FCC requirements § 2.1033 (b)

NOGA NEGEV INNOVATION Ltd.

TECHNICAL REPORT

FCC requirements § 2.1033 (b)(1)

The applicant and the manufacturer is the same company
Noga Negev Innovation Ltd.

Address	:Midreshet Sde-Boker,
City	:Sde-Boker
Zip code	:84990
State	:Israel
Telephone number	011-972-7657 0053
Telefax number	011-972-7655 8068
Responsible person	:Mr. Menachem Barash, Manager

FCC requirements § 2.1033 (b)(3)

INSTALLATION INSTRUCTIONS

Installation Instructions furnished to the user of the radio transmitting device follow this page and contain 2 pages.

FCC requirements § 2.1033 (b)(7)

DEVICE PHOTOGRAPHS

Contains 1 page follows this page.

FCC requirements § 2.1033 (b) (8), (9), (10), (11), (12), c.

FCC requirements mentioned above are not applicable to this application for certification.

FCC requirements § 2.1033 (b)(6)

TEST MEASUREMENT REPORT

Contains 26 pages and follows this page.

HERMON LABORATORIES

Test Report:NOGTX.12579
Date: February, 1998
Total 26 pages
FCC ID: NRV-HBLTX

ELECTROMAGNETIC EMISSIONS TEST REPORT

ACCORDING TO FCC PART 15, SUBPART C, §15.231

FOR

NOGA NEGEV INNOVATION Ltd.

EQUIPMENT UNDER TEST

HBL TRANSMITTER

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. M. Barash, Manager
Noga Negev Innovation Ltd.

Hermon Laboratories Ltd.
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Email:hermon@Netvision.net.il

ACCREDITED
839.01

Description of equipment under test

Test items	Low Power Transmitter, FCC ID:NRV-HBLTX
Manufacturer	Noga Negev Innovation Ltd.
Brand Mark	Noga Negev
Type (Model)	HBL

Applicant information

Applicant's representative	Mr. Igor Shalaev, Engineer
Responsible person	Mr. Menachem Barash, Manager
Company	Noga Negev Innovation Ltd.
Address	Midreshet Sde-Boker
P.O. Box	NA
Postal code	84990
City	Sde-Boker
Country	Israel
Telephone number	011-972-7657 0053
Telefax number	011-972-7655 8068

Test performance

Project Number	12579
Test facility and its location	Hermon Laboratories, Binyamina, Israel
Test started	December 30, 1997
Test completed	January 6, 1998
Purpose of test	The EUT certification in accordance with CFR 47, part 2, §2.1033
Test specification(s)	FCC part 15, subpart C, §15.231

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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
BW	bandwidth
cm	centimeter
dB	decibel
dB(μV)	decibel referred to one microvolt
dB(μV/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
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

1.2 Specification References

CFR 47 part 15:1997	Radio Frequency Devices
ANSI C63.2:06/1987	American National Standard for Instrumantation-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 HBL transmitter is a part of helmet brake light system which is a product for two-wheel vehicles. The rear red brake light, mounted on the rider's helmet (receiver), is connected via a wireless control to the original rear brake light, mounted on the vehicle (transmitter). When the rider presses the vehicle brake pedal, both brake lights operate simultaneously.
The transmitter operates at 433.92 MHz frequency and is powered by 12 V battery.
The HBL is a transmitter, activated by the switch installed on a foot brake pedal, which ceases operation immediately by disconnecting the battery when the switch is released.

1.4 Statement of Manufacturer

I, Menachem Barash, Manager of Noga Negev Innovation Ltd., declare that the HBL transmitter FCC ID:NRV-HBLTX was tested on December 30, 1997 and January 6, 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.

Menachem Barash, Manager
Noga Negev Innovation Ltd.

Signature: _____

Date: _____

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

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 Feldman, test technician, 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 90 years combined experience time in EMC measurements and electronic products design.

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 a technician, have obtained 28 years experience in electronics and measurements.
I have been with Hermon Laboratories since 1995.

Name: Mr. Michael Feldman
Position: test technician
Signature:
Date: February 26, 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: February 26, 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: February 26, 1998

3 Radiated Emission Measurements

3.1 Field Strength of Emissions according to § 15.231 (b)

3.1.1 Specified Limits at 3 m distance

Fundamental Frequency (MHz)	Field Strength of Fundamental (dB μV/m)	Field Strength of Spurious Emissions (dB μV/m)
260 - 470	71.5 to 82*	51.5 to 62*
above 470	82	62

* - Linear interpolations

3.1.2 Test Procedure and Results

The test was performed in the Hermon Labs anechoic chamber at 3 meter test distance, i.e. the distance between measuring antenna and EUT boundary.
The EUT was placed on the wooden turntable, as shown in Figure 3.1 and Photographs 3.1.1, 3.1.2, and 3.1.3. The EUT was operated in continuous transmitting mode and measured in three orthogonal axes during the testing. The frequency range from 30 MHz up to 10^{th} harmonic was investigated.
Biconilog and Double Ridged Guide antennas were used. To find maximum radiation the turntable was rotated 360^{o}, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.
The quasi-peak detector was used at frequencies below 1 GHz. Above 1 GHz the peak detector with resolution bandwidth (IF BW) = 1 MHz and video bandwidth (AVR BW) = 1 MHz was used. All the measured emission results were at least 20 dB below average limit.
The test results were recorded into Table 3.1 and are shown in Plots 3.1.1 to 3.1.2. The plots correspond to the different Spectrum Analyzer settings.

3.1.3 Periodic Operation Requirement §15.231(a)(1)

The EUT is a transmitter, activated by the switch installed on a foot brake pedal, which ceases operation immediately by disconnecting the battery when the switch is released.

Reference numbers of test equipment used

HL 0041	HL 0275	HL 0465	HL 0521	HL 0593	HL 0604	

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 § 15.231(b)
COMPANY:	Noga Negev Innovation Ltd.
EUT:	HBL Transmitter
DATE:	December 30, 1997
RELATIVE HUMIDITY:	63%
AMBIENT TEMPERATURE:	18°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency MHz	Resolution Bandwidth kHz	Detector Type	Antenna Type.	Antenna Polarization	Measured Result dB (µV)	Specification Limit dB (µV/m)	Specification Margin dB	Pass/ Fail
434.109	120	QP	BL	H	72.1	80.8	8.7	Pass
1 GHz - 6.5 GHz	120	Peak	Horn	V+H	20 dB below limit	60.8	20 dB minimum	Pass

Notes to Table:

Antenna polarization = H- horizontal, V-vertical.
Specified Limit in accordance with § 15.231(b)

Table Abbreviations:
Ant. Type - = Antenna type (BL -Biconilog).
Spec. Margin = Specification Margins = dB below (negative if above) specification limit.

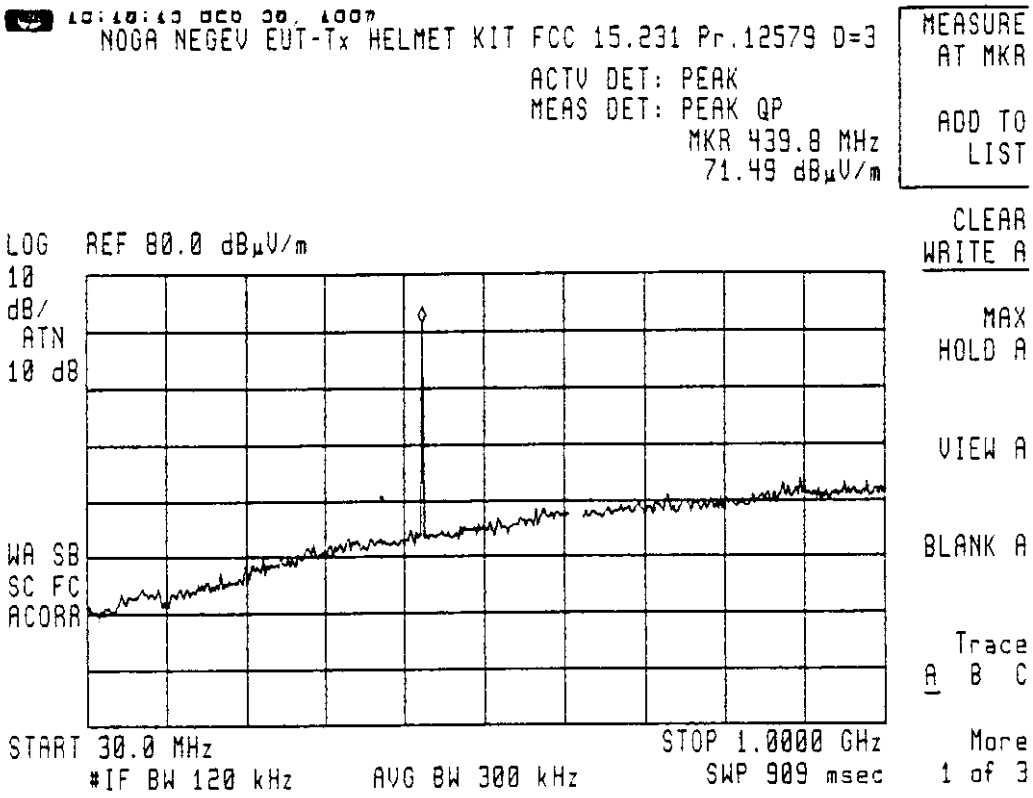
Test Performed by:
Mr. Michael Feldman, test technician

Hermon Labs

Customer Representative person:
Mr. Igor Shalaev, Engineer

Noga Negev Innovation Ltd.

Plot 3.1.1
Radiated Emission Measurement Results



Signal Number	Frequency (MHz)	QP (dBuV)	QP Delta L 1 (dB)	Av Delta L 2 (dB)	Corr (dB)
1	434.108759	72.1	-8.4		19.0

Plot 3.1.2
Radiated Emission Measurement Results

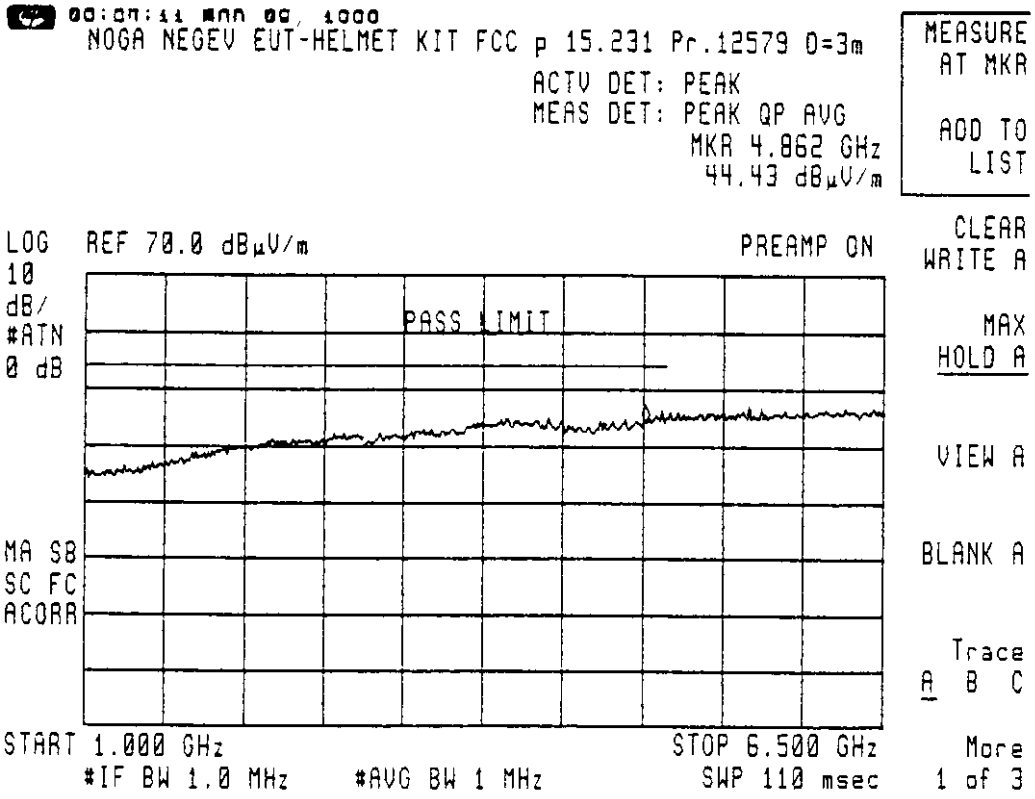
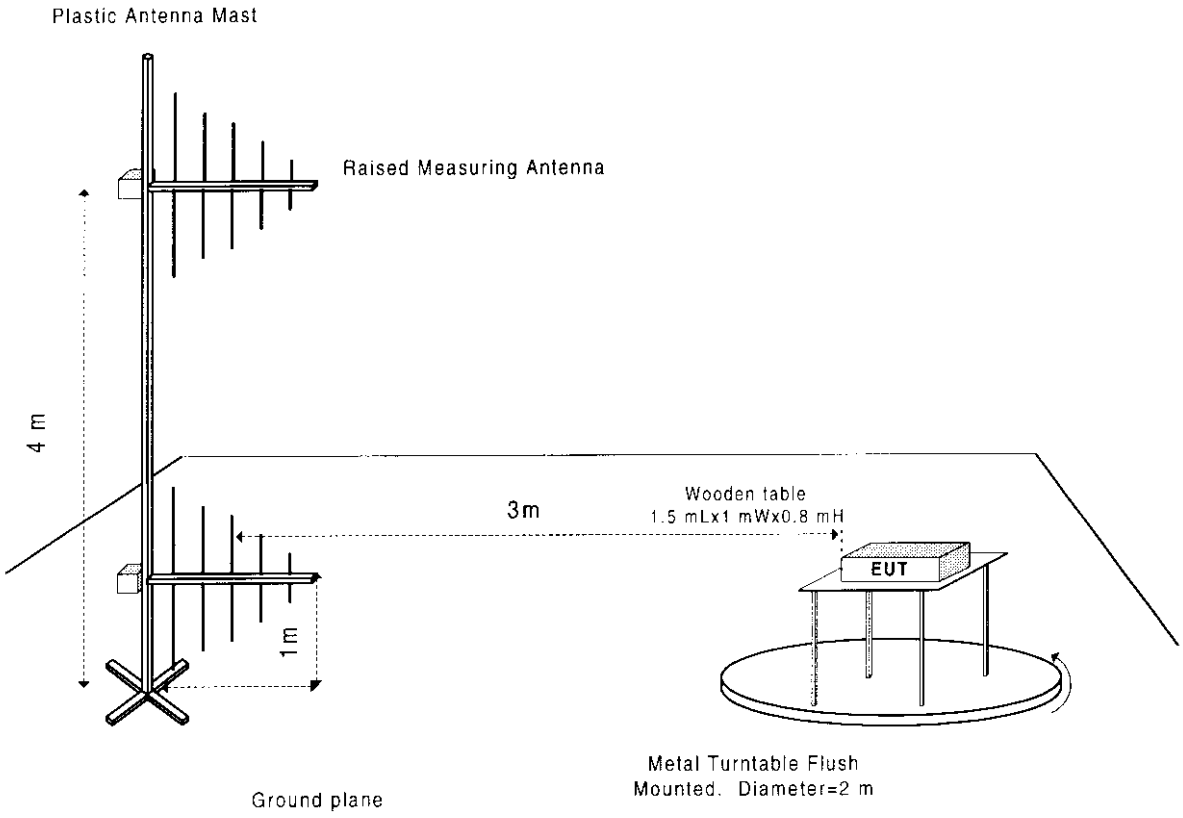


Figure 3.1
Radiated Emission Test Setup



3.2 Bandwidth of Emission according to § 15.231 (c)

3.2.1 Specified Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

3.2.2 Test Procedure and Results

To comply with the provision for the occupied bandwidth the maximum bandwidth was calculated as 0.0025 of the center frequency:

0.0025 x 433.92 MHz = 1.08 MHz

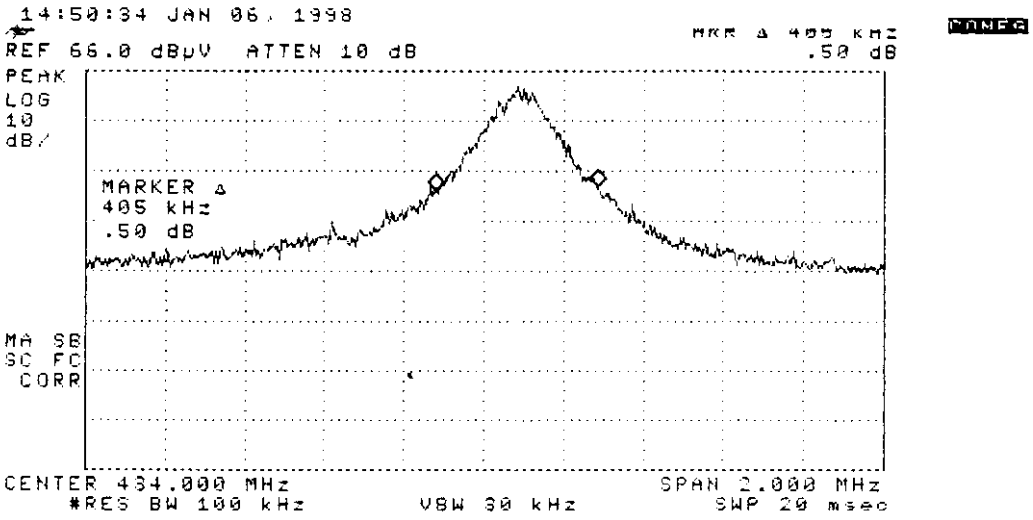
The spectrum trace data around transmitter fundamental frequency was obtained with the Spectrum Analyzer in "Max Hold" mode. The bandwidth value was determined between two points 20 dB down from the amplitude of the center frequency. The occupied bandwidth of 0.405 MHz was measured which is narrower than required 1.08 MHz.
The test results are shown in Plots 3.2.1, 3.2.2 (with different spectrum analyzer settings).

Reference numbers of test equipment used

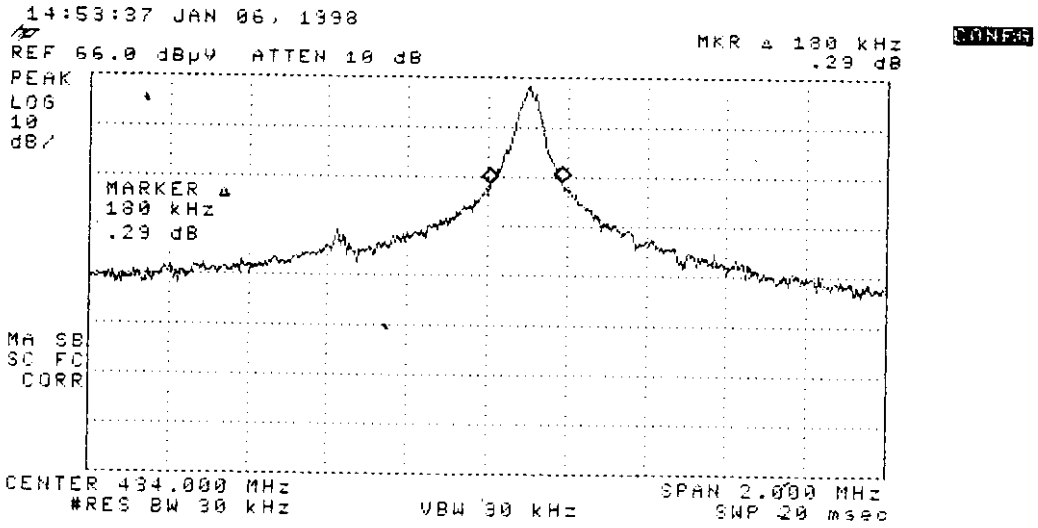
HL 0275	HL 0465	HL 0521	HL 0593	HL 0604		

Full description is given in Appendix A.

Plot 3.2.1
Emission Bandwidth Measurement Results



Plot 3.2.2
Emission Bandwidth Measurement Results



4 Summary and Signatures

The HBL transmitter FCC ID:NRV-HBLTX was found to be in compliance with the requirements of FCC part 15, subpart C, § 15.231.

Test performed by:

Mr. Michael Feldman, test technician

Approved by:

Dr. Edward Usoskin, C.E.O.

Responsible Person from Noga Negev Innovation Ltd.

Mr. Menachem Barash, Manager

APPENDIX A - Test equipment and ancillaries used for tests

HL Serial No.	Serial No.	Description	Manufacturer	Model No.	Due Calibr.
0041	2811	Double Ridged Guide Antenna, 1 - 18 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

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(μV) to convert to field intensity in dB(μV/meter).

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

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

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