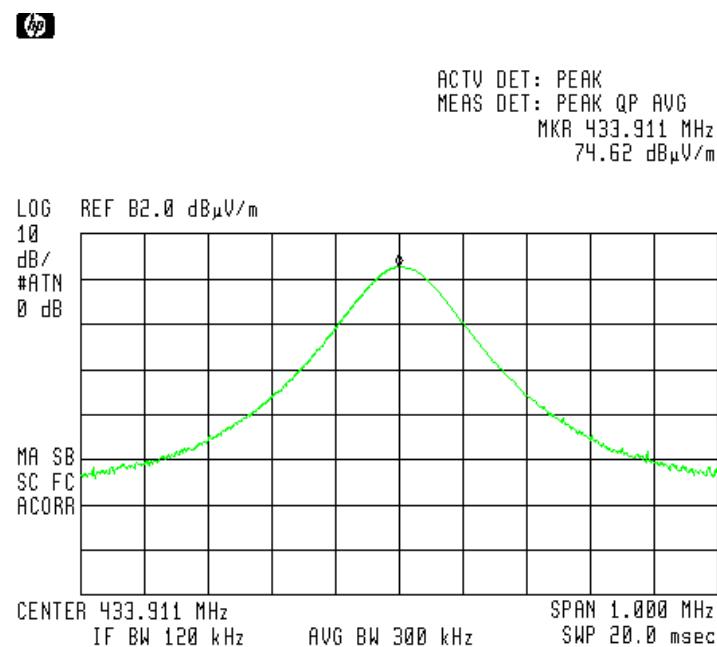
E.U.T Description      Elpas IR Reader RS-485  
 Type                    5-RRB008805-RRB00880-2  
 Serial Number:        Not Designated

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

Antenna Polarization: Vertical

Test Distance: 3 meters

Detectors: Peak, Quasi-peak, Average



**Figure 12. Field Strength of Fundamental. Antenna Polarization: VERTICAL.  
 Detectors: Peak, Quasi-peak, Average**

#### 7.4 **Test Instrumentation Used, Field Strength of Fundamental**

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 17, 2008	1 year
RF Section	HP	85420E	3705A00248	November 16, 2008	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 06, 2008	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

## 8. Radiated Emission, 9 kHz – 30 MHz

### 8.1 Test Specification

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

### 8.2 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 10 meters.

### 8.3 Measured Data

JUDGEMENT: Passed

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

TEST PERSONNEL:

Tester Signature: Evan Ever

Date: 18/08/2009

Typed/Printed Name: E. Ever

#### **8.4 Test Instrumentation Used**

<b>Instrument</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration</b>	<b>Period</b>
EMI Receiver	HP	85422E	3906A00276	November 17, 2008	1 year
RF Section	HP	85420E	3705A00248	November 16, 2008	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 15, 2008	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

## 8.5 **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]

Example:  $FS = 30.7 \text{ dB}\mu\text{V (RA)} + 14.0 \text{ dB (AF)} + 0.9 \text{ dB (CF)} = 45.6 \text{ dB}\mu\text{V}$

No external pre-amplifiers are used.

## 9. Spurious Radiated Emission

### 9.1 ***Test Specification***

30 - 4500 MHz, F.C.C., Part 15, Subpart C

### 9.2 ***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 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 2.9 – 4.5 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. 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.

### 9.3 **Test Data**

JUDGEMENT: Passed by 3.8 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 3.8 dB in the worst case at the frequency of 200.68 MHz, vertical polarization.

TEST PERSONNEL:

Tester Signature: Evan Ever Date: 18/08/2009

Typed/Printed Name: E. Ever

## Radiated Emission

E.U.T Description      Elpas IR Reader RS-485  
 Type                    5-RRB008805-RRB00880-2  
 Serial Number:        Not Designated

Specification: FCC Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical      Frequency range: 30 MHz to 4500 MHz  
 Antenna: 3 meters distance                      Detectors: Peak, Quasi-peak

Frequency (MHz)	Peak Amp (dB $\mu$ V/m)	Quasi Peak (dB $\mu$ V/m)	Antenna Polarity	Specification (dB $\mu$ V/m)	Margin (dB)
30.81	40.4	32.7	H	40.5	-7.3
46.41	50.0	35.3	H	40.5	-4.7
200.66	44.1	35.8	H	43.5	-7.7
55.24	36.8	32.1	V	43.5	-7.9
200.68	47.2	39.7	V	43.5	-3.8
288.03	42.8	41.3	V	46.0	-4.7

**Figure 13. Radiated Emission. Antenna Polarization:  
HORIZONTAL/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.*

#### 9.4 **Test Instrumentation Used**

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 17, 2008	1 year
RF Section	HP	85420E	3705A00248	November 16, 2008	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 3, 2008	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	March 17, 2009	1 Year
Antenna Bioconical	ARA	BCD 235/B	1041	March 25, 2009	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 06, 2008	1 year
Antenna-Log Periodic	A.H.System	SAS-200/511	253	January 29, 2009	2 years
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

## 10. Bandwidth

### 10.1 Test procedure

The transmitter unit operated with normal modulation. The spectrum analyzer was set to 30 kHz resolution BW and center frequency of the transmitter fundamental. The spectrum bandwidth of the transmitter unit was measured and recorded. The BW was measured at 20 dBc points.

The EUT was set up as shown in Figure 3, and its proper operation was checked. The transmitter occupied bandwidth was measured with the EMI receiver as frequency delta between reference points on the modulation envelope.

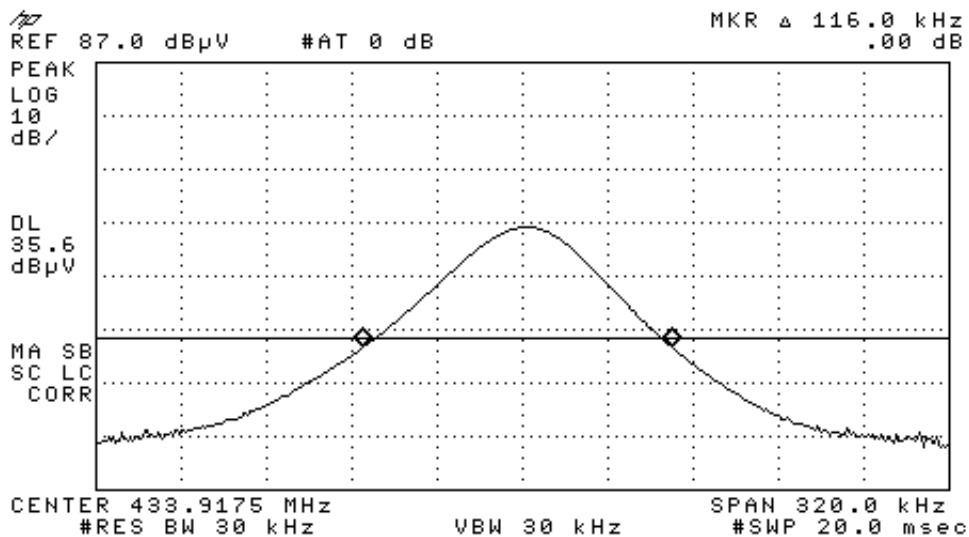


Figure 14  $F_{\text{High}}$  and  $F_{\text{Low}}$  Reading

## 10.2 Results table

E.U.T Description: Elpas IR Reader RS-485  
Model: 5-RRB008805-RRB00880-2  
Serial Number: Not Designated  
Specification: F.C.C. Part 15, Subpart C: (15.231(c))

Bandwidth Reading (kHz)	Specification (1) (kHz)	Margin (kHz)
116.0	1084.8	968.0

**Figure 15 Bandwidth**

JUDGEMENT: Passed by 968.0 kHz

TEST PERSONNEL:

Tester Signature: Eliav Ever Date: 18/08/2009

Typed/Printed Name: E. Ever

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

### 10.3 Test Equipment Used.

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 17, 2008	1 year
RF Section	HP	85420E	3705A00248	November 16, 2008	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	November 06, 2008	1 year

**Figure 16 Test Equipment Used**

## 11. Comparison requirements FCC with Industry Canada

EUT	FCC Specification	According FCC Standard	IC Standard
Elpas IR Reader	<b>Periodic Operation</b>	FCC Part 15.231 (a)(1-5)	RSS- 210 Section 2.6 Annex 1, A1.1.1
	<b>Field Strength at Fundamental</b>	FCC Part 15.231 (b)	RSS- 210 Annex 1 A1.1.2, Section 2.6
	<b>Spurious Emissions and Intermodulation</b>	FCC Part 15.231 (b)	RSS- 210 Section 2.6 Annex 1 A1.1.2
	<b>Bandwidth</b>	FCC Part 15.231 (c)	RSS- 210 Section 2.6 Annex 1 A1.1.3

## 12. APPENDIX B - CORRECTION FACTORS

### 12.1 *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".

## 12.2

### **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.

### 12.3 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.

## 12.4 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	0.3	1200.0	9.8
20.0	0.8	1400.0	10.0
30.0	0.9	1600.0	11.3
40.0	1.2	1800.0	12.2
50.0	1.4	2000.0	13.1
60.0	1.6	2300.0	14.5
70.0	1.8	2600.0	15.9
80.0	1.9	2900.0	16.4
90.0	2.0		
100.0	2.1		
150.0	2.6		
200.0	3.2		
250.0	3.8		
300.0	4.2		
350.0	4.6		
400.0	5.1		
450.0	5.3		
500.0	5.6		
600.0	6.3		
700.0	7.0		
800.0	7.6		
900.0	8.0		
1000.0	8.7		

### 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".

**12.5 Correction factors for LOG PERIODIC ANTENNA**  
**Type LPD 2010/A**  
**at 3 and 10 meter ranges.**

<b>Distance of 3 meters</b>		<b>Distance of 10 meters</b>	
<b>FREQUENCY</b> (MHz)	<b>AFE</b> (dB/m)	<b>FREQUENCY</b> (MHz)	<b>AFE</b> (dB/m)
200.0	9.1	200.0	9.0
250.0	10.2	250.0	10.1
300.0	12.5	300.0	11.8
400.0	15.4	400.0	15.3
500.0	16.1	500.0	15.6
600.0	19.2	600.0	18.7
700.0	19.4	700.0	19.1
800.0	19.9	800.0	20.2
900.0	21.2	900.0	21.1
1000.0	23.5	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".

**12.6 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".

## 12.7 Correction factors for BICONICAL ANTENNA

Type BCD-235/B,  
at 3 meter range

FREQUENCY (MHz)	AFE (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".

**12.8 Correction factors for BICONICAL ANTENNA  
Type BCD-235/B,  
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".

**12.9 Correction factors for Double-Ridged Waveguide Horn**
**Model: 3115, S/N 29845  
 at 3 meter range.**

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENN A Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

**12.10 Correction factors for**

**Horn Antenna**

**Model: SWH-28  
at 1 meter range.**

<b>FREQUENCY</b> <b>(GHz)</b>	<b>AFE</b> <b>(dB /m)</b>	<b>Gain</b> <b>(dB1)</b>
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

**12.11 Correction factors for**

**Horn Antenna  
Model: V637**

<b>FREQUENCY</b> <b>(GHz)</b>	<b>AFE</b> <b>(dB /m)</b>	<b>Gain</b> <b>(dB1)</b>
26.0	43.6	14.9
27.0	43.7	15.1
28.0	43.8	15.3
29.0	43.9	15.5
30.0	43.9	15.8
31.0	44.0	16.0
32.0	44.1	16.2
33.0	44.1	16.4
34.0	44.1	16.7
35.0	44.2	16.9
36.0	44.2	17.1
37.0	44.2	17.4
38.0	44.2	17.6
39.0	44.2	17.8
40.0	44.2	18.0

**12.12 Correction factors for ACTIVE LOOP ANTENNA**

**Model 6502**

**S/N 9506-2950**

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (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