

FCC requirements § 2.1033 (b)(6)

TEST MEASUREMENT REPORT


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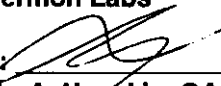


ELECTROMAGNETIC EMISSIONS TEST REPORT
ACCORDING TO FCC PART 15, SUBPART C, §15.245

FOR
ELECTRONICS LINE Ltd.

EQUIPMENT UNDER TEST
ATLAS ALARM SENSOR
(MOTION DETECTOR)

Prepared by: 
Mrs. M. Cherniavsky, Certif. Engineer
Hermon Labs

Approved by: 
Mr. A. Usoskin, QA Manager
Hermon Labs

Approved by: 
Dr. E. Usoskin, C.E.O.
Hermon Labs

Approved by: 
Mr. Shaul Aviezer, QA Manager
Electronics Line Ltd.

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HERMON LABORATORIES

Test Report: ELLTX.12831

Date: May, 1998

FCC ID: HNA2YUATL

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in any form except in full with the approval
of Hermon Laboratories Ltd.***



Description of equipment under test

Test items	Alarm sensor unit, FCC ID:HNA2YUATL
Manufacturer	Electronics Line Ltd.
Brand Mark	Electronics Line USA
Type (Model)	ATLAS
Trade Name	1) ATLAS 620 2) ATLAS 1240 or BEACON DT 3) ATLAS 1650

Applicant information

Applicant's representative	Mr. Shaul Aviezer, QA Manager
Responsible person	Mr. Shaul Aviezer, QA Manager
Company	Electronics Line Ltd.
Address	58 Amal Street
P.O. Box	3253
Postal code	49130
City	Petach Tikva
Country	Israel
Telephone number	011-972-3921 1110
Telefax number	011-972-3921 1128

Test performance

Project Number	12831
Test facility and its location	Hermon Laboratories, Binyamina, Israel
Test started	April 9, 1998
Test completed	April 20, 1998
Purpose of test	The EUT certification in accordance with CFR 47, part 2, §2.1033
Test specification(s)	FCC part 15, subpart C, §15.245

Through this report a point is used as the decimal separator and the thousands are counted with a comma.
This report is in conformity with EN 45001 and ISO GUIDE 25.
The test results relate only to the items tested.



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1 General Information

1.1 Abbreviations and Acronyms

The following abbreviations and acronyms are applicable to this test report:

AVR	Average (Detector)
BW	bandwidth
dB	decibel
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
DC	Direct Current
EMC	Electromagnetic Compatibility
EUT	Equipment Under Test
GHz	Gigahertz
H	height
HL	Hermon Laboratories
HP	Hewlett Packard
Hz	Hertz
IF	intermediate frequency
kHz	kilohertz
kV	kilovolt
L	length
m	meter
mm	millimeter
MHz	Megahertz
msec	millisecond
mW	milliwatt
NA	Not Applicable
NARTE	National Association of Radio and Telecommunications Engineers, Inc.
Ohm	Ohms
QP	Quasi-Peak (Detector)
RBW	Resolution Bandwidth
RF	Radio Frequency
RE	Radiated Emission
V	volt
V/m	volt per meter



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1.2 Specification References

CFR 47 part 15:1997	Radio Frequency Devices
ANSI C63.2:06/1987	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4:1992	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

1.3 EUT Description

The EUT, ATLAS Detector, is an alarm sensor unit based on passive infrared detector and microwave motion sensor (X-band Doppler module) with 10.528 GHz frequency of operation. The output power is 316 mW. The EUT is used within a building.

The alarm sensor is powered by 9 -16 V DC power source.

The device has the following trade names:

- 1) ATLAS 620
- 2) ATLAS 1240 or BEACON DT
- 3) ATLAS 1650.

All of them are electrically and mechanically identical and have the same FCC ID: HNA2YUATL.



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1.4 Statement of Manufacturer

I, Shaul Aviezer, QA Manager of Electronics Line Ltd., declare that the ATLAS alarm sensor FCC ID:HNA2YUATL was tested on April 9 to 20, 1998 by Hermon Laboratories and which this test report applies to, is identical of the equipment that will be marketed.

The term identical means identical within the variations that can be expected to arise as a result of quantity production technique.

Shaul Aviezer, QA Manager
Electronics Line Ltd.

Signature: _____

Date: _____

21.5.98



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2 Test Facility Description

2.1 General

Tests were performed at Hermon Laboratories, which is a fully independent, private EMC, Safety and Telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), recognized by VDE (Germany) for witness test, certified by VCCI (Japan), Registration No. C-266, R-263, accredited by Netherlands Metrology Institute according to EN 45001 for all European Telecommunications (Network and Wireless) standards, including Safety, recognized by TUV Sudwest (Germany) for Safety testing, and Accredited by AMTAC (UK) for safety of Medical Devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO GUIDE 25/EN 45001 for EMC, Telecommunications and Product Safety of Information Technology Equipment (Certificate No. 839.01).

Address: PO Box 23, Binyamina 30550, Israel.
Telephone: +972-6-628-8001
Fax: +972-6-628-8277

Person for contact: Mr. Alex Usoskin, Testing and QA Manager.

2.2 Equipment Calibration

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of MIL-STD-45662A. The laboratory standards are calibrated by the third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements.



2.2.1 Uncertainty in Hermon Labs Measurements

Radiated Emissions (95% Confidence)	Biconical Antenna: 3m measuring distance : + 4.06 dB Expanded uncertainty : - 3.98 dB Expanded uncertainty : + 2.032 dB Combined standard uncertainty : - 1.99 dB Combined standard uncertainty 10m measuring distance : + 3.98 dB Expanded uncertainty : - 4.08 dB Expanded uncertainty : + 1.99 dB Combined standard uncertainty : - 2.04 dB Combined standard uncertainty Log periodic Antenna: 3m measuring distance : + 4.74 dB Expanded uncertainty : - 3.26 dB Expanded uncertainty : + 2.37 dB Combined standard uncertainty : - 1.63 dB Combined standard uncertainty 10m measuring distance : + 3.06 dB Expanded uncertainty : - 3.00 dB Expanded uncertainty
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2.3 Laboratory Personnel

The three people of Hermon Laboratories that have participated in measurements and documentation preparation are: Dr. Edward Usoskin - Laboratory C.E.O., Mr. Michael Nikishin, test engineer, and Mrs. Marina Cherniavsky - certification engineer.

Dr. E. Usoskin is an EMC Specialist and M. Cherniavsky is a Telecommunication Engineer certified by the National Association of Radio and Telecommunications Engineers (NARTE, USA.).

The Hermon Laboratories' personnel that participated in this project have more than 70 years combined experience time in EMC measurements and electronic products design.



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Date: May, 1998
FCC ID: HNA2YUATL

2.4 Statement of Qualification

The test measurement data supplied in this test measurement report having been received by me, is hereby duly certified. The following is a statement of my qualifications. I am an engineer, graduated from university in 1996 with an MScEE degree, have obtained 1 year experience in EMC measurements and have been with Hermon Laboratories since 1998.

Name: Mr. Michael Nikishin
Position: test engineer

Signature: _____
Date: May 18, 1998

I hereby certify that this test measurement report was prepared by me and is hereby duly certified. The following is a statement of my qualifications.

I am an engineer, graduated from University in 1971, with an MScEE degree, have obtained 25 years experience in electronic products design and development and have been with Hermon Laboratories since 1991. Also, I am a Telecommunication Class II engineer certified by the National Association of Radio and Telecommunications Engineers, Inc. (USA.), the certificate no. is E2-03410.

Name: Mrs. Marina Cherniavsky
Position: certif. engineer

Signature: _____
Date: May 18, 1998

I hereby certify that this test measurement report was prepared under my direction and that to the best of my knowledge and belief, the facts set in the report and accompanying technical data are true and correct.

The following is a statement of my qualifications.

I have a Ph.D. degree in electronics, have obtained more than 41 years of experience in EMC measurements and electronic product design and have been with Hermon Laboratories since 1986.

Also, I am an EMC engineer certified by the National Association of Radio and Telecommunications Engineers, Inc. (USA). The certificate no. is EMC-000623-NE, Senior Member.

Name: Dr. Edward Usoskin
Position: C.E.O.

Signature: _____
Date: May 18, 1998



3 Radiated Emission Measurements

3.1 Field Strength of Emissions according to § 15.245 (b)

3.1.1 Specified Limits

Fundamental Frequency	Field Strength of Fundamental @3 m distance	Calculated Field Strength of Fundamental @1 m distance	Field Strength of Spurious Emissions @3 m distance	Calculated Field Strength of Spurious Emissions @1 m distance
GHz	dB (µV/m)	dB (µV/m)	dB (µV/m)	dB (µV/m)
10.5-10.55	128	137.5	88	97.5

3.1.2 Test Procedure and Results

The test was performed in the Hermon Labs Open Field Test Site at 1 meter and 0.3 meter test distances (i.e. the distance between measuring antenna and EUT boundary), because the signal levels were not detected by the measurement equipment at 3 m specified distance. The results were extrapolated using linear-distance extrapolating factor.

The EUT was installed on the 0.8 m high wooden table which was on the top of the metal turntable flush mounted with the ground plane as shown in Photograph 3.1.1. Log Periodic and Double Ridged Guide antennas were used. To find the maximum radiation measuring antenna height was changed from 0.8 to 4 m, the turntable was rotated 360° and the antennas polarization was changed from vertical to horizontal. The EUT was operated in continuous transmitting mode and the frequency range up to 5th harmonic (52.5 GHz) was investigated.

The peak detector was used. The test results were recorded into Table 3.1 and are shown in Plots 3.1.1 to 3.1.4. The plots correspond to the different Spectrum Analyzer settings.

Reference numbers of test equipment used

HL 0025	HL 0041	HL 0275	HL 0593	HL 0661	HL 0739	HP 8565E
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Full description is given in Appendix A.



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Date: May, 1998
FCC ID: HNA2YUATL

Table 3.1

Radiated Emission Measurements - Test Results
(Field strength of fundamental frequency)

TEST SPECIFICATION: FCC part 15 subpart C § 15.245(b)
COMPANY: Electronics Line Ltd.
EUT: ATLAS alarm sensor unit
DATE: April 20, 1998
RELATIVE HUMIDITY: 41%
AMBIENT TEMPERATURE: 23°C

128 @ 3m

MEASUREMENTS PERFORMED AT 1 METER DISTANCE

Frequency	Detector Type	RBW	VBW	Measured Result	Antenna Factor	Cable Loss and Amplifier Gain	Radiated Emissions	Limit @ 1 m distance	Spec. Margin	Pass/Fail
GHz		MHz		dB (μV)	dB (1/m)	dB	dB (μV/m)	dB (μV/m)	dB	
10.528	Peak	1	1 MHz	85.4	42.5	-4.5	123.4	157.5	34.1	Pass
10.528	Average	1	10 Hz	47.0	42.5	-4.5	85.0	137.5 ✓	52.5	Pass

MEASUREMENTS PERFORMED AT 0.3 METER DISTANCE

Frequency	Detector Type	RBW	VBW	Measured Result	Antenna Factor	Cable Loss and Amplifier Gain	Radiated Emissions	Limit @ 0.3 m distance	Spec. Margin	Pass/Fail
GHz		MHz		dB (μV)	dB (1/m)	dB	dB (μV/m)	dB (μV/m)	dB	
21.056	Peak	1	1 MHz	61.8	50.5	-6.9	105.4	128.0	22.6	Pass
21.056	Average	1	10 Hz	47.1	50.5	-6.9	90.7	108.0	17.3	Pass

Notes to Table:

Antenna type - Double Ridged Guide Antenna
Antenna polarization = Horizontal
Limit is calculated for 1 m and 0.3 m test distances

Table Abbreviations:

RBW - Resolution Bandwidth
VBW - Video Bandwidth
Spec. Margin = Specification Margins = dB below (negative if above) specification limit.

Test Performed by:
Mr. Michael Nikishin, test engineer

Hermon Labs

Customer Representative person:
Mr. Shaul Aviezer, QA Manager

Electronics Line Ltd.



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Test Report: ELLTX.12831

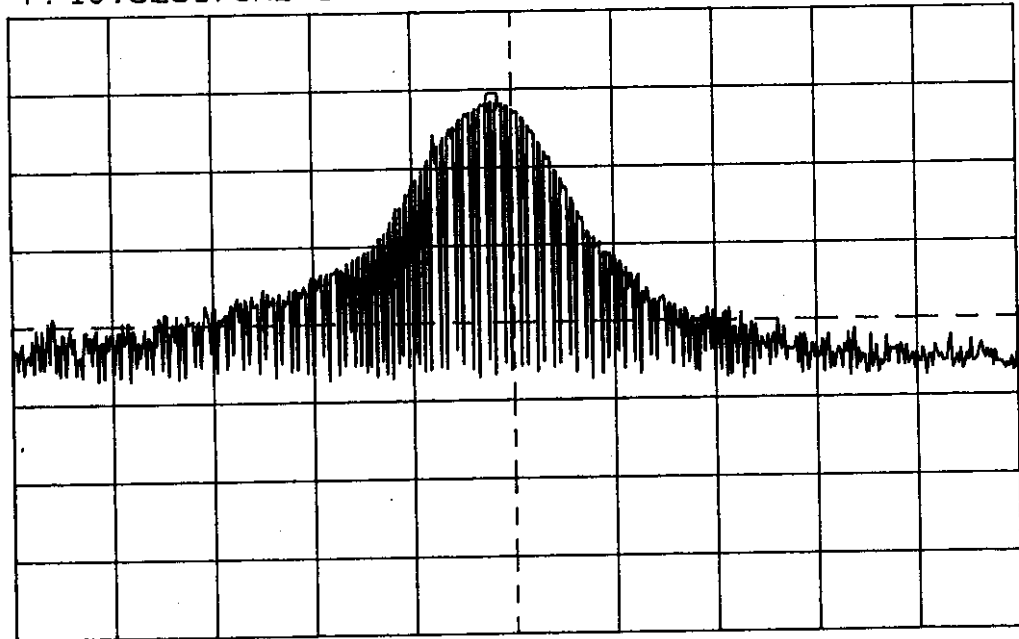
Date: May, 1998

FCC ID: HNA2YUATL

Plot 3.1.1
Radiated Emission Measurement Results
at 1 meter distance

MK: 10.527970GHz - 21.6dBm

F: 10.52817GHz SP: 1.00MHz/ RL: -.. 10 dBm 10dB/ 2-



RBW: 1MHz VBW: 1MHz SWP: 10mS/@ ATT: 10dB@

Woo



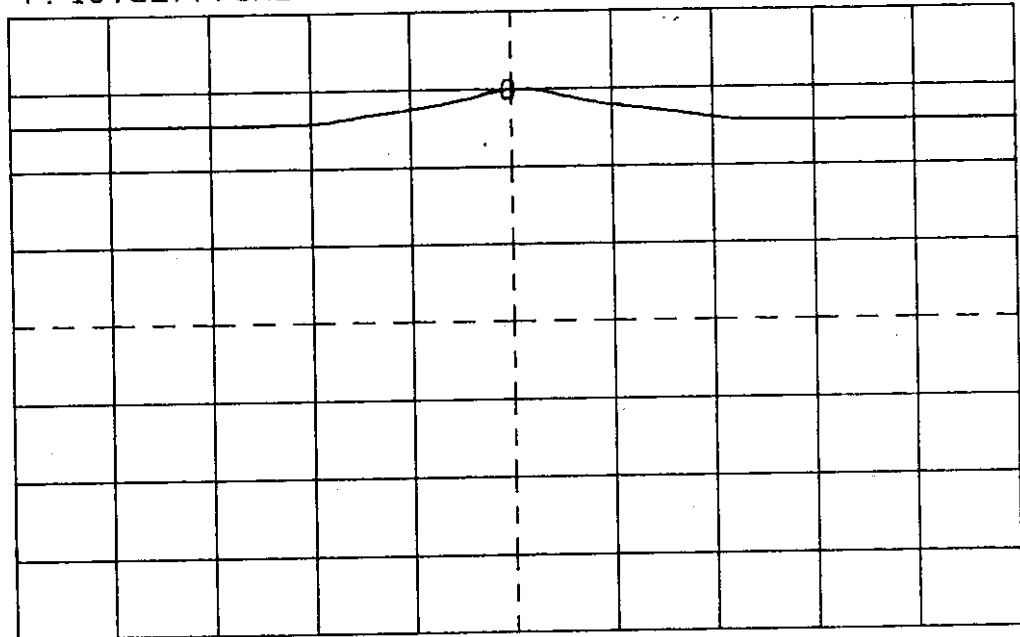
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FCC ID: HNA2YUATL

Plot 3.1.2
Radiated Emission Measurement Results
at 1 meter distance

MK: 10.527730GHz - 60.0dBm

F: 10.52777GHz SP: 1.00MHz/ RL: - 50 dBm 10dB/ 2-



RBW: 1MHz VBW: 10 Hz SWP: 600mS/@ ATT: 10dB@



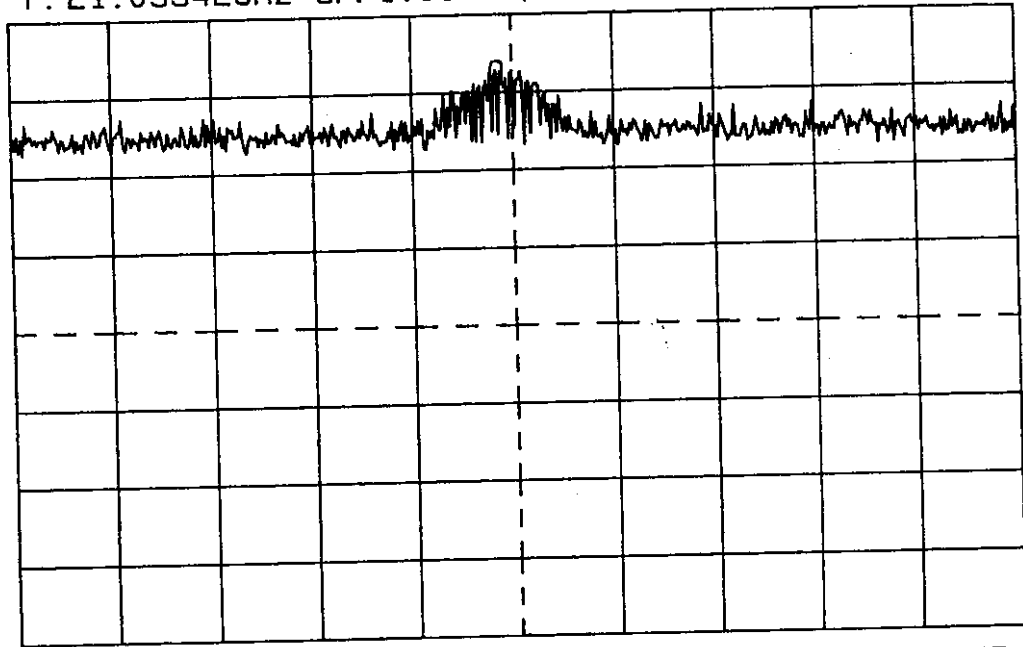
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Plot 3.1.3
Radiated Emission Measurement Results
at 0.3 meter distance

MK: 21.055267GHz - 45.2dBm

F: 21.05542GHz SP: 1.00MHz/ RL: -- 38 dBm 10dB/ 4+



RBW: 1MHz VBW: 1MHz SWP: 10mS/ø ATT: 0dB



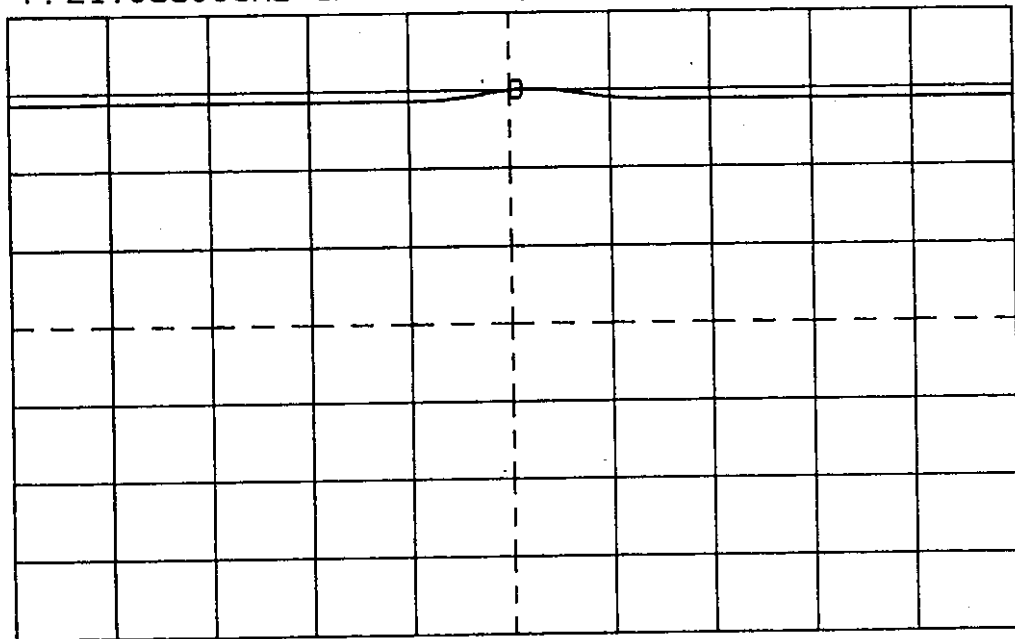
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Test Report: ELLTX.12831
Date: May, 1998
FCC ID: HNA2YUATL

Plot 3.1.4
Radiated Emission Measurement Results
at 0.3 meter distance

MK: 21.055067GHz - 59.9dBm

F: 21.05500GHz SP: 1.00MHz/ RL: - 50 dBm 10dB/ 4+



RBW: 1MHz VBW: 10 Hz SWP: 600ms/° ATT: 0dB



3.2 Unintentional Radiated emissions (class B digital device) test according to §15.109

3.2.1 Definition of the test

This test was performed to measure radiated emissions from the incorporated digital device of the EUT and also to verify the EUT full compliance with §15.109.

Radiated emission measurements specification limits are given in Table 3.2.1 below:

Table 3.2.1 Limits for Electric field strength at 3 meters distance, quasi-peak detector

Frequency MHz	Class B Equipment dB ($\mu\text{V/m}$)
30 - 88	40
88 - 216	43.5
216 - 960	46
960 - 5000	54

3.2.2 Test Procedure and Results

The radiated emissions measurements of the EUT incorporating digital device in the frequency range from 30 MHz to 1 GHz were performed in the anechoic chamber at 3 meters measuring distance. The EUT was placed on the wooden table as shown in Figure 3.2.1 and Photograph 3.2.1.

The Biconilog antenna was used. To find maximum radiation the turntable was rotated 360°, the cables position was varied, the measuring antenna height changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal. The quasi-peak detector with resolution bandwidth (IF BW) of 120 kHz was used.

The results of measurements were recorded into Table 3.2.2 and shown in Plot 3.2.1.

Reference numbers of test equipment used

HL 0275	HL 0465	HL 0521	HL 0593	HL 0604		
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Full description is given in Appendix A.



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Table 3.2.2
Radiated Emission Measurements - Test Results
(Electric Field, frequency range 30 MHz - 1 GHz)

TEST SPECIFICATION: FCC part 15, Class B
COMPANY: Electronics Line Ltd.
EUT: ATLAS alarm sensor unit
DATE: April 9, 1998
RELATIVE HUMIDITY: 50%
AMBIENT TEMPERATURE: 21°C

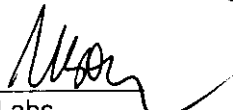
MEASUREMENTS PERFORMED AT 3 METERS DISTANCE

Frequency MHz	Antenna Polarization	Antenna Height m	TT Position (°)	Radiated Emissions dB (µV/m)	Specification Limit dB (µV/m)	Specification Margin dB	Pass/ Fail
37.88	V	1	286	21.7	40.0	18.3	Pass
47.36	V	1	272	23.0	40.0	17.0	Pass
59.97	V	1	287	17.3	40.0	22.7	Pass
123.134	H	3.6	274	16.8	43.5	26.7	Pass
161.01	V	1	282	15.3	43.5	28.2	Pass
170.50	V	1	234	15.9	43.5	27.5	Pass

Notes to Table:

The measurements were performed with quasi-peak detector, resolution bandwidth = 120 kHz
Antenna Type - biconilog
Antenna Polarization = V-vertical, H-horizontal
TT Position - turntable position in degrees (EUT front panel = 0°)
Specification Margins = dB below (negative if above) specification limit.

Test Performed by:
Mr. Michael Nikishin, test engineer


Hermon Labs

Customer Representative Person:
Mr. Shaul Aviezer, QA Manager


Electronics Line Ltd.



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Plot 3.2.1 Radiated Emission Measurement Results

18:34:02 APR 09, 1998
ELECTRONIC LINE, ATLAS 1650, Pr. 12031, FCC 15 cl.B, RE 3m

ACTV DET: PEAK
MEAS DET: PEAK QP
MKR 47.1 MHz
23.65 dB μ V/m

MEASURE
AT MKR

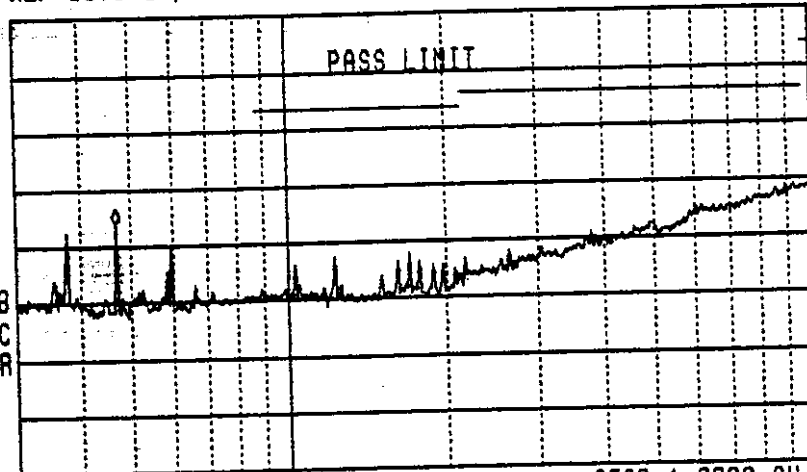
ADD TO
LIST

LOG REF 60.0 dB μ V/m
10
dB/
#ATN
0 dB

PREAMP ON

MARKER
NORMAL

MA SB
SC FC
ACORR



MARKER
▲

MARKER
AMPTD

SELECT
1 2 3 4

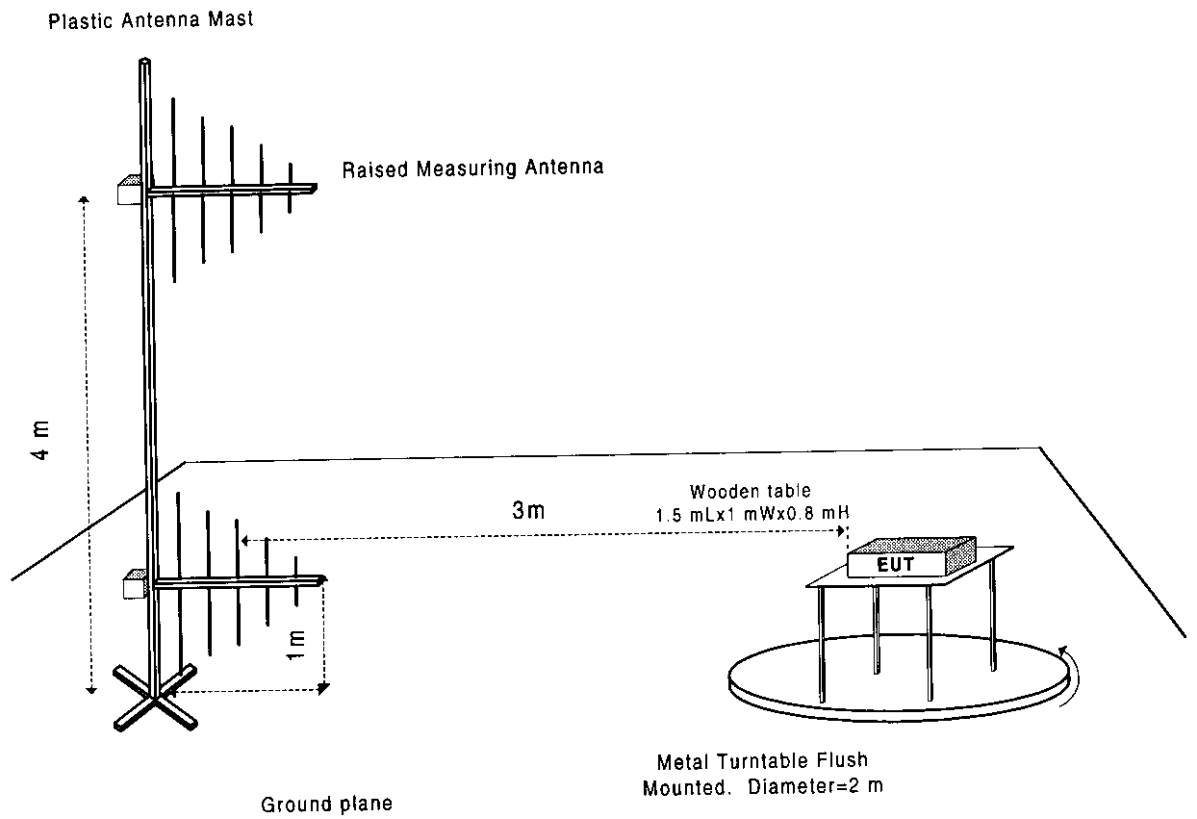
MARKER 1
ON OFF

START 30.0 MHz #IF BW 120 kHz AVG BW 300 kHz STOP 1.0000 GHz SWP 909 msec

More
1 of 2



Figure 3.2.1
Radiated Emission Test Setup





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4 Summary and Signatures

The ATLAS alarm sensor unit, FCC ID:HNA2YUATL was found to be in compliance with the requirements of FCC part 15, subpart C, § 15.245 and subpart B, § 15.109.

↑
Test performed by:

Mr. Michael Nikishin, test engineer



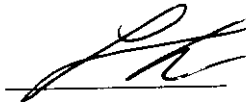
Approved by:

Dr. Edward Usoskin, C.E.O.



Responsible Person from Electronics Line Ltd.

Mr. Shaul Aviezer, QA Manager





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APPENDIX A - Test equipment and ancillaries used for tests

HL Serial No.	Serial No.	Description	Manufacturer	Model No.	Due Calibr.
0025	5837	Spectrum Analyzer, 10 kHz-23 GHz	Anritsu	MS-710C	8/98
0041	2811	Double Ridged Guide Antenna, 1 - 50 GHz	Electro-Metrics	RGA 50/60	8/98
0275	0275	Wooden Table, 1.5 x 1.0 x 0.8	Hermon Labs	NA	NA
0465	0465	Anechoic Chamber 9 mL x 6.5 mW x 5.5 mH	Hermon Labs	NA	10/99
0521	0319	Spectrum Analyzer with RF filter section (EMI Receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	7/98
0593	593	Antenna Mast, 1-4 m/ 1-6 m Pneumatic	Hermon Labs	HLAM-F1	NA
0604	1011	Antenna Log-Periodic/T Bow-Tie, 26 - 2000 MHz	EMCO	3141 BICONILOG	12/98
0661	0266	Generator Swept Signal, 10 MHz-40 GHz + 10 dBm	Hewlett Packard	83640B	5/99
0739	391	Antenna Log-Periodic 1-19 GHz	A.H. Systems	SAS-200/518	12/98
	0347	Spectrum Analyzer, 0.1 - 50 GHz	Hewlett Packard	8565E	3/99



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APPENDIX B-Test Equipment Correction Factors

Antenna Factor at 3m calibration
Biconilog Antenna EMCO Model 3141
Ser.No.1011

Frequency, MHz	Antenna Factor, dB(1/m)
26	7.8
28	7.8
30	7.8
40	7.2
60	7.1
70	8.5
80	9.4
90	9.8
100	9.7
110	9.3
120	8.8
130	8.7
140	9.2
150	9.8
160	10.2
170	10.4
180	10.4
190	10.3
200	10.6
220	11.6
240	12.4
260	12.8
280	13.7
300	14.7
320	15.2
340	15.4
360	16.1
380	16.4
400	16.6
420	16.7
440	17.0
460	17.7
480	18.1
500	18.5
520	19.1
540	19.5
560	19.8
580	20.6
600	21.3
620	21.5
640	21.2
660	21.4
680	21.9
700	22.2
720	22.2
740	22.1
760	22.3
780	22.6
800	22.7
820	22.9
840	23.1
860	23.4
880	23.8
900	24.1
920	24.1

Antenna factor is to be added to receiver meter reading in dB(μ V) to convert to field intensity in dB(μ V/meter).



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Antenna Factor at 3m calibration
Biconilog Antenna EMCO Model 3141
Ser.No.1011
(cont'd)

Frequency, MHz	Antenna Factor, dB(1/m)
940	24.0
960	24.1
980	24.5
1000	24.9
1020	25.0
1040	25.2
1060	25.4
1080	25.6
1100	25.7
1120	26.0
1140	26.4
1160	27.0
1180	27.0
1200	26.7
1220	26.5
1240	26.5
1260	26.5
1280	26.6
1300	27.0
1320	27.8
1340	28.3
1360	28.2
1380	27.9
1400	27.9
1420	27.9
1440	27.8
1460	27.8
1480	28.0
1500	28.5
1520	28.9
1540	29.6
1560	29.8
1580	29.6
1600	29.5
1620	29.3
1640	29.2
1660	29.4
1680	29.6
1700	29.8
1720	30.3
1740	30.8
1760	31.1
1780	31.0
1800	30.9
1820	30.7
1840	30.6
1860	30.6
1880	30.6
1900	30.6
1920	30.7
1940	30.9
1960	31.2
1980	31.6
2000	32.0



HERMON LABORATORIES

Test Report: ELLTX.12831
Date: May, 1998
FCC ID: HNA2YUATL

Antenna Factor
Double Ridged Guide Antenna
Electro-Metrics, Model RGA-50/60
Ser.No.2811

Frequency, MHz	Antenna Factor, dB(1/m)
1000	24.3
1500	25.4
2000	28.4
2500	29.2
3000	30.5
3500	31.6
4000	33.7
4500	32.2
5000	34.5
5500	34.5
6000	34.6
6500	35.3
7000	35.5
7500	35.9
8000	36.6
8500	37.3
9000	37.7
9500	37.7
10,000	38.2
10,500	38.5
11,000	39.0
11,500	40.1
12,000	40.2
12,500	39.3
13,000	39.9
13,500	40.6
14,000	41.1
14,500	40.5
15,000	39.9
15,500	37.8
16,000	39.1
16,500	41.1
17,000	41.7
17,500	45.1
18,000	44.3
20,000	45.0
30,000	45.0
40,000	45.0
50,000	45.0

Antenna factor dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/meter)



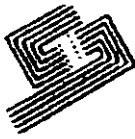
HERMON LABORATORIES

Test Report: ELLTX.12831

Date: May, 1998

FCC ID: HNA2YUATL

Antenna Factor
Log Periodic Antenna
A.H.Systems, Inc., Model SAS-200/518
Ser.No.391



A.H. Systems, Inc.

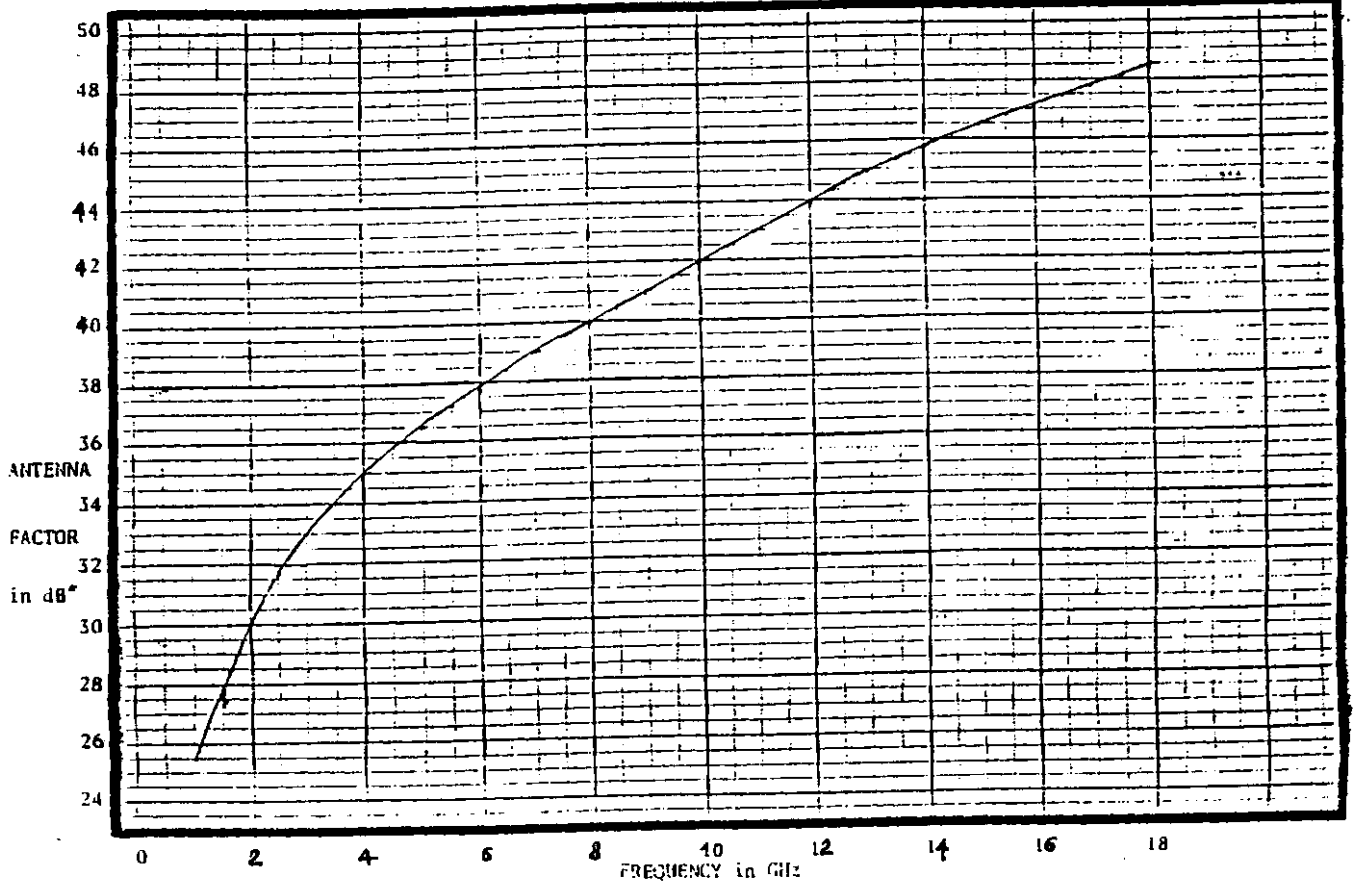
9710 Corycroft Avenue
Chatsworth, California 91311
(818) 998-0223

ANTENNA FACTORS - 1 METER

LOG PERIODIC ANTENNA

MODEL SAS-200/518 SN.

CONVERSION OF
ANTENNA FACTORS
TO FIELD STRENGTH
 $J\mu V + AF^2 = dB\mu V/M$



FCC requirements § 2.1033 (b)(7)

DEVICE PHOTOGRAPHS

Contains 9 pages follow this page.



3 Radiated Emission Measurements

3.1 Field Strength of Emissions according to § 15.245 (b)

3.1.1 Specified Limits

Fundamental Frequency	Field Strength of Fundamental @3 m distance	Calculated Field Strength of Fundamental @ 1 m distance	Field Strength of Spurious Emissions @3 m distance	Calculated Field Strength of Spurious Emissions @1 m distance
GHz	dB (µV/m)	dB (µV/m)	dB (µV/m)	dB (µV/m)
10.5 -10.55	128	137.5	88	97.5

3.1.2 Test Procedure and Results

The test was performed in the Hermon Labs Open Field Test Site at 1 meter and 0.3 meter test distances, i.e. the distance between measuring antenna and EUT boundary. The EUT was installed on the 0.8 m high wooden table which was on the top of the metal turntable flush mounted with the ground plane as shown in Photograph 3.1.1. Log Periodic and Double Ridged Guide antennas were used. To find the maximum radiation measuring antenna height was changed from 0.8 to 4 m, the turntable was rotated 360° and the antennas polarization was changed from vertical to horizontal. The EUT was operated in continuous transmitting mode and the frequency range up to 5th harmonic (52.5 GHz) was investigated. The peak detector was used. The test results were recorded into Table 3.1 and are shown in Plots 3.1.1 to 3.1.2.

Reference numbers of test equipment used

HL 0025	HL 0041	HL 0275	HL 0593	HL 0661	HL 0739	HP 8565E
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Full description is given in Appendix A.



Table 3.1

Radiated Emission Measurements - Test Results
(Field strength of fundamental frequency)

TEST SPECIFICATION: FCC part 15 subpart C § 15.245(b)
COMPANY: Electronics Line Ltd.
EUT: ATLAS alarm sensor unit
DATE: April 20, 1998
RELATIVE HUMIDITY: 41%
AMBIENT TEMPERATURE: 23°C

128 + 9.5

MEASUREMENTS PERFORMED AT 1 METER DISTANCE

Frequency GHz	Detector Type	RBW/ VBW MHz	Measured Result dB (µV)	Antenna Factor dB (1/m)	Cable Loss and Amplifier Gain dB	Average Factor dB	Radiated Emissions dB (µV/m)	Limit @ 1 m distance dB (µV/m)	Spec. Margin dB	Pass/ Fail
10.528	Peak	1/1	85.4	42.5	-4.5	20	103.4	137.5	34.1	Pass
10.528	Peak	1/1	85.4	42.5	-4.5	NA	123.4	157.5	34.1	Pass

MEASUREMENTS PERFORMED AT 0.3 METER DISTANCE

88 + 20

Frequency GHz	Detector Type	RBW/ VBW MHz	Measured Result dB (µV)	Antenna Factor dB (1/m)	Cable Loss and Amplifier Gain dB	Average Factor dB	Radiated Emissions dB (µV/m)	Limit @ 0.3 m distance dB (µV/m)	Spec. Margin dB	Pass/ Fail
21.056	Peak	1/1	61.8	50.5	-6.9	20	85.4	108.0	22.6	Pass
21.056	Peak	1/1	61.8	50.5	-6.9	NA	105.4	128.0	22.6	Pass

Notes to Table:

Antenna type - Double Ridged Guide Antenna

Antenna polarization = Horizontal

Limit is calculated for 1 m and 0.3 m test distances

Radiated Emission dB(µV/m) = Measured Results dB(µV) + Antenna Factor dB(1/m) + Average Factor + Cable Loss & Amplifier Gain

Average factor (duty cycle correction factor) is 20 dB, see plots 3.1.3, 3.1.4

Table Abbreviations:

RBW - Resolution Bandwidth

VBW - Video Bandwidth

Spec. Margin = Specification Margins = dB below (negative if above) specification limit.

Test Performed by:
Mr. Michael Nikishin, test engineer

Customer Representative person:
Mr. Shaul Aviezer, QA Manager

Hermon Labs

Electronics Line Ltd.



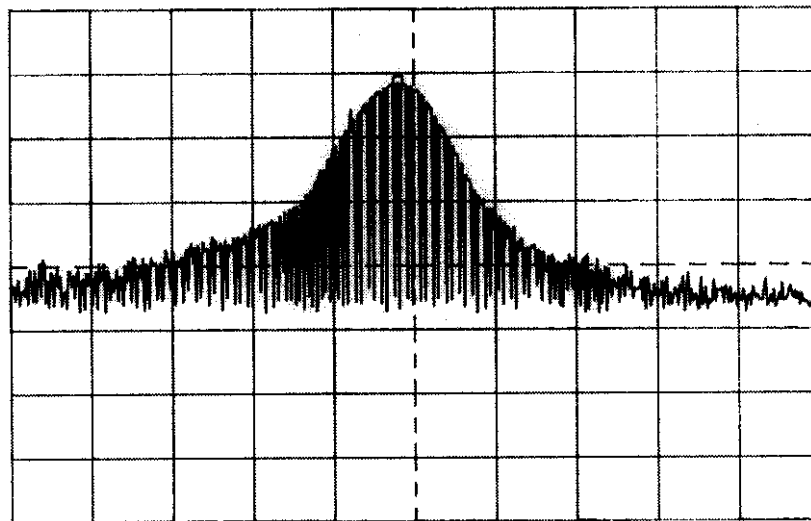
Plot 3.1.1
Radiated Emission Measurement Results
at 1 meter distance

20.04.98 Electronic line, Atlas 1650, Pt. 12831, FCC 15.245

*Hor. pol.
D = 1m
Ext. gain = 4.5 dB*

MK: 10.527970GHz - 21.6dBm

F: 10.52817GHz SP: 1.00MHz/ RL: - 10 dBm 10dB/ 2-



RBW: 1MHz VBW: 1MHz SWP: 10mS/@ ATT: 10dB@



HERMON LABORATORIES

Test Report: ELLTX.12831

Date: May, 1998

FCC ID: HNA2YUATL

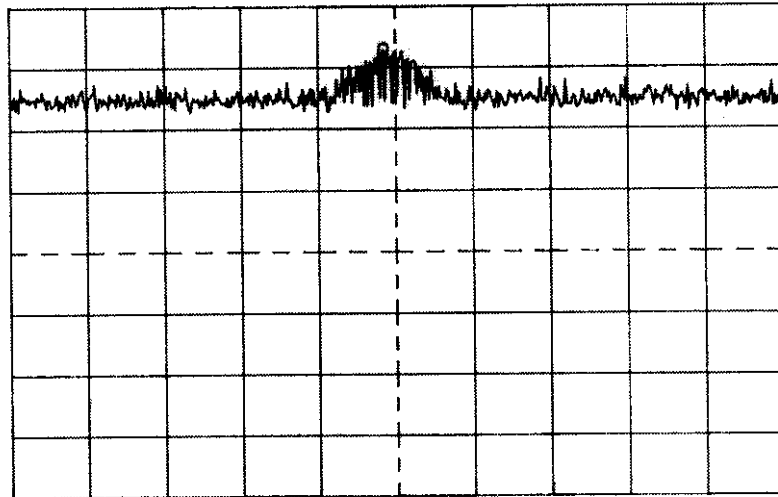
Plot 3.1.2
Radiated Emission Measurement Results
at 0.3 meter distance

20.04.98 Electronic line, Atlas 1650, Pt. 12831, FCC 15.245

*Hor. pol.
D = 0,3 m
Erl. gain = 6,9 dB*

MK: 21.055267GHz - 45.2dBm

F: 21.05542GHz SP: 1.00MHz/ RL: - 38 dBm 10dB/ 4+



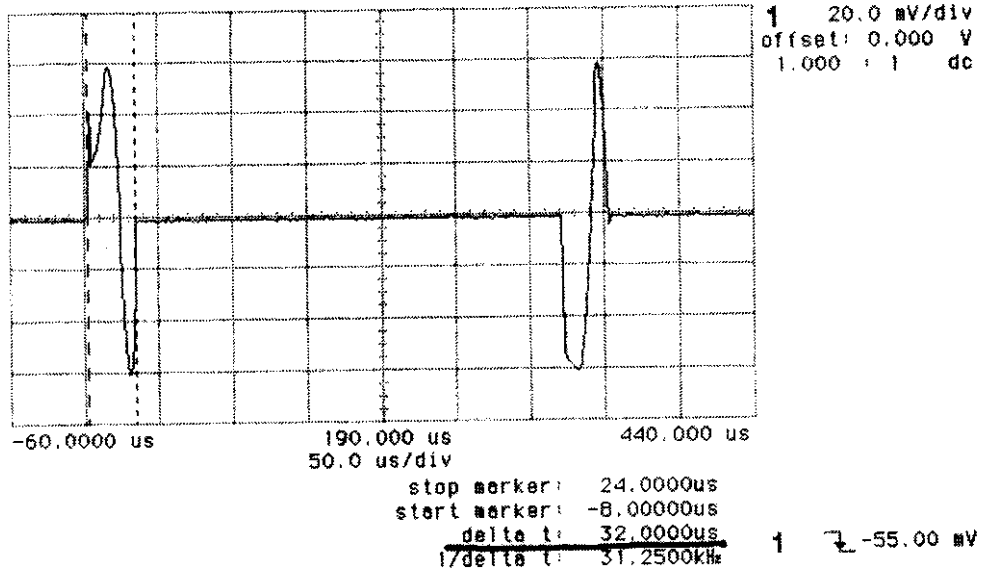
RBW: 1MHz VBW: 1MHz SWP: 10mS/@ ATT: 0dB



Plot 3.1.3
Duty Cycle Measurement Results

*9/03/98 Electronics line, EUT-Atlas 1650, P. 12831
Duty cycle average factor.*

no stopped

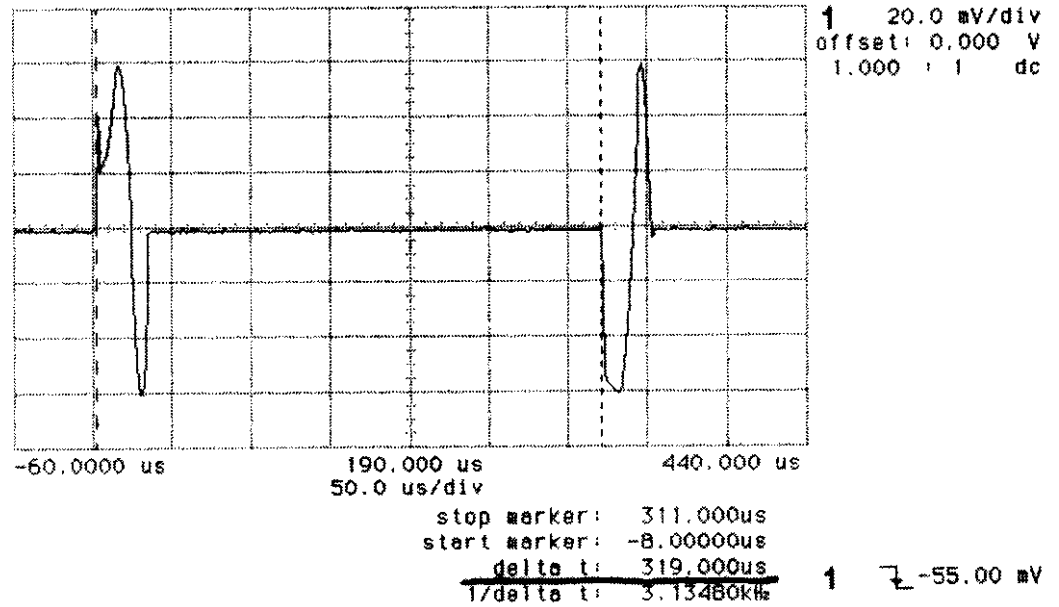


AA



Plot 3.1.4
Duty Cycle Measurement Results

hp stopped



$$Avr. fact. = 20 \log \frac{319}{32} \approx 20 \text{ dB}$$



Attachment to Test Report ELLTX.12831

3.3 Emissions Radiated Outside of the Specified Frequency Band according to § 15.245 (b)(3)

3.3.1 Specified Limits

Emissions radiated outside of the 10500-10550 MHz frequency band, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

3.3.2 Test Results

The test procedure is the same, as described in paragraph 3.1.1. The test results are shown in plots 3.3.1, 3.3.2. To withstand the standard requirements the 47 nF capacitor was installed on the DC power input of the sensor. All the measured emissions were found at least 55.8 dB below the level of the fundamental frequency (worst case result, @10500 MHz).

Reference numbers of test equipment used

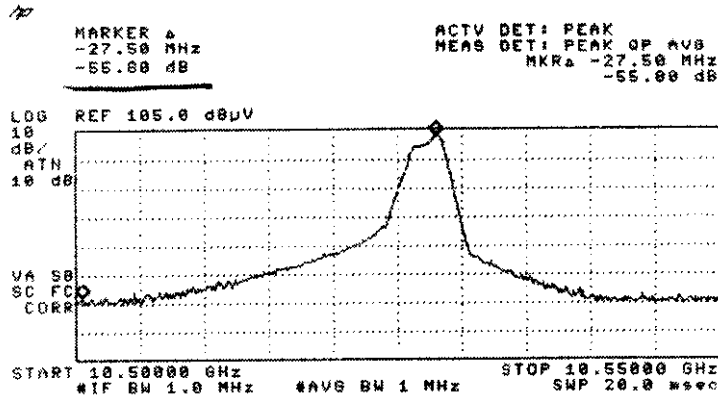
HL 0025	HL 0041	HL 0275	HL 0593	HL 0661	HL 0739	HP 8565E
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Full description is given in Appendix A.



Plot 3.3.1
Fundamental Emission Measurement Results
@ 10500 MHz bandedge

*13/08/98 Electronics line, EUT-Atlas 1650, Pt. 12831
Bandedges attenuation. Att lim \geq 50 dB*



FOR T. R.

Pass

