ELECTROMAGNETIC EMISSIONS TEST REPORT

according to FCC Part 15 subpart C, §15.247 and subpart B

for

BreezeCOM Ltd.

EQUIPMENT UNDER TEST:

Access Point/Station Adapter/Wireless Bridge/ Four Port Adapter

FCC ID: LKTEAP-10N

Prepared by: _____
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Hermon Labs

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Dr. E. Usoskin, C.E.O.
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ACCREDITED
839.01
Electrical

Description of equipment under test

Test items	Frequency hopping transceiver FCC ID:LKTEAP-10N
Manufacturer	BreezeCOM Ltd.
Types (Models)	1) AP-10, AP-10D 2) SA-10, SA-10D 3) WB-10, WB-10D 4) SA-40, SA-40D
Receipt date	March 28, 1999

Applicant information

Applicant's representative and applicant's responsible person	Mr. Itzik Raiskin, RF group manager
Company	BreezeCOM Ltd.
Address	Building 1, Atidim Technological Park
Postal code	61131
City	Tel-Aviv
Country	Israel
Telephone number	+972 3645 6262
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Test performance

Project Number:	13371
Location	Hermon Laboratories
Test started	March 28, 1999
Test completed	April 5, 1999
Purpose of test	The EUT certification in accordance with CFR 47, part 2, §2.1033
Test specification(s)	FCC Part 15, Subpart C, §15.247, §§15.205, 15.207, 15.209, 15.107, 15.109

The A2LA logo endorsement applies only to the test methods and the standards that are listed in the scope of Hermon Laboratories accreditation by A2LA (see attached appendix C of this Test Report).
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.

Table of Contents

1 General Information

1.1 Abbreviations and Acronyms

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

AC	alternating current
AVRG	average (detector)
BER	bit error rate
BW	bandwidth
CE	conducted emissions
cm	centimeter
CW	sine wave
dB	decibel
dBm	decibel referred to one milliwatt
dB(µA)	decibel referred to one microampere
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
FSK	frequency shift keying
ft	foot, feet
GHz	gigahertz
GND	grounding
H	height
HL	Hermon Laboratories
Hz	hertz
IF	Intermediate frequency
kHz	kilohertz
L	length
LISN	line impedance stabilization network
m	meter
mm	millimeter
MHz	megahertz
msec	millisecond
NA	not applicable
NARTE	National Association of Radio and Telecommunications Engineers, Inc.
nF	nanofarad
QP	quasi-peak (detector)
PC	personal computer
RBW	resolution bandwidth
RF	radio frequency
RE	radiated emission
sec	second
V	volt
V/m	volt per meter
W	watt

1.2 Specification References

CFR 47 part 15:1998	Radio Frequency Devices.
ANSI C63.2:1996	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 is a frequency hopping wireless LAN device operating in the 2.4 to 2.4835 GHz frequency band with GFSK type of modulation. The EUT has the following trade names and models:

AP-10D, AP-10	Access Point;
SA-10D, SA-10	Station Adapter;
WB-10D, WB-10	Wireless Bridge,
SA-40D, SA-40	Four Port Adapter.

The devices are designed to operate under IEEE 802.11 standard.
The hardware of the AP-10, AP-10D, SA-10, SA-10D, WB-10, WB-10D is identical. All products have integrated antennas implemented in two ways:
- “D” models have non-standard interface for connection with antennas,
- non”D” models have a fixed integral antennas which require disassembly of the unit in order to be removed. A list of utilized antennas is supplied.

The devices can be programmed either as “Access Point”-AP, as “Station Adapter”- SA or as “Wireless Bridge”- WB. The programming comprises the installation of a Flash memory with appropriate software and the setting of dipswitch. The programming as AP, SA or WB has no influence on the test results. The difference in the software is on the way the unit handles data while the radio and modem controls are common. The SA-40(D) is based on the hardware and software of the SA-10(D). The RF and baseband parts of SA-40(D) and SA-10(D) are identical, however digital part of SA-40(D) has some additional hardware options for 4 Ethernet ports. The software of SA-40(D) is identical to SA-10.
The EUT was tested in the following four options:

- AP-10, AP-10D
- SA-40, SA-40D

The information about all used antennas is provided in the attached application documentation. The AP-10(D) is an Access Point and the SA-40(D) is a Four Port Adapter for Wireless LAN. The EUT is powered from mains via 120 V AC/5 V DC adapter (model No: A05D-01MP) with unshielded cable 1.5 m length.

1.4 EUT Test Configuration

The EUT ports and lines description is given in Table 1.1, the support/test equipment description is given in Table 1.2.
Throughout the testing the radio mode was activated by PC which was disconnected after EUT initiation. The EUT test configuration is shown in Figures 1.1 to 1.2.

Table 1.1 EUT Ports and Lines

Port Type	Quantity	Cable Type Description	Cable Length	Connected to
Power	1	unshielded-	1.5 m	mains
Antenna	2	shielded	0 up to 15 m.	antenna
Ethernet	1 or 4 (see section 1.3)	unshielded	0.6 m	PC

Table 1.2 EUT Support/Test Equipment

Description	Manufacturer	Model Number	Serial Number	FCC ID Number	Remarks
8 Ports Ethernet HUB	Dynamode	NA	9807273407	NA	Used for SA-40(D) testing according to P.15, subpart B
Personal Computer	Siemens Nixdorf	Scenic Pro M5 166ATX		HSSSCENICMS01	Used for SA-40(D) and AP-10(D) testing according to P.15, subpart B
Monitor 15”	Seimens Nixdorf	MCM 1503 NTD	BW397726	GWGPAXCAX1415C	
Mouse	Microsoft	90741	007564	C3KKMP3	
Keyboard	Seimens Nixdorf	S26381-K252-V188		0G6C1KMPII	
Parallel-Port Printer	Hewlett Packard	C2184A	ES66S210T8	B94C2184X	

Figure 1.1
EUT (SA-40, SA-40D) test configuration

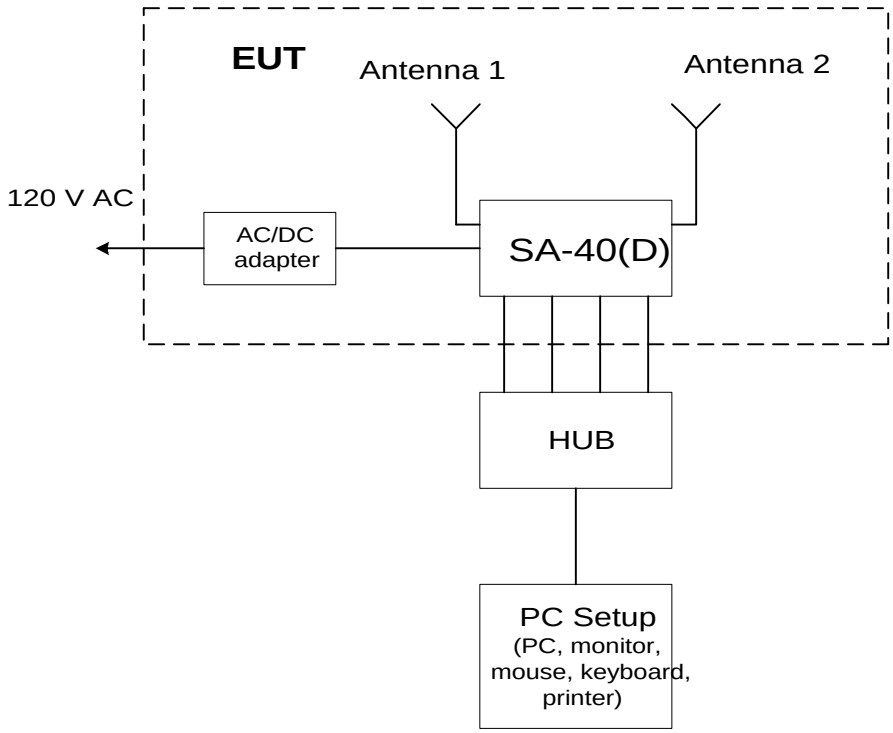
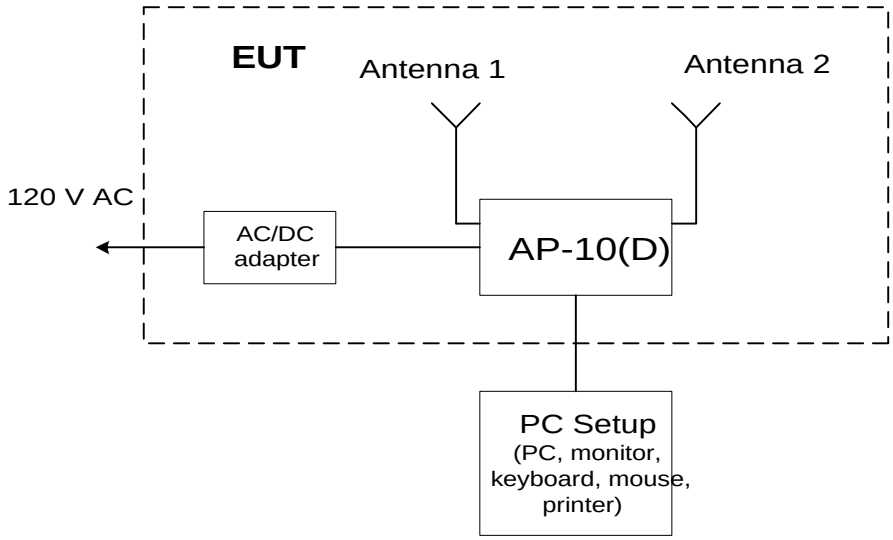


Figure 1.2
EUT (AP-10, AP-10D) test configuration



1.5 Statement of Manufacturer

I, Itzik Raiskin, RF group manager of BreezeCOM Ltd., declare that the, were tested from March 28 to April 5, 1999 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.

Mr. Itzik Raiskin, RF group manager
BreezeCOM 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), listed by Industry Canada for radiated measurements (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), recognized by VDE (Germany) for witness test, certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-809 for anechoic chamber, C-845 for conducted emissions site), assessed by NMi Certin B.V. (Netherlands) for a number of EMC, Telecommunications and Safety standards, 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 Information Technology Equipment (Certificate No. 839.01).

Address: PO Box 23, Binyamina 30550, Israel.
Telephone: +972-(0)6-628-8001
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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 Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Conducted emissions with LISN	9 kHz to 30 MHz: ± 2.1 dB
Radiated emissions in the open field test site at 10 m measuring distance	Biconilog antenna: ±3.2 dB Log periodic antenna: ±3 dB Biconical antenna: ±4 dB
Radiated emissions in the anechoic chamber at 3 m measuring distance	Biconilog antenna: ±3.2 dB

2.3 Laboratory Personnel

The three people of Hermon Laboratories that have participated in measurements and documentation preparation are: Dr. Edward Usoskin - C.E.O., Mrs. Eleonora Pitt - 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.

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 the University in 1974 with an MScEE degree, have obtained 26 years experience in EMC measurements and have been with Hermon Laboratories since 1991.

Name: Mrs. Eleonora Pitt Signature: _____
Position: Test Engineer Date: May 11, 1999

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 26 years experience in electronic products design and development and have been with Hermon Labs 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 Signature: _____
Position: certification engineer Date: May 11, 1999

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 42 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 Signature: _____
Position: C.E.O. Date: May 11, 1999

3 Emission Measurements

3.1 Frequency hopping channels separation and hopping frequency usage test according to §15.247(a)(1)(ii)

3.1.1 Definition of the test

This test was performed to prove that the EUT frequency hopping system uses at least 75 hopping frequencies and has hopping channel carrier frequencies separation by a minimum of 25 kHz or by the 20 dB bandwidth of the hopping channel, whichever is greater.

3.1.2 Test set-up

The EUT transmitting antennas were removed and RF output was connected to the spectrum analyzer through 30 dB attenuator.
All the spectrum analyzer settings are shown in the plots.

3.1.3 Test results

The four Plots 3.1.1 to 3.1.4 show 79 channels and the 0.960 MHz spacing between carriers which are greater than 75 channels and 20 dB bandwidth separation required by the standard. The EUT successfully passed this test.

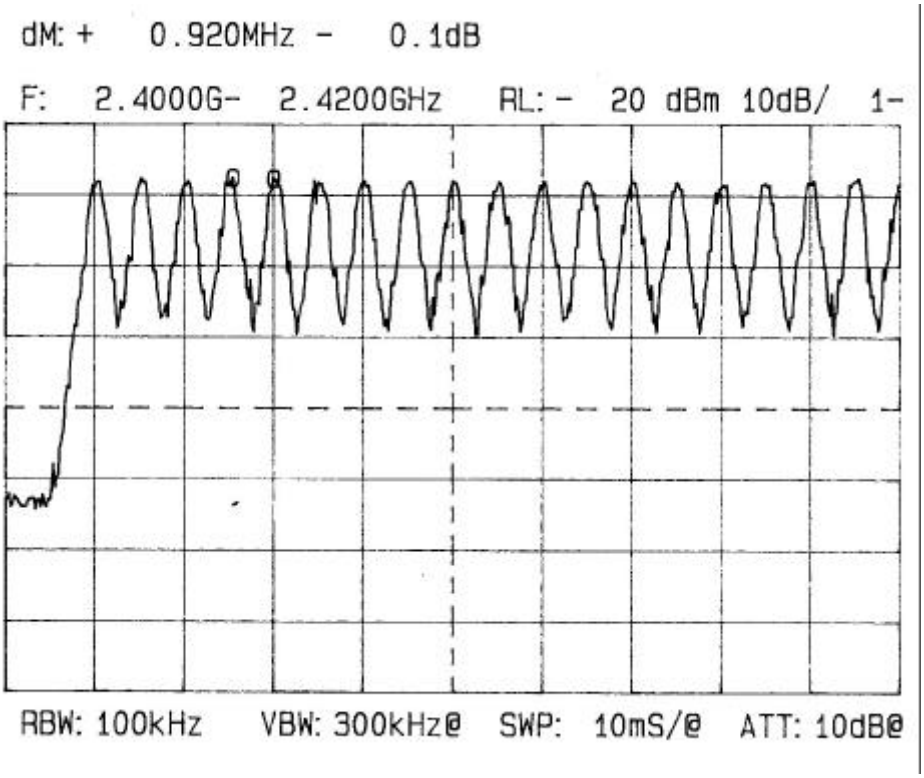
Reference numbers of test equipment used

HL 0025	HL 0056	HL 1175				

Full description is given in Appendix A.

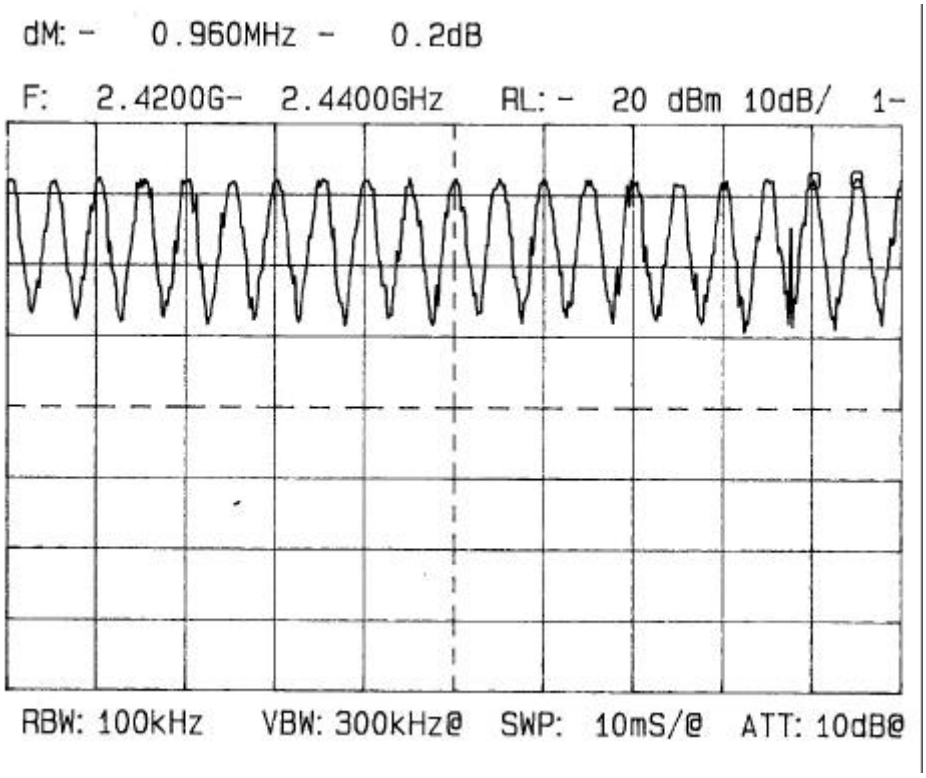
Plot 3.1.1

Test specification: § 15.2479a)(1)(ii)
Hopping channels separation test results



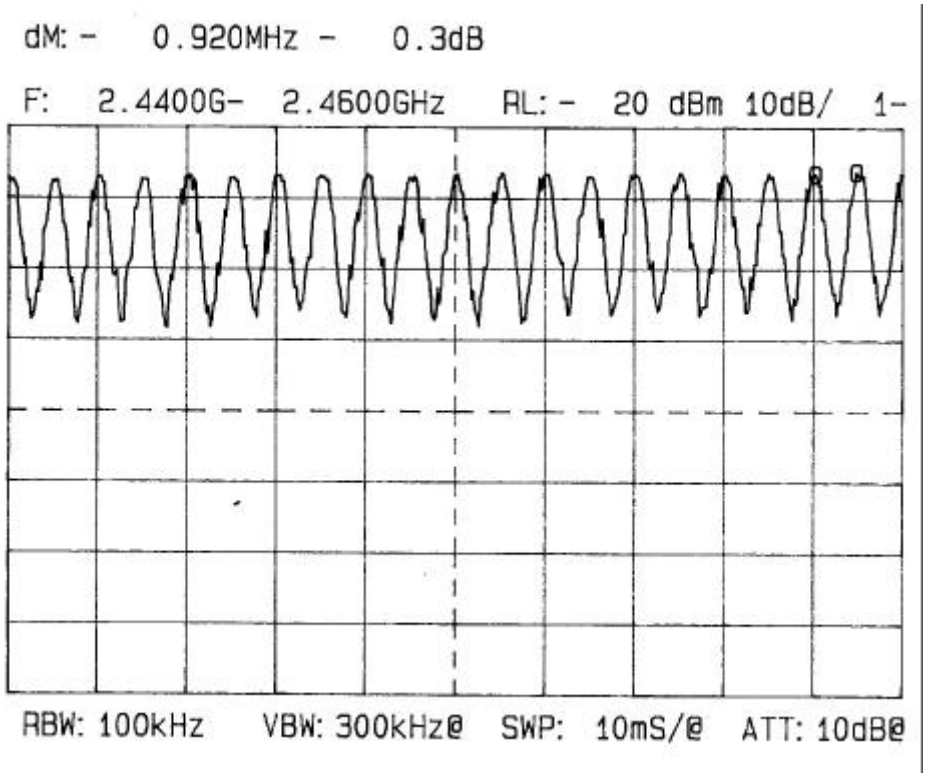
Plot 3.1.2

Test specification: § 15.2479a)(1)(ii)
Hopping channels separation test results



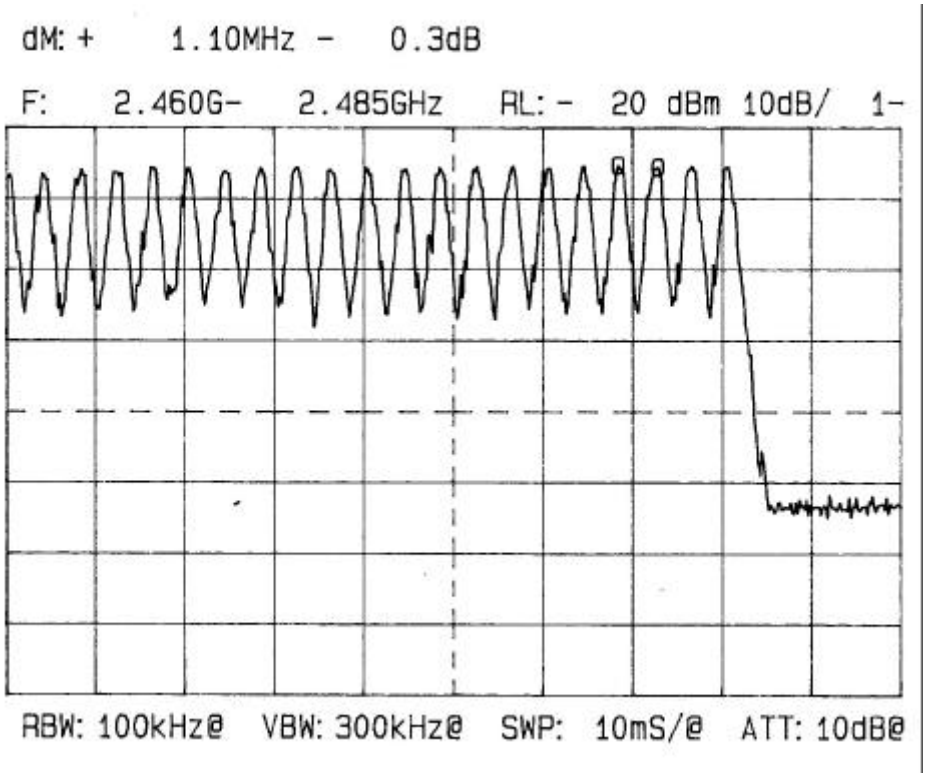
Plot 3.1.3

Test specification: § 15.2479a)(1)(ii)
Hopping channels separation test results



Plot 3.1.4

Test specification: § 15.2479a)(1)(ii)
Hopping channels separation test results



3.2 Occupied bandwidth test according to § 15.247(a)(1)(ii)

3.2.1 Definition of the test

This test was performed to prove that the maximum 20 dB bandwidth of the hopping channel is less than 1 MHz.

3.2.2 Test set-up

The test setup was the same as in test 3.1.

3.2.3 Test results

The measurements were performed in turn with 2FSK, 4FSK and 8FSK type of modulation. The occupied bandwidth measurement was performed for carrier (channel) frequency at low and high edges and at the middle of the 2.400 - 2.4835 GHz frequency band (see Tables 3.2.1 to 3.2.3 below). Plots 3.2.1 to 3.2.9 demonstrate the test results of the occupied bandwidth measurements. The spectrum analyzer settings are shown in plots.

Table 3.2.1 Occupied bandwidth test results with 2FSK type of modulation

Carrier frequency, GHz	Measured 20 dB BW, MHz	Limit, MHz	Result
2.402	0.810	1	Pass
2.441	0.880	1	Pass
2.480	0.870	1	Pass

Table 3.2.2 Occupied bandwidth test results with 4FSK type of modulation

Carrier frequency, GHz	Measured 20 dB BW, MHz	Limit, MHz	Result
2.402	0.860	1	Pass
2.441	0.870	1	Pass
2.480	0.850	1	Pass

Table 3.2.3 Occupied bandwidth test results with 8FSK type of modulation

Carrier frequency, GHz	Measured 20 dB BW, MHz	Limit, MHz	Result
2.402	0.880	1	Pass
2.441	0.890	1	Pass
2.480	0.900	1	Pass

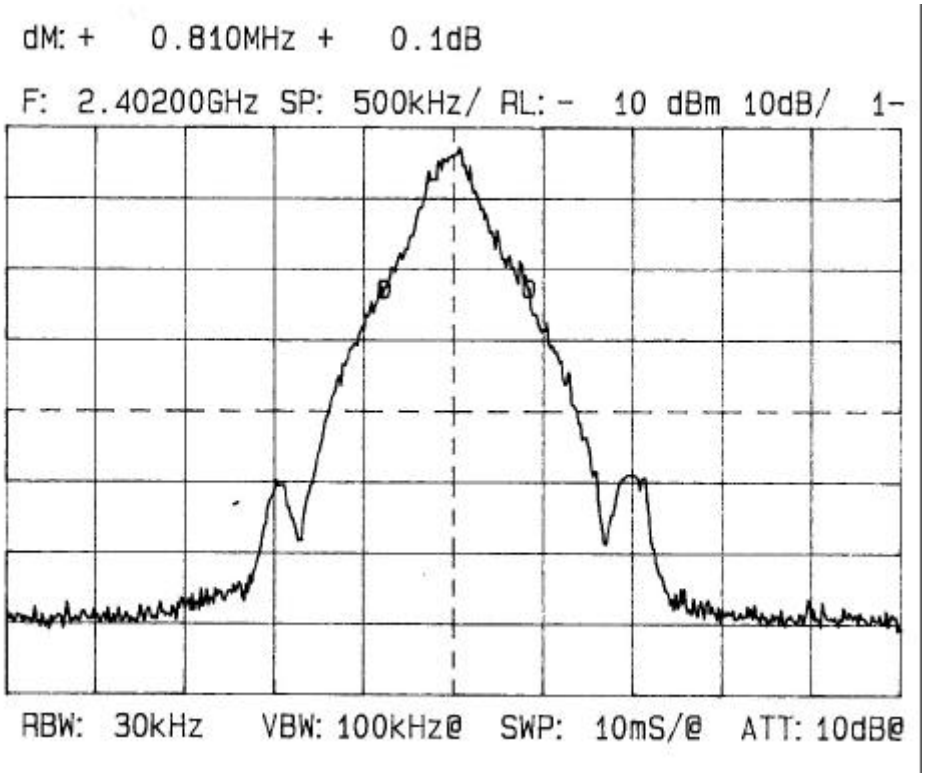
Reference numbers of test equipment used

HL 0025	HL 0056	HL 1175				

Full description is given in Appendix A.

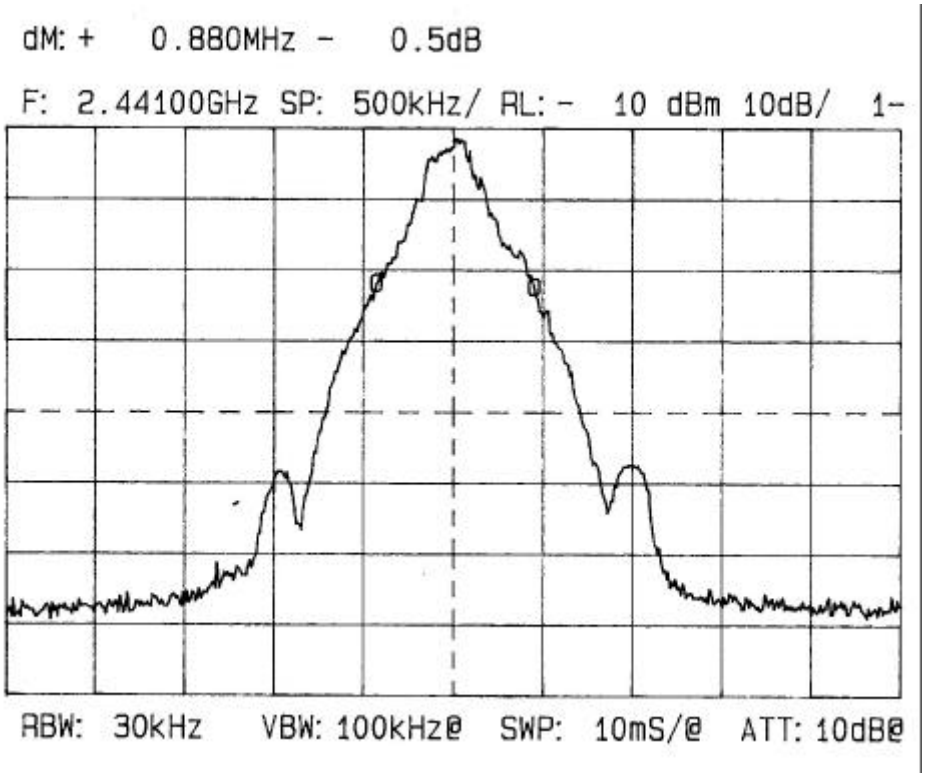
Plot 3.2.1

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 2FSK type of modulation



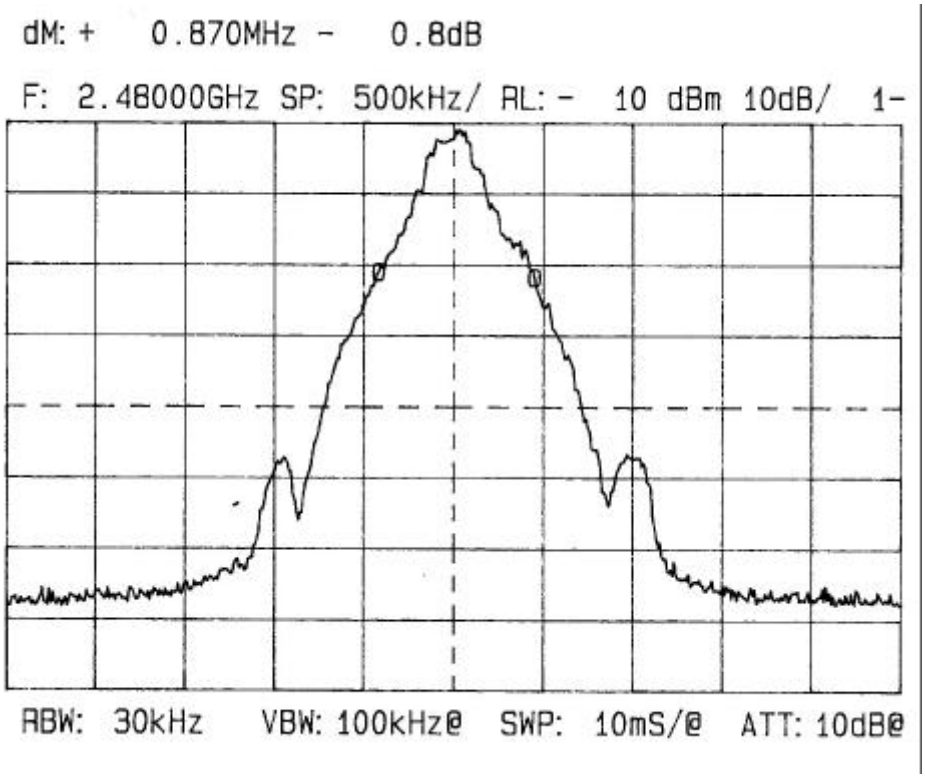
Plot 3.2.2

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 2FSK type of modulation



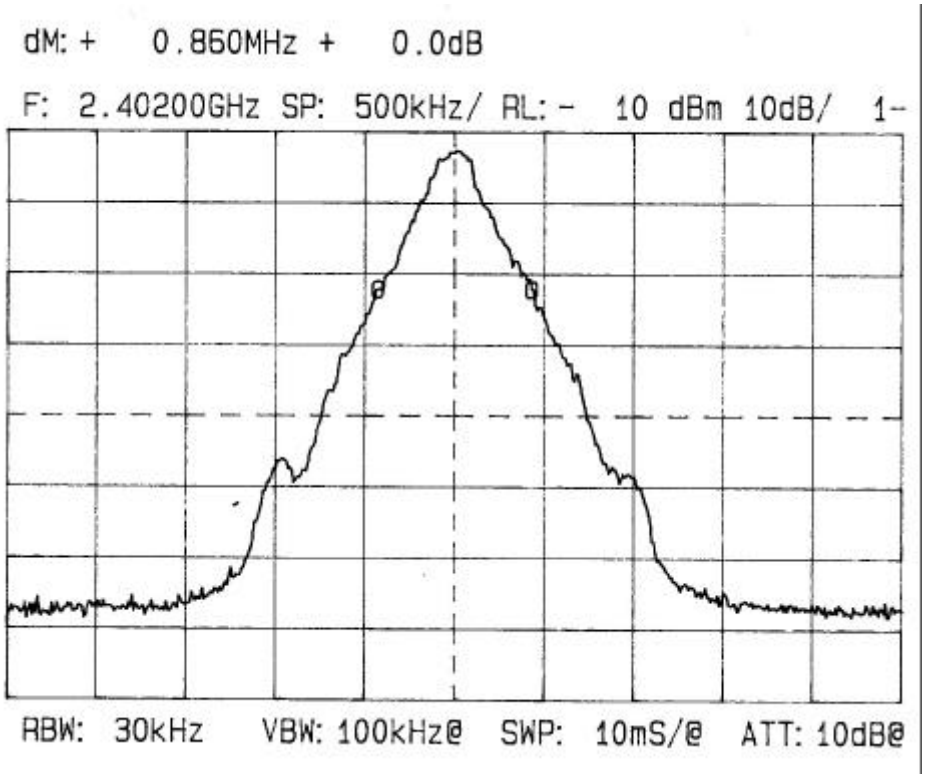
Plot 3.2.3

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 2FSK type of modulation



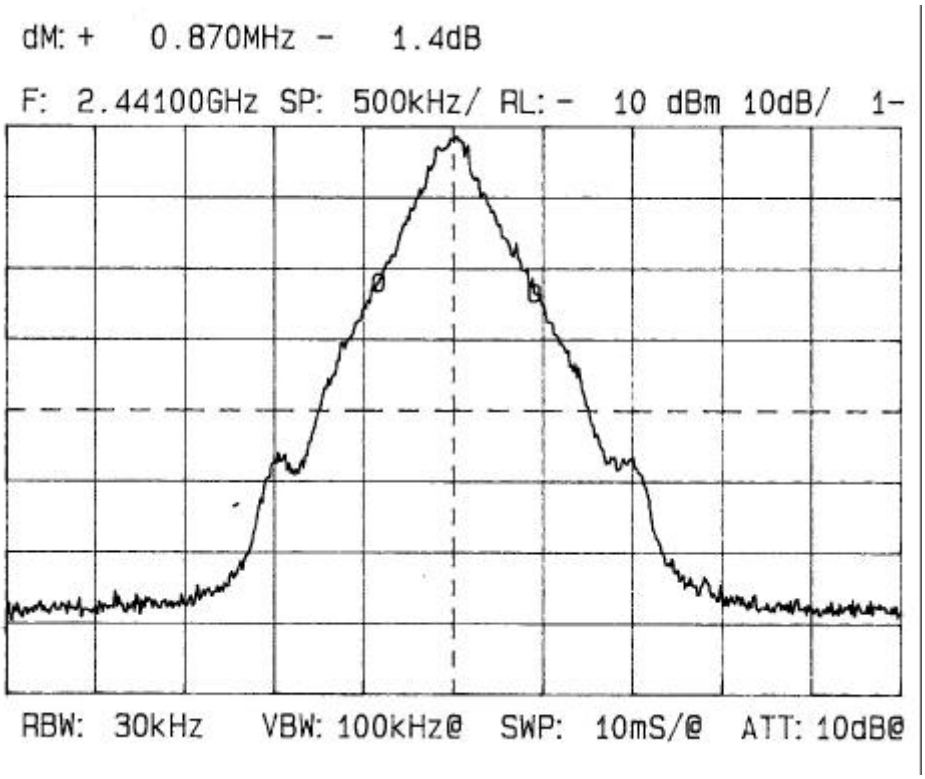
Plot 3.2.4

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 4FSK type of modulation



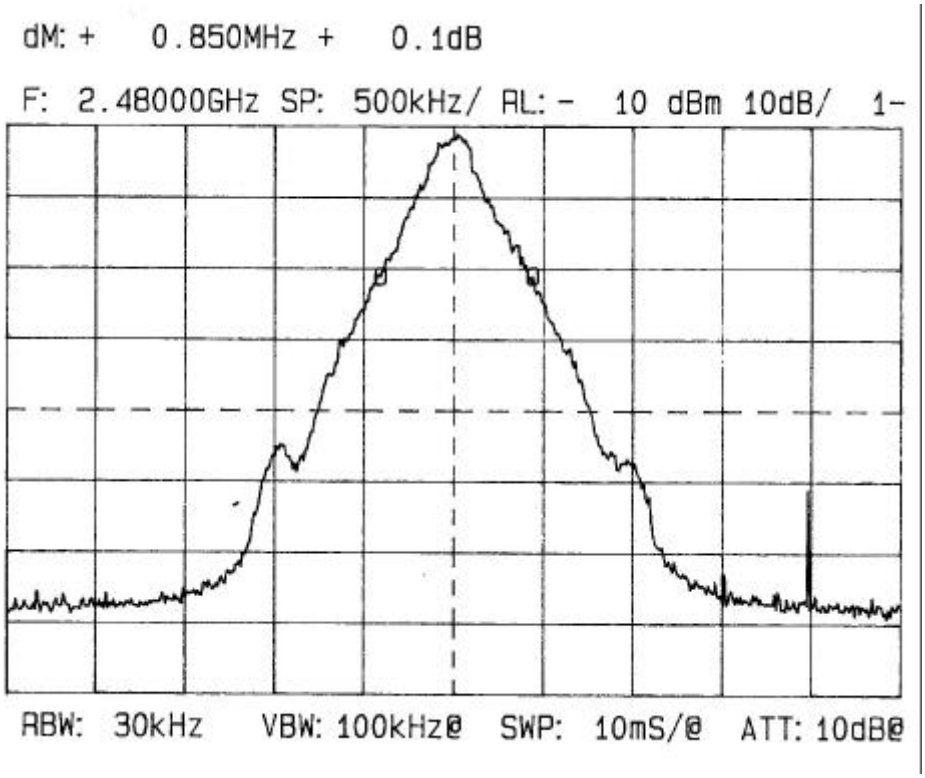
Plot 3.2.5

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 4FSK type of modulation



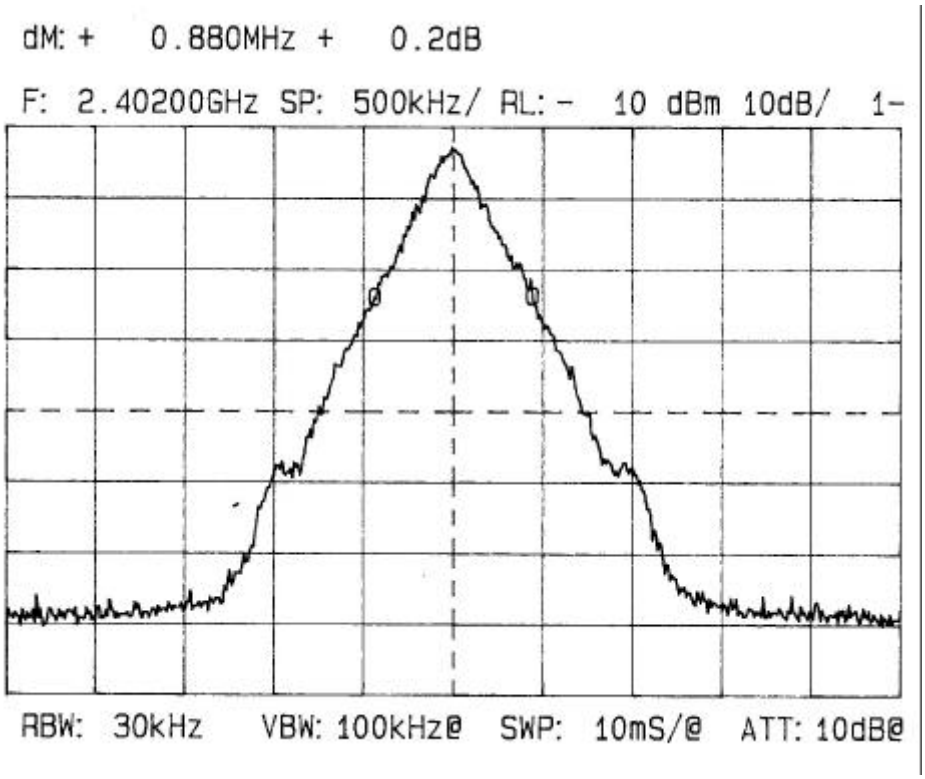
Plot 3.2.6

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 4FSK type of modulation



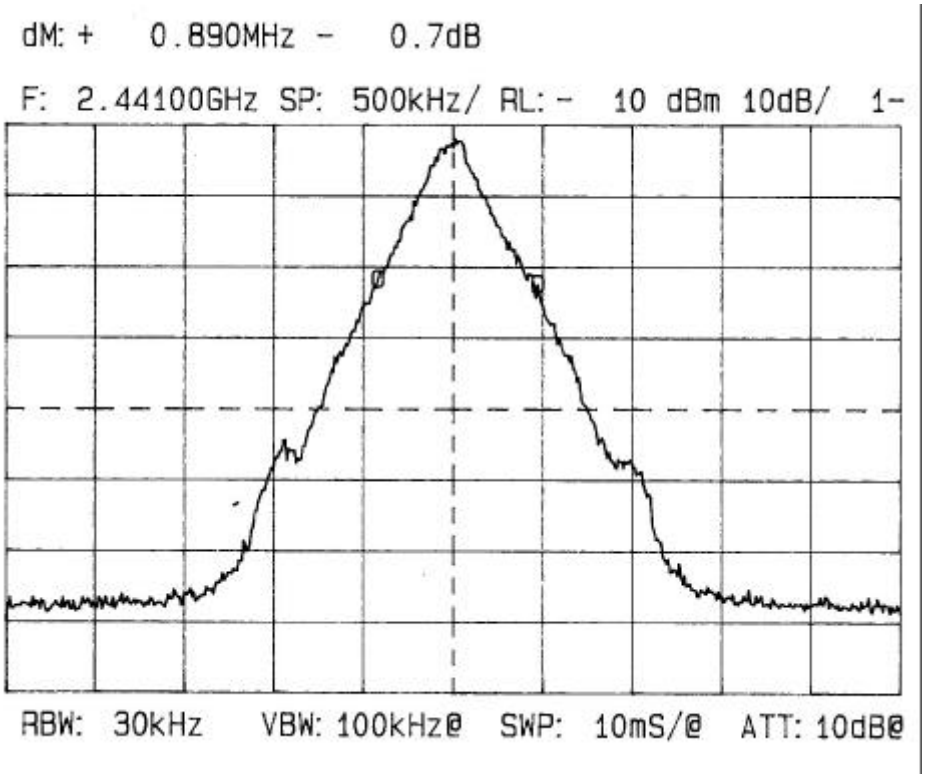
Plot 3.2.7

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 8FSK type of modulation



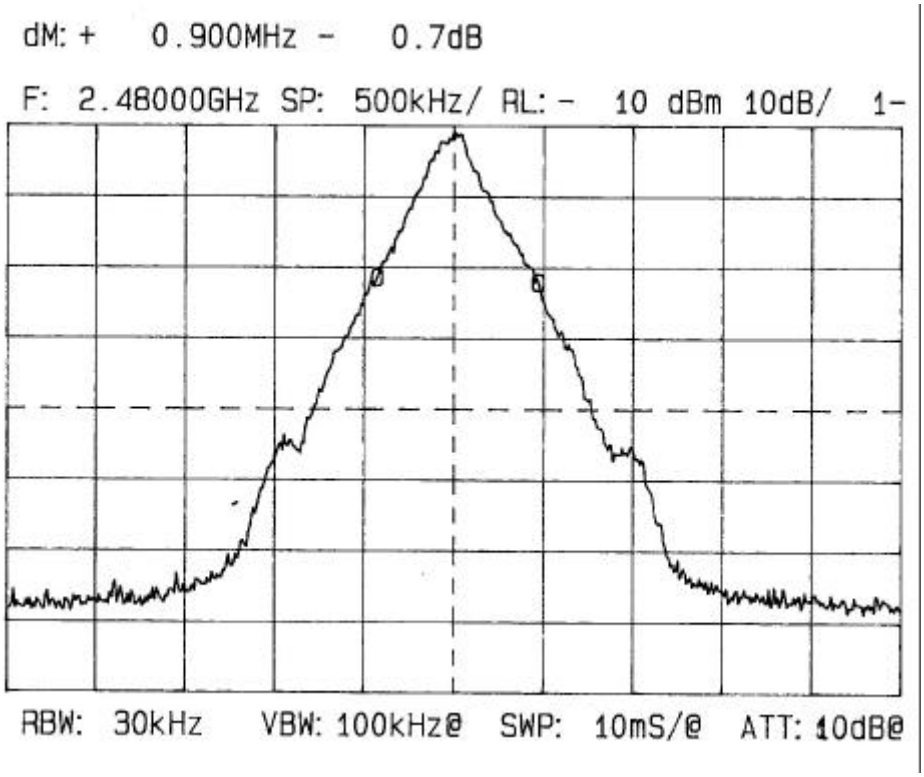
Plot 3.2.8

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 8FSK type of modulation



Plot 3.2.9

Test specification: § 15.2479a)(1)(ii)
Occupied bandwidth test results with 8FSK type of modulation



3.3 Average factor (duty cycle correction) test § 15.35

3.3.1 Definition of the test

The test was performed to define total time of transmitting energy occupancy during any 100 msec time interval.
This average factor applies for the actual emission level calculation.

3.3.2 Test results

The average factor calculation is given in table below: The specification was supplied by the manufacturer.

Dwell time		**20 msec**
Average packet length		**500 byte**
Average Tx duration		**2.12 msec**
Tx duration at 100 msec	**= average Tx duration x (100 / dwell time)**	**10.6 msec**
Duty cycle	**= 10.6 msec / 100 msec**	**0.106**
Averaging factor	**= 20 x $\log_{10}$ (calculated duty cycle)**	**-19.49 dB**

3.4 Maximum peak output power test according to §15.247 (b)(1), (3)(i)

3.4.1 Definition of the test

This test was performed to demonstrate that the maximum RF peak output power of the transmitter does not exceed one watt (30 dBm) reduced by 1 dB for every 3 dB above 6 dBi gain of the directional antenna.

3.4.2 Test set-up

The test setup was the same as in test 3.1.

3.4.3 Test results

The allowed output power for the maximum 24 dBi antenna gain is:

30 dBm - (24 dBi -6 dBi):3 = 24 dBm.

The maximum RF output power was measured at 3 carrier (channel) frequencies (low, middle, high). All measured results given in Plots 3.4.1 to 3.4.3 were received with the 30 dB external attenuator, therefore 30.5 dB (0.5 dB cable loss) were added to the results shown in plots. The measurements were performed on the both antenna connectors.
The Table 3.4 below gives output power in dBm.

Table 3.4
Transmitter output RF power test results

Frequency, MHz	Measured result, dBm	Peak output power, dBm	Limit, dBm	Margin dB	Result
2402	-9.6	20.9	24	3.1	Pass
2441	-8.6	21.9	24	2.1	Pass
2480	-8.2	22.3	24	1.7	Pass

Reference numbers of test equipment used

HL 0025	HL 0056	HL 1175				

Full description is given in Appendix A.

3.4.4 Exposure limit according to part 1, §1.1310

Limit for power density for general population/uncontrolled exposure is 1 mW/cm^2.

$$\text{The power density } P\ (mW/cm^2) = \frac{P_T}{4\pi r^2}, \text{ where}$$

P_T - the transmitted power, which is equal to the transmitter output power 22.3 dBm plus maximum antenna gain 12 dBi, the maximum output transmitter power is 34.3 dBm = 2692 mW.

$$1(mW/cm^2) = 2692\ mW / 4\pi r^2$$

The allowed distance "r", where RF exposure limits may not be exceeded, is 14.6 cm:

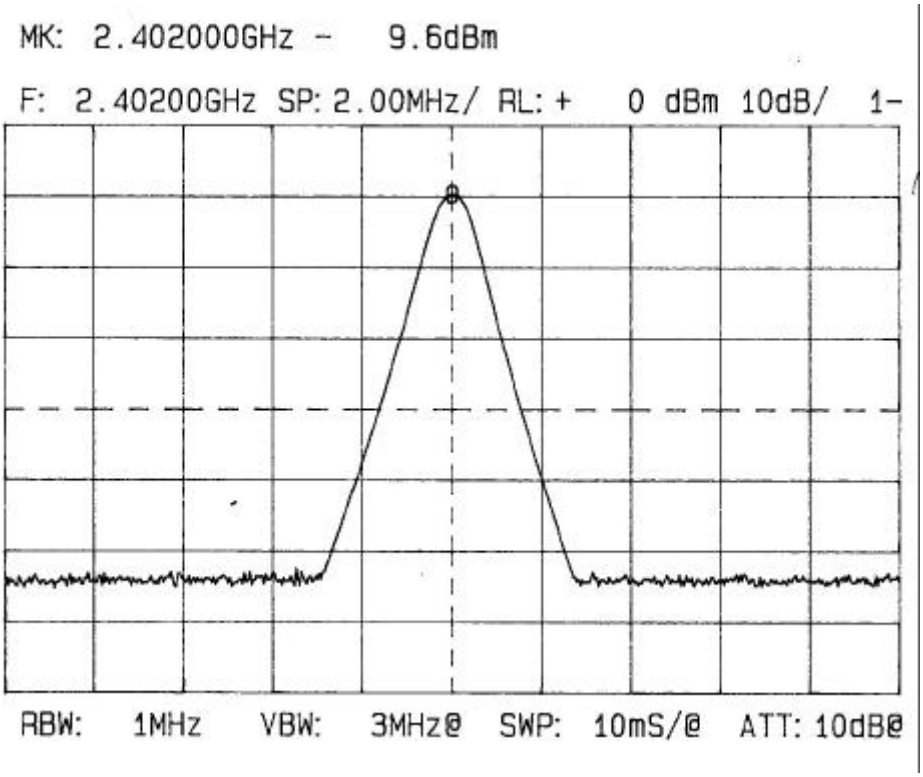
$$r = \sqrt{P_T / 4\pi} = \sqrt{2692 / 4 \times 3.14} \approx 14.6\ (cm).$$

The public cannot be exposed to dangerous RF level.

Note: 12 dBi is the maximum antenna gain of indoor antennas, the antennas with18 dBi and 24 dBi gain are outdoor.

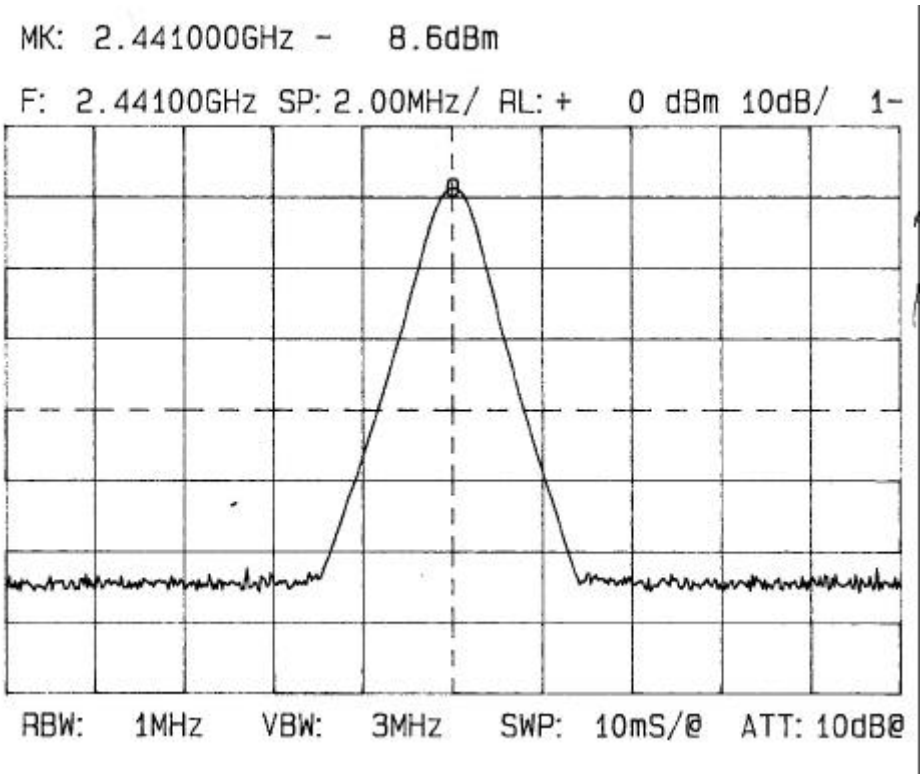
Plot 3.4.1

Test specification: § 15.247(b)(1), (3)(i)
Output power test
External attenuation 30.5 dB



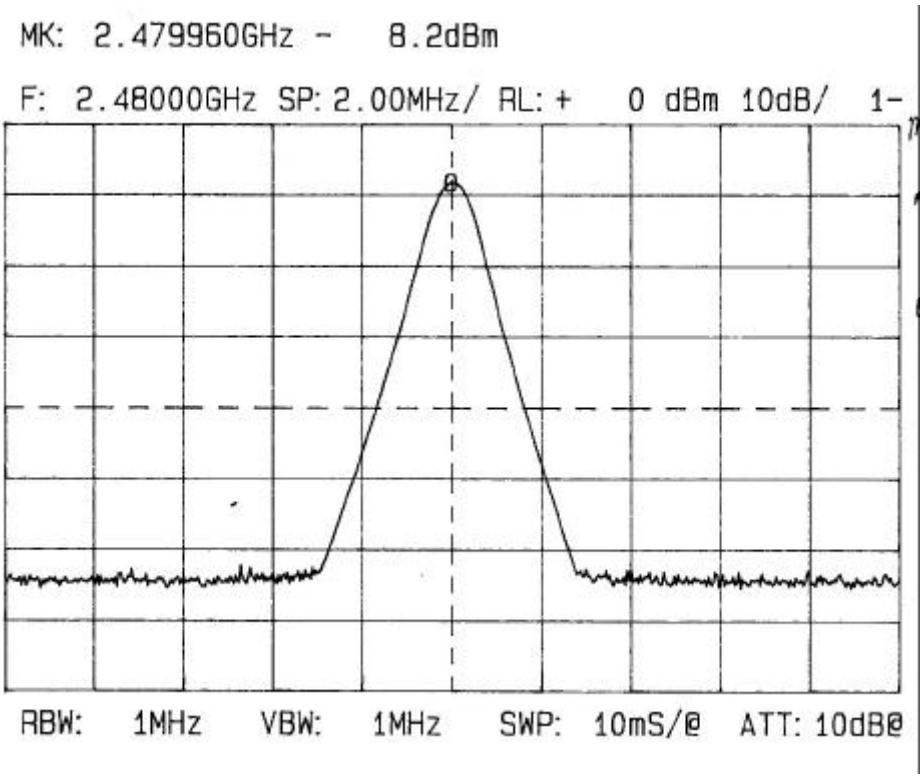
Plot 3.4.2

Test specification: § 15.247(b)(1), (3)(i)
Output power test
External attenuation 30.5 dB



Plot 3.4.3

Test specification: § 15.247(b)(1), (3)(i)
Output power test
External attenuation 30.5 dB



3.5 Out of band antenna conducted emissions test according to §15.247(c)

3.5.1 Definition of the test

This test was performed to prove that the EUT out-of-band emissions in any 100 kHz bandwidth outside 2.400 to 2.4835 GHz are at least 20 dB below maximum power content as measured in any 100 kHz bandwidth within the band that contains the highest level of the desired power.

3.5.2 Test set-up

The test setup was the same as in test 3.1.

3.5.3 Test results

The test was performed with transmitter operating at 3 carrier (channels) frequencies 2402, 2441 and 2480 MHz from 30 MHz to the 10^{th} harmonic, i.e. 25 GHz. Plots 3.5.1, 3.5.5 and 3.5.9 show the in-band signal (2.402, 2.401 and 2.480 GHz), Plots 3.5.2 to 3.5.4, 3.5.6 to 3.5.8 and 3.5.10 to 3.5.12 show that the out of bands measured signals were more than 20 dBc.

Note:

The recorded marker frequency 2.3928 GHz in Plot 3.5.3 is inaccurate (due to large spectrum analyzer span) and corresponds to 2.402 GHz carrier frequency.

The recorded marker frequency 2.4739 GHz in Plot 3.5.11 is inaccurate (due to large spectrum analyzer span) and corresponds to 2.480 GHz carrier frequency.

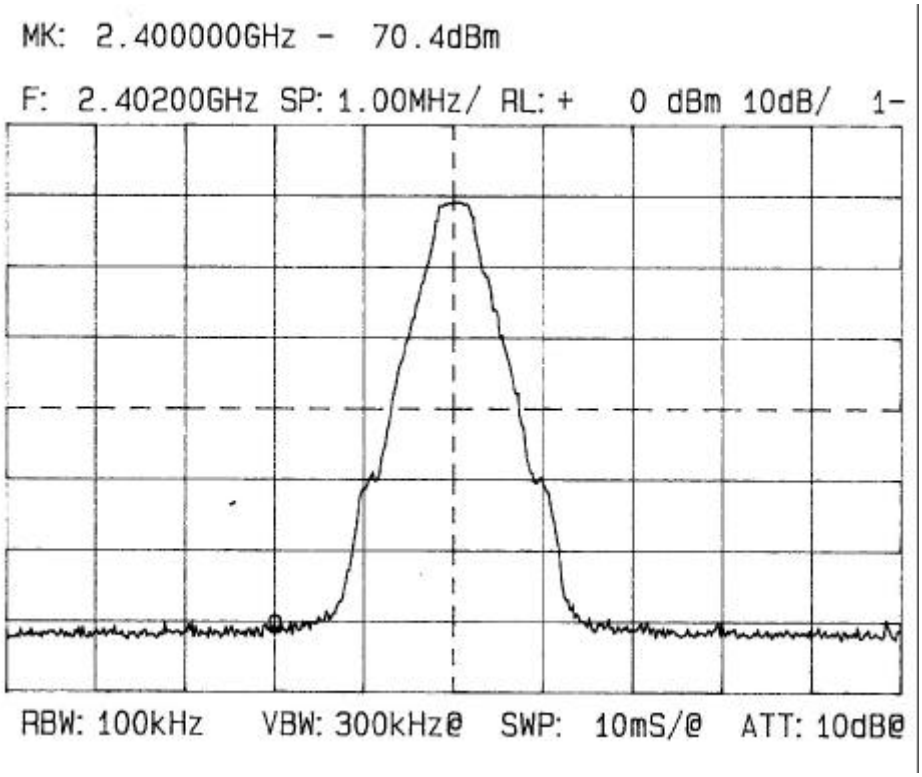
Reference numbers of test equipment used

HL 0025	HL 0056	HL 1175				

Full description is given in Appendix A.

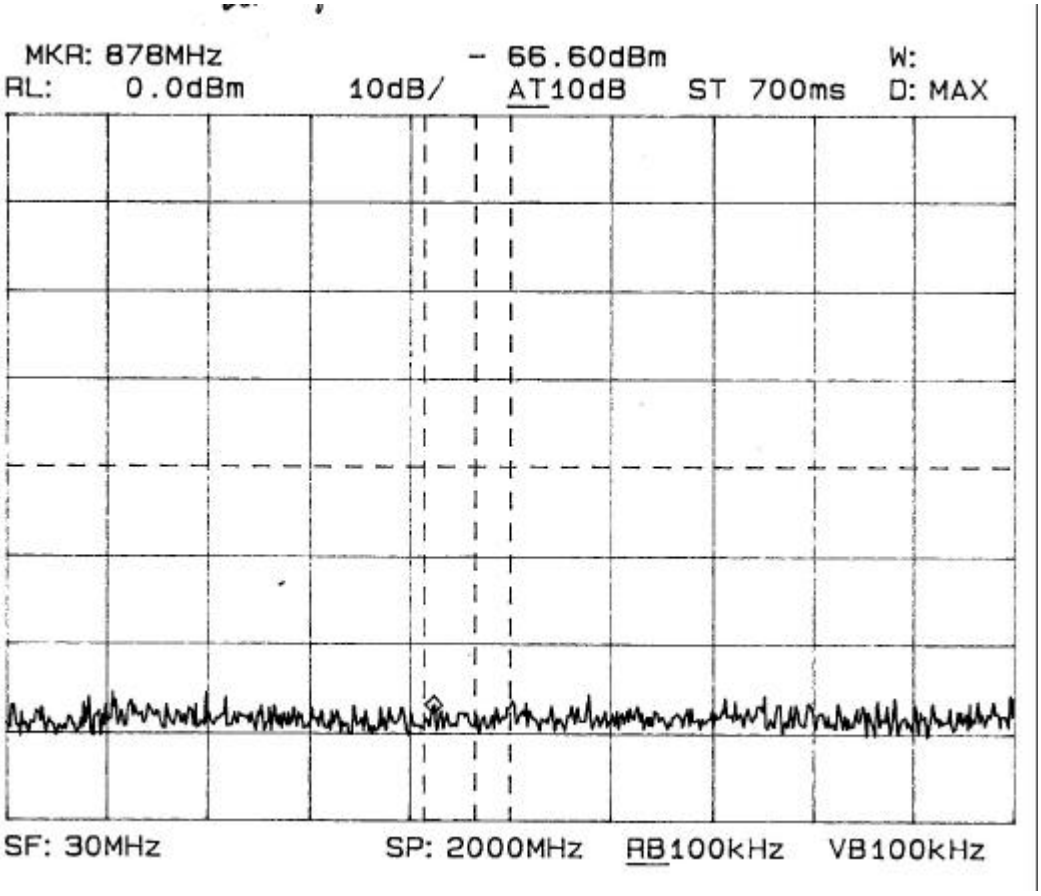
Plot 3.5.1

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.402 GHz , in-band signal



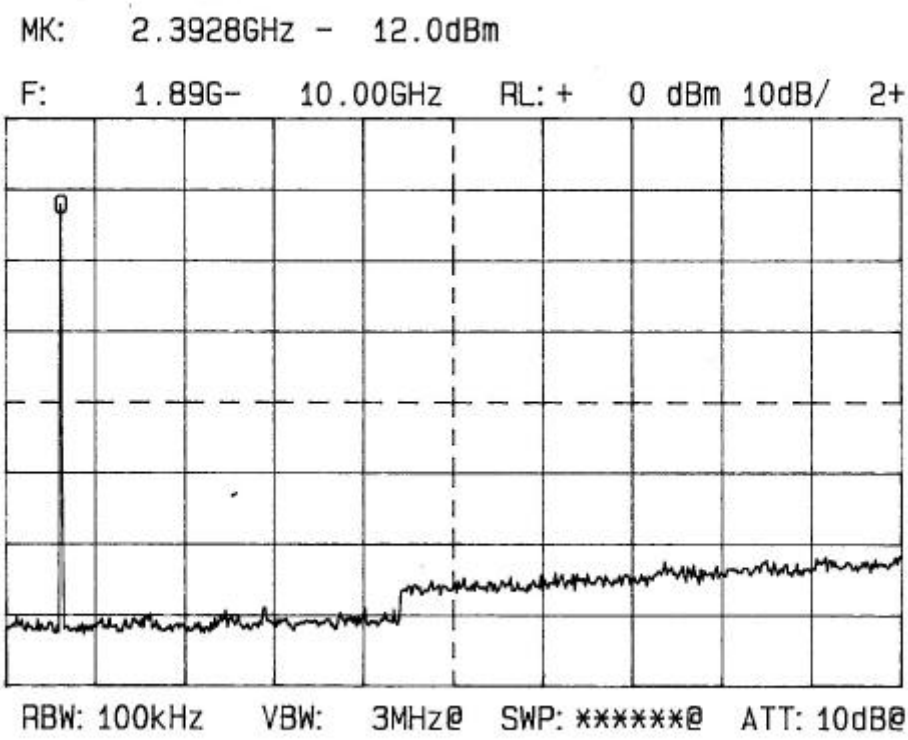
Plot 3.5.2

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.402 GHz



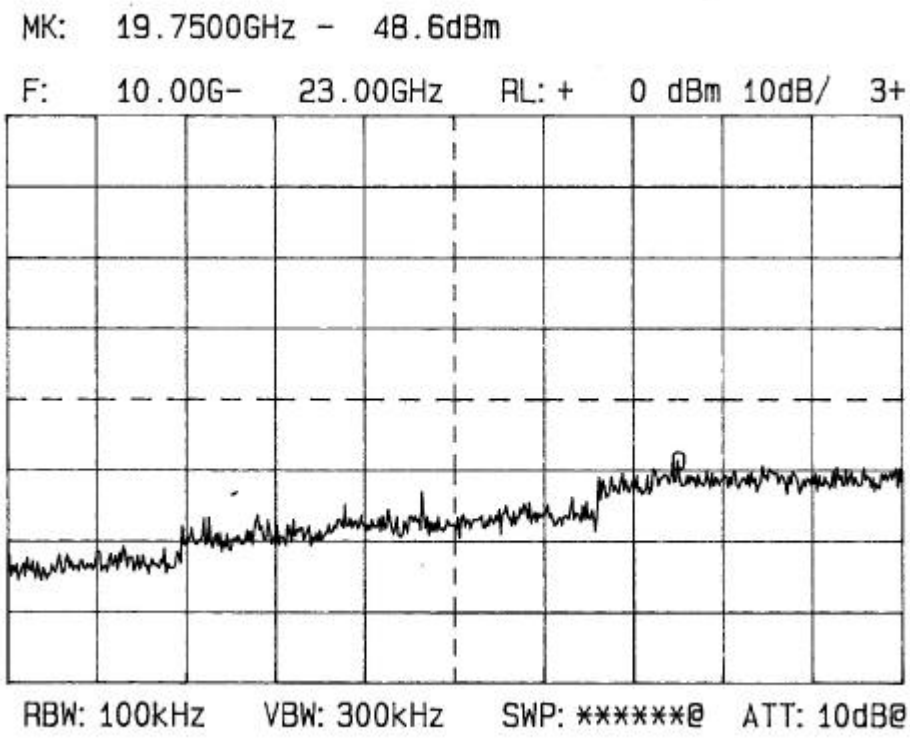
Plot 3.5.3

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.402 GHz



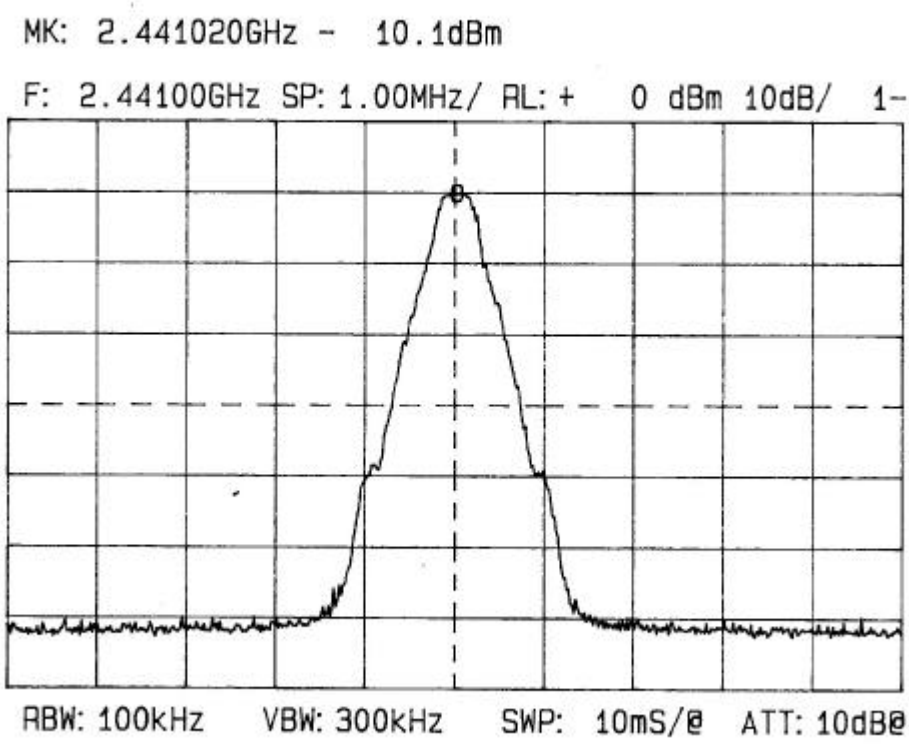
Plot 3.5.4

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.402 GHz



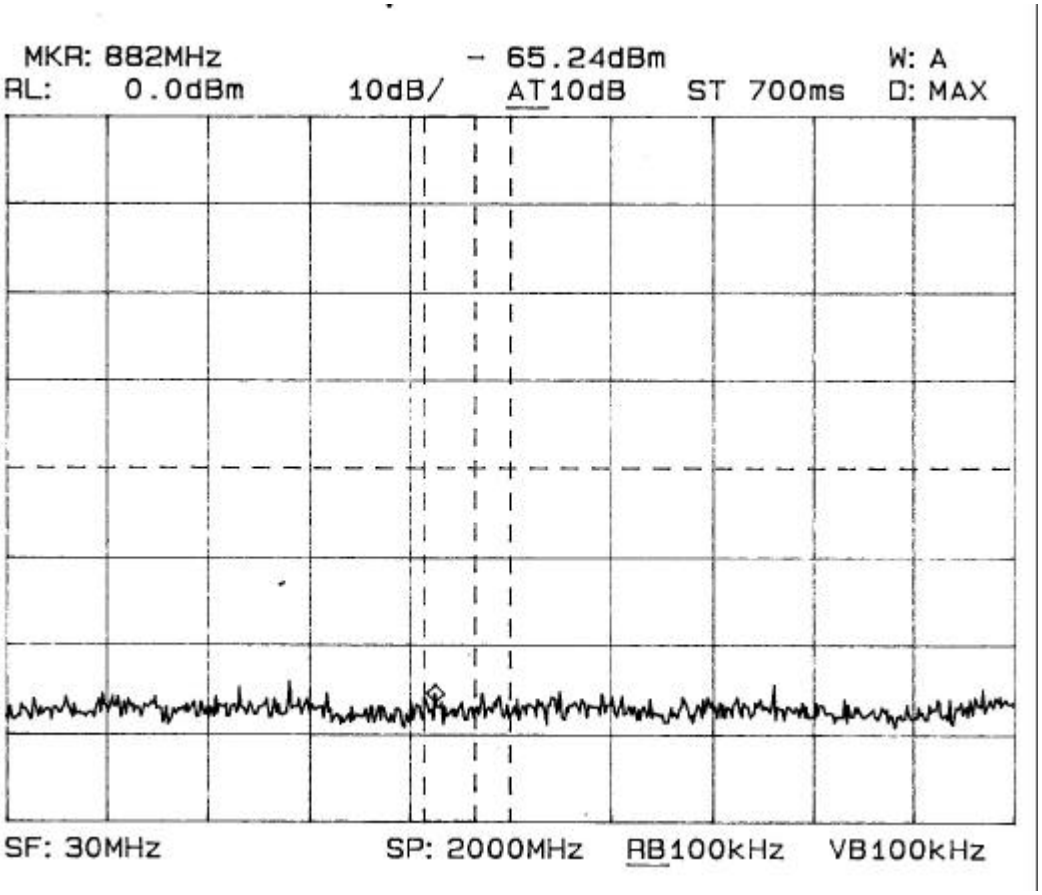
Plot 3.5.5

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.441 GHz , in-band signal



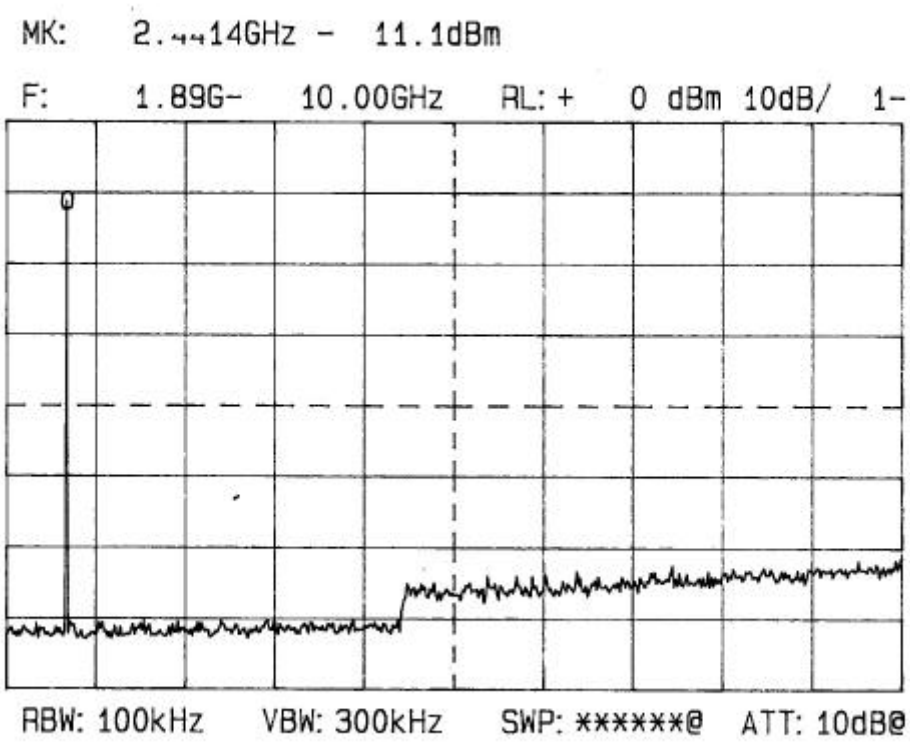
Plot 3.5.6

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.441 GHz



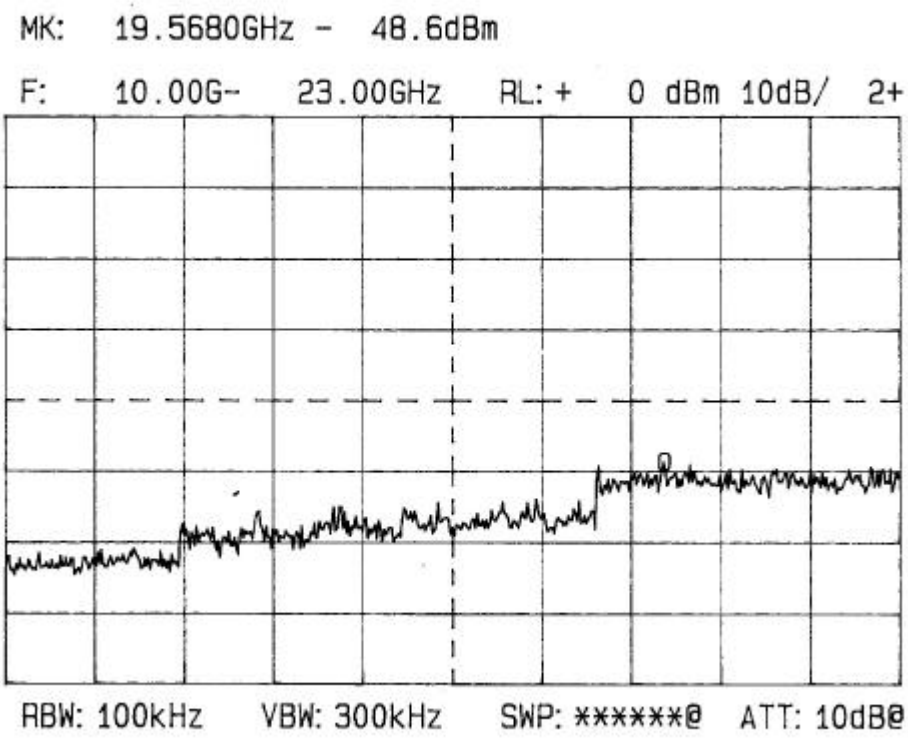
Plot 3.5.7

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.441 GHz



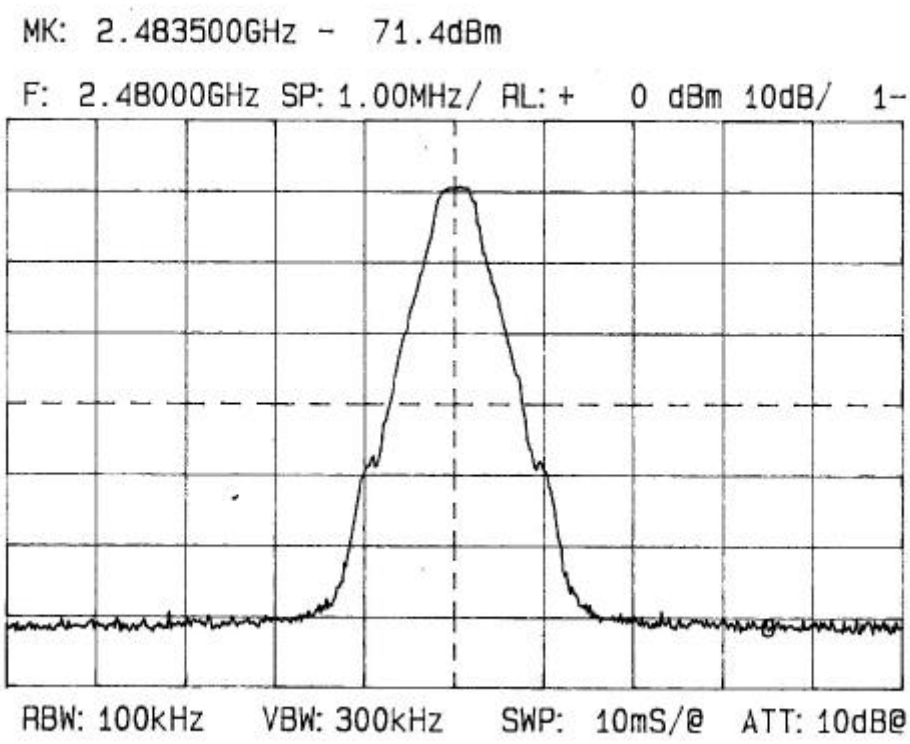
Plot 3.5.8

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.441 GHz



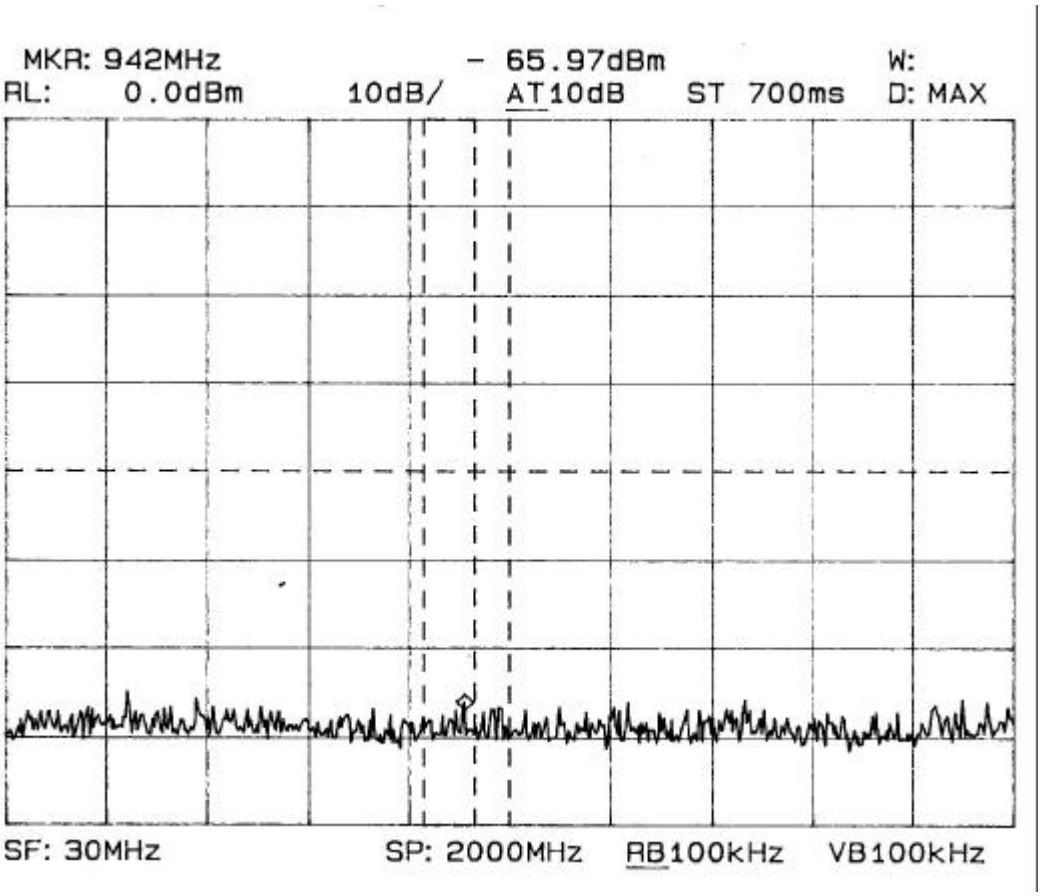
Plot 3.5.9

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.480 GHz , in-band signal



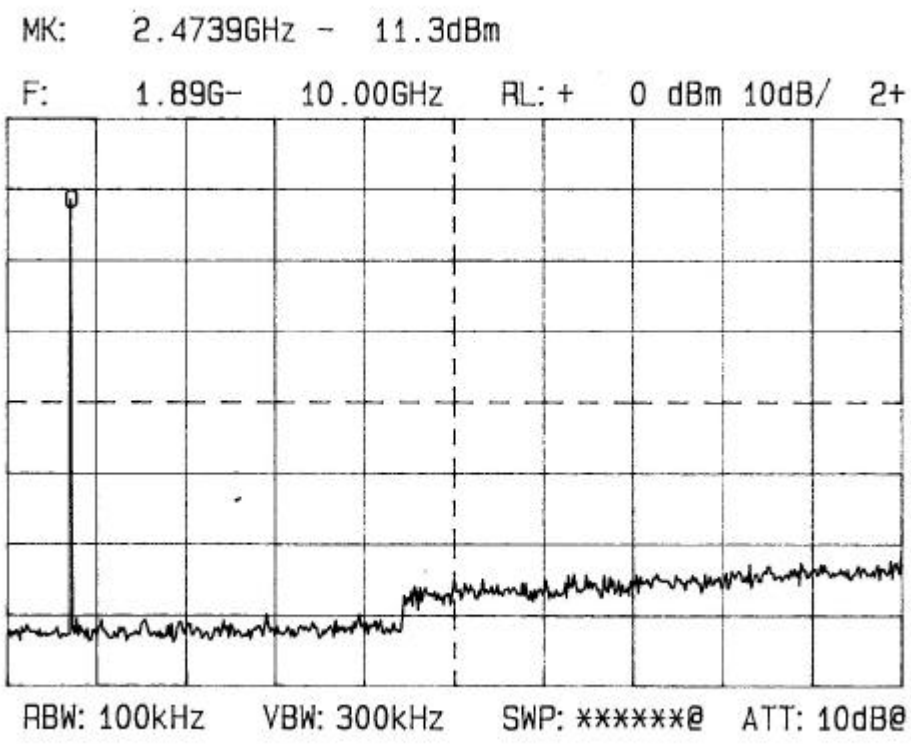
Plot 3.5.10

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.480 GHz



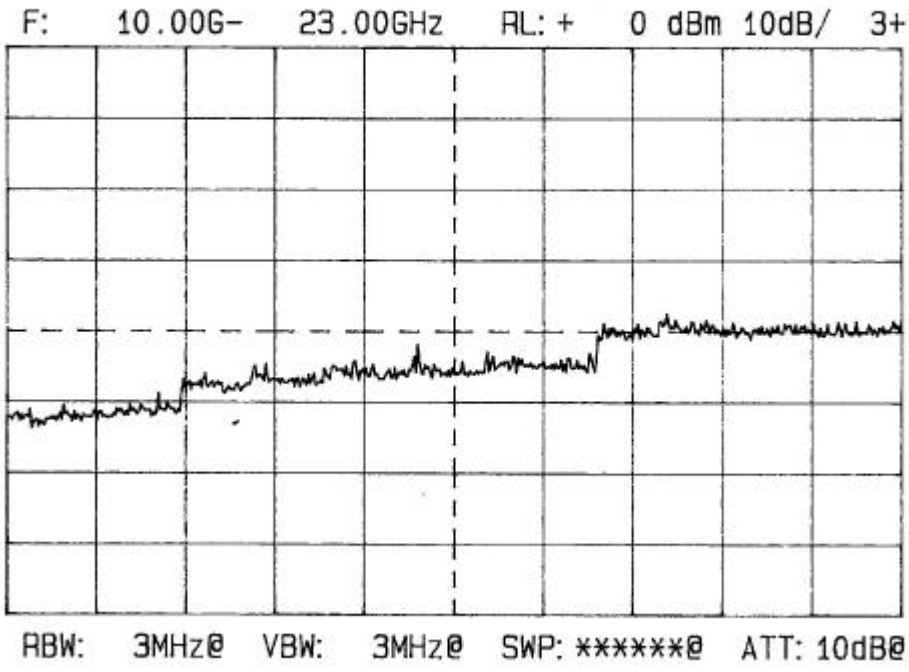
Plot 3.5.11

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.480 GHz



Plot 3.5.12

Test specification: § 15.247 (c)
Out-of-band conducted in the antenna emissions test
Frequency: 2.480 GHz



3.6 Average time of occupancy definition according to § 15.247

3.6.1 Definition

This parameter was checked to prove that the average time of occupancy on any frequency is not greater than 0.4 seconds within any 30 second period.

3.6.2 Calculation

The average occupancy time was calculated from the following equation:

Number of channels = 79
Dwell time = 20 msec
Duty cycle = 0.106
Average time on each channel: 30 / 79 = 0.38 sec

Average occupancy time = average time on each channel x Tx duty cycle = 0.38 X 0.106 = 0.040 sec, which is less than the required 0.4 sec.

3.7 Radiated emissions test according to § 15.205, 15.209(a), 15.247(c)

3.7.1 Definition of the test

This test was performed to measure radiated emissions except carriers generated by the transmitter.

3.7.2 Test set-up

The radiated emissions measurements were performed in the open field test site with the biconical, log periodic and double ridged guide antennas at 3 meters test distance and with the double ridged guide antenna at 1 meter test distance as shown in Photographs 3.7.1 to 3.7.9. The results were extrapolated by using an inverse linear distance factor. The frequency range from 30 MHz to 24 GHz was investigated.

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. To find the maximum radiation measuring antenna height was changed from 1 to 4 m, the turntable was rotated 360° and the antennas polarization was changed from vertical to horizontal.

3.7.3 Test measurements results

The test was performed with transmitter operating with modulation at 3 carrier (channels) frequencies 2.401, 2.441 and 2.480 GHz with the integral antenna and with the 2 dBi, 5 dBi, 6 dBi, 8.5 dBi, 12 dBi, 18 dBi, 24dBi gain external antennas.
The average (duty cycle correction) factor was obtained from the par. 3.3 of this test report. The § 15.35 (b) peak limits (20 dB above average limits) were met since the measurements were performed with peak detector function and as is seen in Tables 3.7.1.- 3.7.8.
Emissions found in 30 - 1000 MHz range were due to the incorporated digital device and are brought in section 3.8 of this test report.
The 1m limit was calculated from the following equation:
Limit $_{1m}$ = Specified limit $_{3m}$ + 20 log $_{10}$ 3/1 = 54 + 9.5 = 63.5 dB (μV/m).

Reference numbers of test equipment used

HL 0025	HL 0034	HL 0038	HL 0041	HL 0275	HL 0287	HL 0412
HL 0547	HL 0554	HL 0566				

Full description is given in Appendix A.

Table 3.7.1 Radiated emission (modulated carrier) measurements test results with the integral antenna

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: March 30, 1999
Relative Humidity: 52%
Ambient Temperature: 24°C

MEASUREMENTS PERFORMED AT 1 METRE DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Calculated Limit @1m dB (μV/m)	Spec. Margin dB	Pass/ Fail
4.802	38.7	34.5	2	-1.5	-19.5	57.2	63.5	6.3	Pass
4.882	41.4	34.5	2	1.4	-19.5	57.0	63.5	6.5	Pass
4.960	46.0	34.5	2	4	-19.5	59.0	63.5	4.5	Pass
7.323	74.4	35.7	2.6	35.7	-19.5	57.4	63.5	6.1	Pass
7.440	74.6	35.7	2.6	35.7	-19.5	57.6	63.5	5.9	Pass
12.205	50.5	39.3	3.5	32	-19.5	41.8	63.5	21.7	Pass
12.400	50.0	39.3	3.5	32	-19.5	41.3	63.5	22.2	Pass

Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Table 3.7.2 Radiated emission (modulated carrier) measurements test results with 2 dBi external antenna

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: March 28, 1999
Relative Humidity: 52%
Ambient Temperature: 24°C

MEASUREMENTS PERFORMED AT 1 METRE DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable Loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Calculated Limit @1m dB (μV/m)	Spec. Margin dB	Pass/ Fail
4.960	36.8	34.5	2	4	-19.5	47.8	63.5	15.7	Pass

Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer

_____
Hermon Labs

Table 3.7.3 Radiated emission (modulated carrier) measurements test results with 5 dBi external antenna and 12 ft LMR200 cable

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: April 4, 1999
Relative Humidity: 52%
Ambient Temperature: 24°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable Loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Specified Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
7.323	49.4	35.7	2.6	35.7	-19.5	32.5	54	21.5	Pass
7.440	50.5	35.7	2.6	35.7	-19.5	33.7	54	20.3	Pass

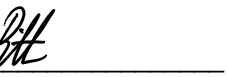
Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer



Hermon Labs

Table 3.7.4 Radiated emission (modulated carrier) measurements test results with 6 dBi external antenna and 4 ft LMR200 cable

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: March 30, 1999
Relative Humidity: 52%
Ambient Temperature: 24°C

MEASUREMENTS PERFORMED AT 1 METRE DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Calculated Limit @1m dB (μV/m)	Spec. Margin dB	Pass/ Fail
4.802	35.5	34.5	2	-1.5	-19.5	54.0	63.5	9.5	Pass
4.882	37.5	34.5	2	1.4	-19.5	53.1	63.5	10.4	Pass
4.960	40.0	34.5	2	4	-19.5	53.0	63.5	10.5	Pass
7.323	58.7	35.7	2.6	35.7	-19.5	41.8	63.5	21.7	Pass
7.440	58.2	35.7	2.6	35.7	-19.5	41.3	63.5	22.2	Pass
12.400	51.4	39.3	3.5	32	-19.5	42.7	63.5	20.8	Pass

Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Table 3.7.5 Radiated emission (modulated carrier) measurements test results with 8.5 dBi external antenna and 20 ft LMR400 cable or 8 ft LMR200 cable

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: March 30, 1999
Relative Humidity: 52%
Ambient Temperature: 24°C

MEASUREMENTS PERFORMED AT 1 METRE DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Calculated Limit @1m dB (μV/m)	Spec. Margin dB	Pass/ Fail
4.804	39.0	34.5	2	-1.5	-19.5	57.5	63.5	6.0	Pass
4.882	40.7	34.5	2	1.4	-19.5	56.3	63.5	7.2	Pass
4.960	45.0	34.5	2	4	-19.5	57.5	63.5	6.0	Pass
7.323	51.3	35.7	2.6	35.7	-19.5	34.4	63.5	29.1	Pass
7.440	53.6	35.7	2.6	35.7	-19.5	36.7	63.5	26.8	Pass

Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Table 3.7.6 Radiated emission (modulated carrier) measurements test results with 12 dBi external antenna and 20 ft LMR400 cable

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: March 30, 1999
Relative Humidity: 52%
Ambient Temperature: 24°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Specified Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
7.323	51.9	35.7	2.6	35.7	-19.5	35.0	54	19.0	Pass
7.440	56.6	35.7	2.6	35.7	-19.5	39.7	54	14.3	Pass

Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer

_____
Hermon Labs

Table 3.7.7 Radiated emission (modulated carrier) measurements test results with 18 dBi external antenna and 30 ft LMR400 cable

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: April 4, 1999
Relative Humidity: 49%
Ambient Temperature: 23°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Specified Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
7.440	45.2	35.7	2.6	35.7	-19.5	28.3	54	25.7	Pass

Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Table 3.7.8 Radiated emission (modulated carrier) measurements test results with 24 dBi external antenna and 50 ft LMR400 cable

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: BreezeCOM Ltd.
EUT: AP-10D
DATE: April 4, 1999
Relative Humidity: 49%
Ambient Temperature: 23°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency GHz	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Amplifier gain dB	Average Factor dB	Radiated Emissions dB (μV/m)	Specified Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
7.440	46.1	35.7	2.6	35.7	-19.5	29.2	54	24.8	Pass

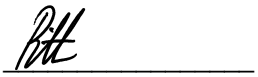
Notes to Table:

The measurements were performed with peak detector, resolution bandwidth = 1 MHz, video bandwidth = 1 MHz
Antenna type = double ridged guide in vertical polarization
Radiated emission dB(μV/m) = measured result dB(μV) + antenna factor dB(1/m) +cable loss (dB) – amplifier gain (dB) + average factor (dB) (During the measurements the received emissions were amplified)
Average Factor = -19.5 dB (see section 3.3.1).

Table Abbreviations:

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

Test performed by:
Mrs. Eleonora Pitt, test engineer



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Photograph No. 3.7.1
Radiated emission measurements test setup with the integral type antenna

Photograph No. 3.7.2
Radiated emission measurements test setup with the 5 dBi magnetic mount antenna

Photograph No. 3.7.3
Radiated emission measurements test setup with the 5 dBi magnetic mount antenna

Photograph No. 3.7.4
Radiated emission measurements test setup with the 8.5 dBi external antenna

Photograph No. 3.7.5
Radiated emission measurements test setup with the 8.5 dBi external antenna

Photograph No. 3.7.6
Radiated emission measurements test setup with the 6 dBi external antenna

Photograph No. 3.7.7
Radiated emission measurements test setup with the 12 dBi external antenna

Photograph No. 3.7.8
Radiated emission measurements test setup with the 18 dBi external antenna

Photograph No. 3.7.9
Radiated emission measurements test setup with the 24 dBi external antenna

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

3.8.1 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.

3.8.2 Test set-up

The radiated emissions measurements of the EUT with incorporated digital device and receiver were performed in the anechoic chamber at 3 meters measuring distance with biconilog and double ridged guide antennas. The measurements were done from 30 MHz to 5th harmonic. The EUT was placed on the wooden table as shown in Figure 3.8.1 and Photographs 3.8.1 to 3.8.9. The AP-10, AP-10D, SA-40 and SA-40D models were tested.
To find maximum radiation the turntable was rotated 360^{o}, 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. In frequency range from 30 to 1000 MHz the EMI receiver settings were: RBW=120 kHz, quasi-peak detector.

The receiver radiated emission measurements from 1 GHz up to 5 GHz were performed with the spectrum analyzer settings: RBW=VBW=1 MHz, peak detector was used. The spectrum analyzer settings are shown in the plots.

The results of measurements were recorded into Tables 3.8.1 to 3.8.3 and are shown in Plots 3.8.1 to 3.8.8 for AP-10D with all kinds of antennas, Plots 3.8.9, 3.8.10 - for SA-40D.

Reference numbers of test equipment used

HL 0041	HL 0275	HL 0465	HL 0521	HL 0593	HL 0594	HL 0604
HL 0815	HL 0816					

Full description is given in Appendix A.

Table 3.8.1 Radiated emission measurements test results
frequency range 30 MHz - 5 GHz

TEST SPECIFICATION: FCC part 15 subpart B § 15.109
COMPANY: BreezeCOM Ltd.
EUT: AP-10D with 2 dBi external antenna
DATE: April 4, 1999
RELATIVE HUMIDITY: 49%
AMBIENT TEMPERATURE: 23°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency MHz	Ant. Pol.	Radiated Emissions dB (μV/m)	Spec. Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
39.085	V	33.97	40.0	6.03	Pass
109.007	V	36.07	43.5	7.43	Pass
249.997	H	30.74	46.0	15.26	Pass
598.288	H	39.83	46.0	6.17	Pass
997.146	V	45.69	54.0	8.31	Pass

Notes to Table Calculations:

Measurements were performed with biconilog antenna and quasi-peak detector
Resolution bandwidth = 120 kHz
Ant. Pol. = Antenna polarization (V-vertical, H-horizontal)
Spec. Margin = Specification margins = dB below (negative if above) specification limit.

Test performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Table 3.8.2 Radiated emission measurements test results
frequency range 30 MHz - 5 GHz

TEST SPECIFICATION: FCC part 15 subpart B § 15.109
COMPANY: BreezeCOM Ltd.
EUT: SA-40 with integral antenna
DATE: April 4, 1999
RELATIVE HUMIDITY: 49%
AMBIENT TEMPERATURE: 23°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency MHz	Ant. Pol.	Radiated Emissions dB (μV/m)	Spec. Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
38.660	V	36.44	40.0	3.56	Pass
101.261	V	29.25	43.5	14.25	Pass
299.998	H	42.23	46.0	3.77	Pass

Notes to Table Calculations:

Measurements were performed with biconilog antenna and quasi-peak detector
Resolution bandwidth = 120 kHz
Ant. Pol. = Antenna polarization (V-vertical, H-horizontal)
Spec. Margin = Specification margins = dB below (negative if above) specification limit.

Test performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Table 3.8.3 Radiated emission measurements test results
frequency range 30 MHz - 5 GHz

TEST SPECIFICATION: FCC part 15 subpart B § 15.109
COMPANY: BreezeCOM Ltd.
EUT: SA-40D with 24 dBi external antenna
DATE: April 5, 1999
RELATIVE HUMIDITY: 50%
AMBIENT TEMPERATURE: 23°C

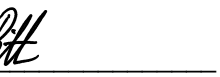
MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency MHz	Ant. Pol.	RBW MHz	Radiated Emissions dB (μV/m)	Spec. Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
35.764	V	0.120	36.70	40.0	3.30	Pass
1063.511	H	1	43.68	54.0	10.32	Pass
1130.043	H	1	39.55	54.0	14.45	Pass

Notes to Table Calculations:

Measurements were performed with biconilog antenna and quasi-peak detector
RBW - resolution bandwidth
Ant. Pol. = antenna polarization (V-vertical, H-horizontal)
Spec. Margin = a
pecification margins = dB below (negative if above) specification limit.

Test performed by:
Mrs. Eleonora Pitt, test engineer



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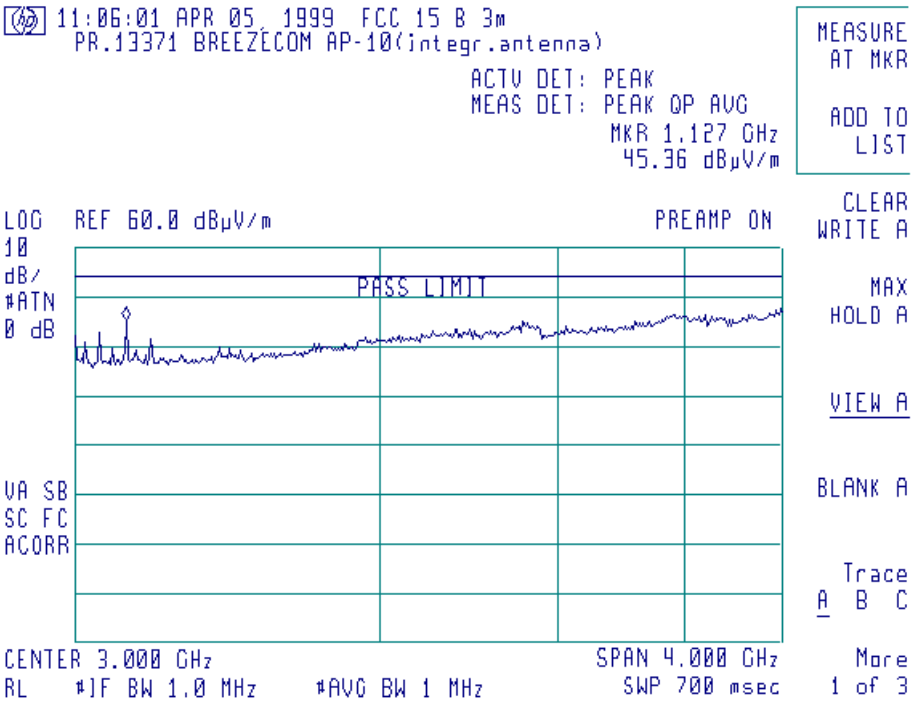
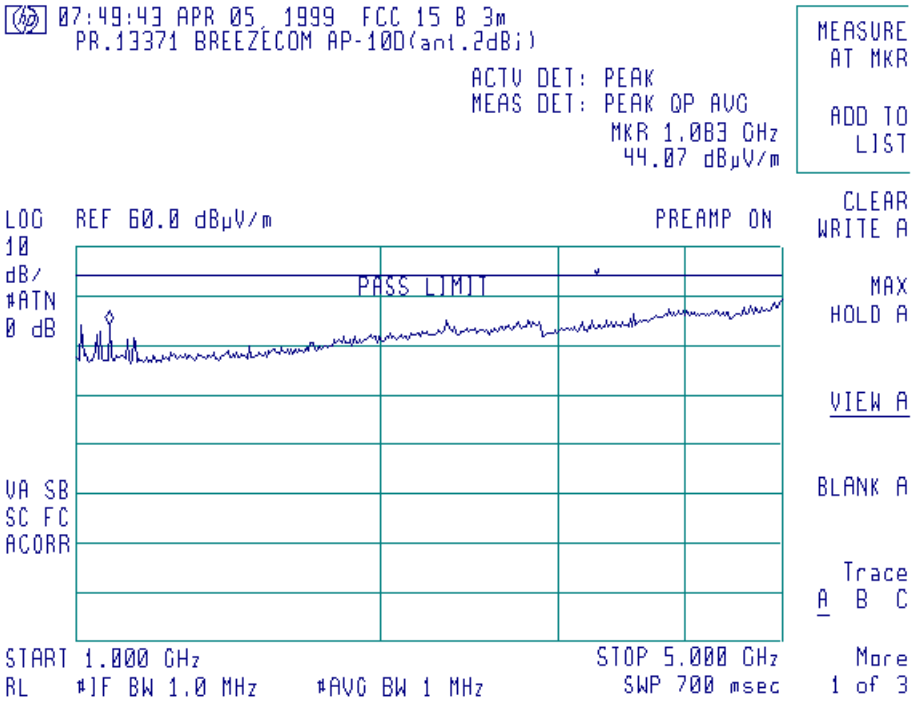
Plot 3.8.1

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



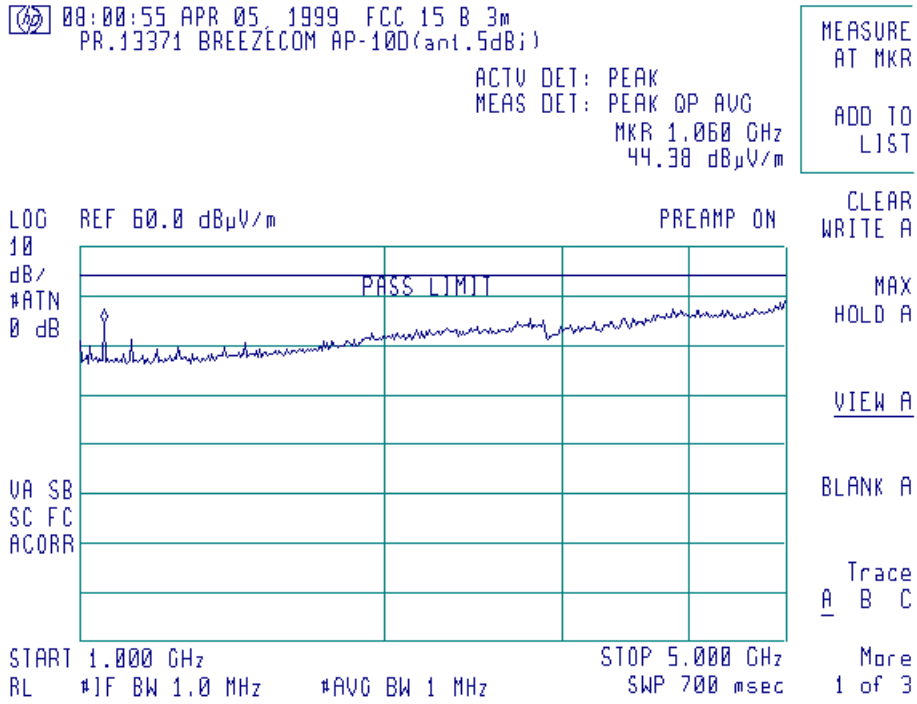
Plot 3.8.2

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



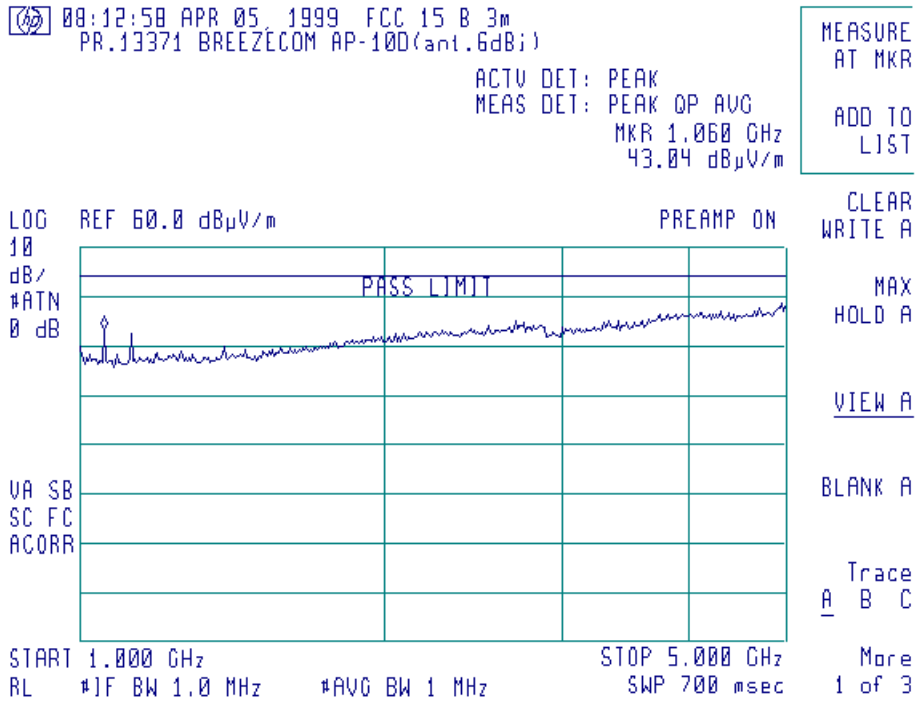
Plot 3.8.3

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



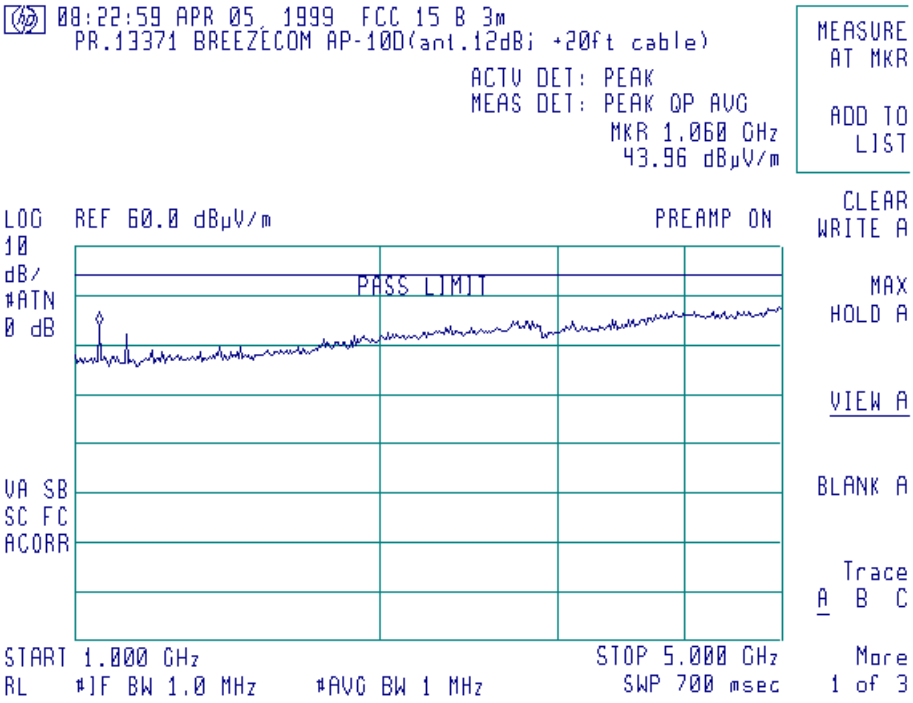
Plot 3.8.4

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



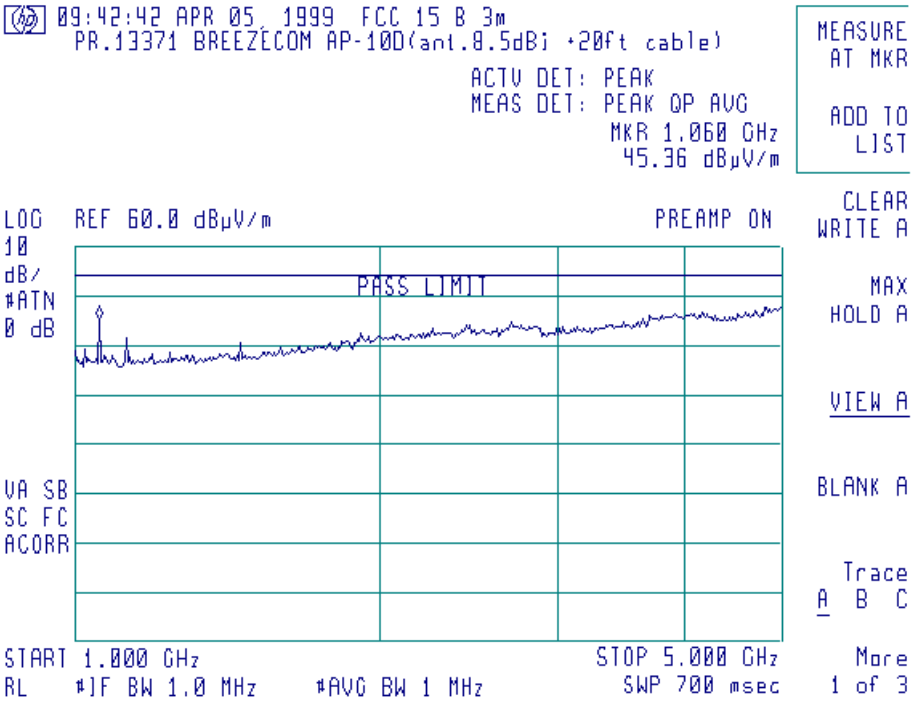
Plot 3.8.5

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



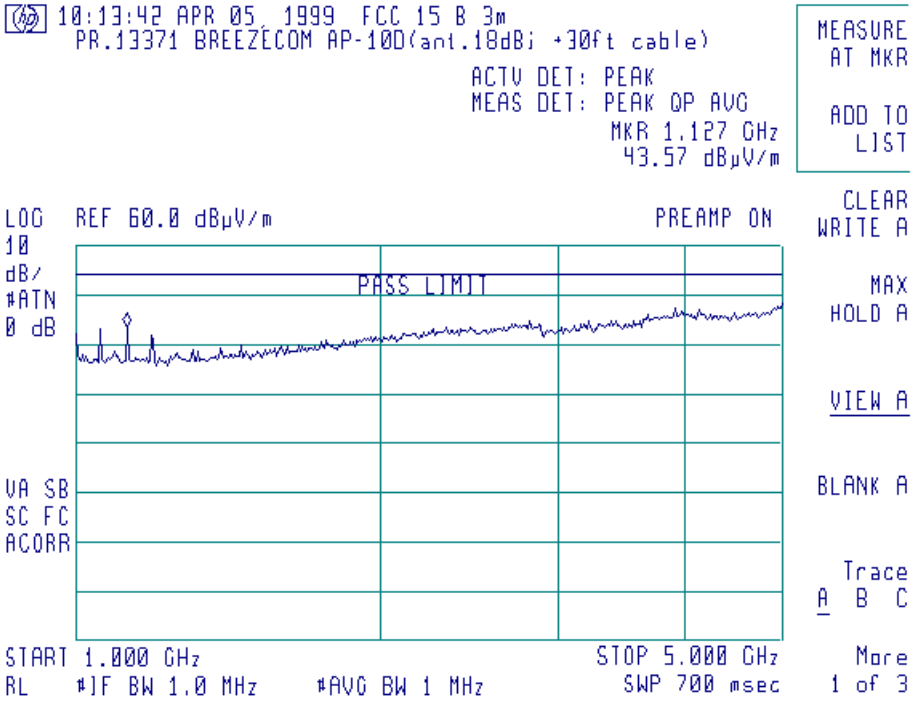
Plot 3.8.6

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



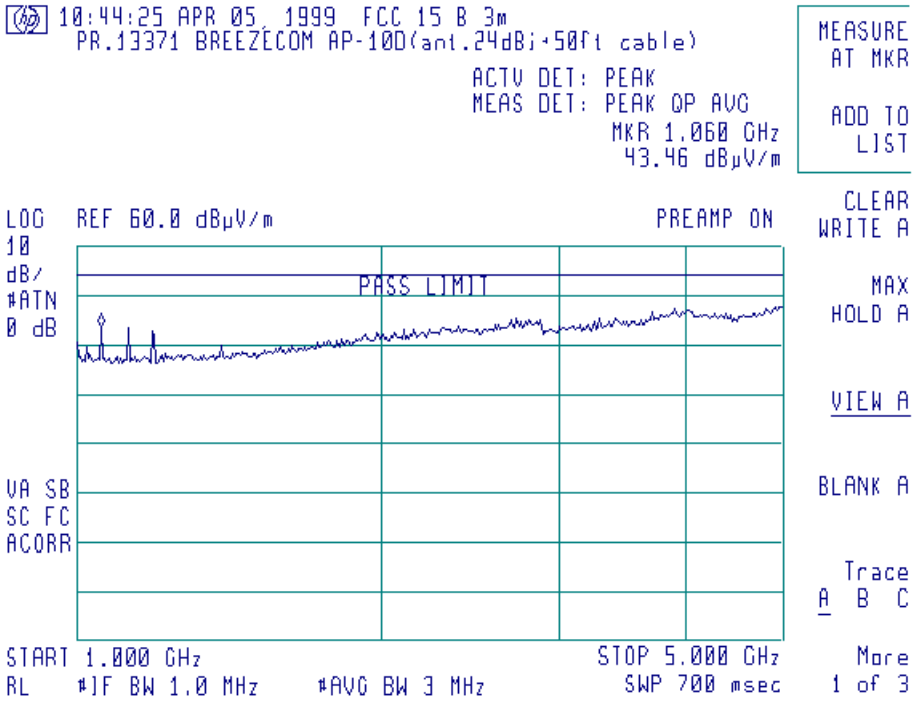
Plot 3.8.7

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



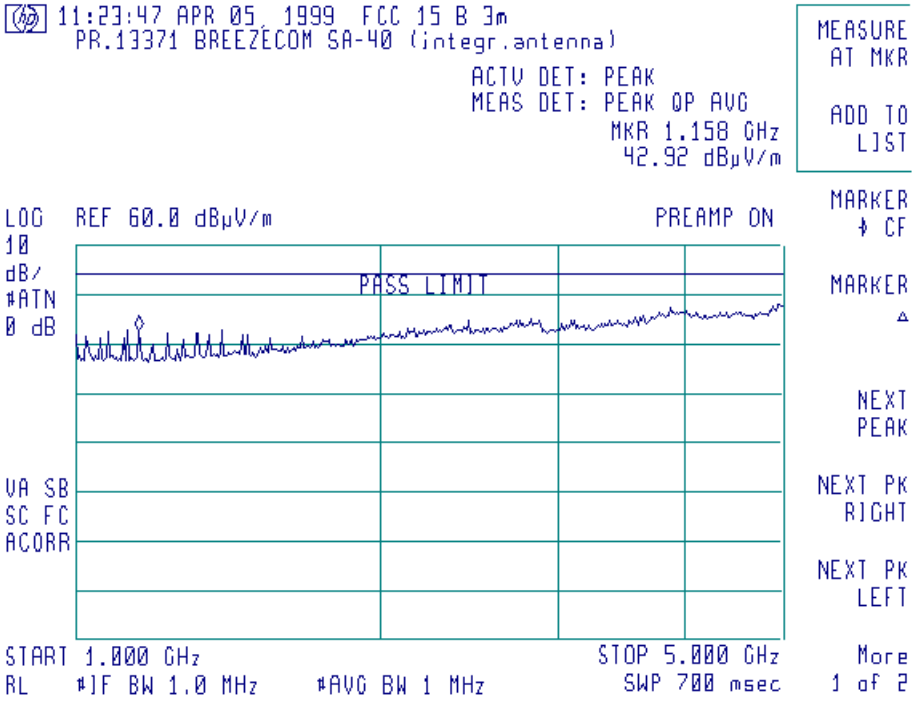
Plot 3.8.8

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



Plot 3.8.9

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device



Plot 3.8.10

Test Specification: §15.109, §15.209
Radiated emissions of receiver and digital incorporated device

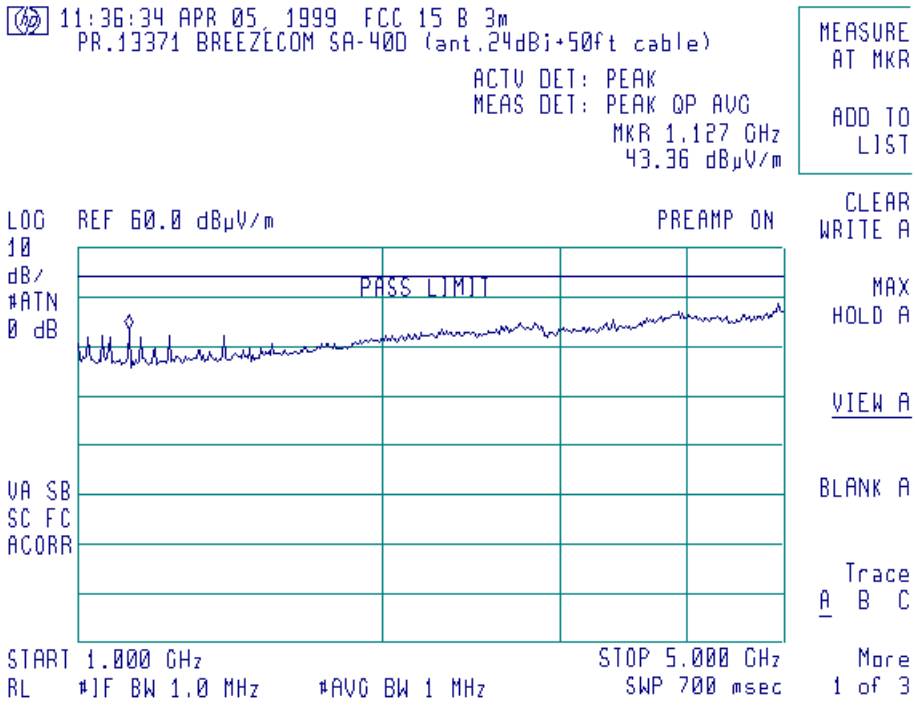
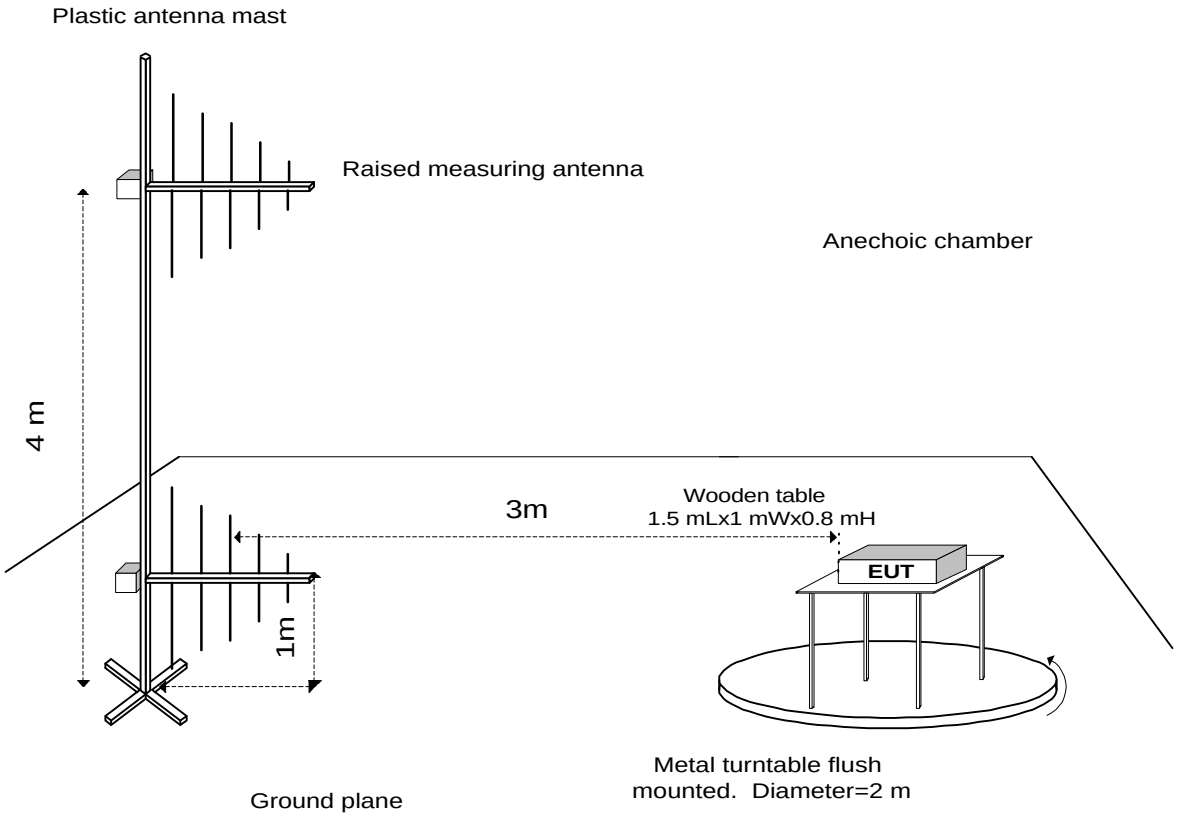


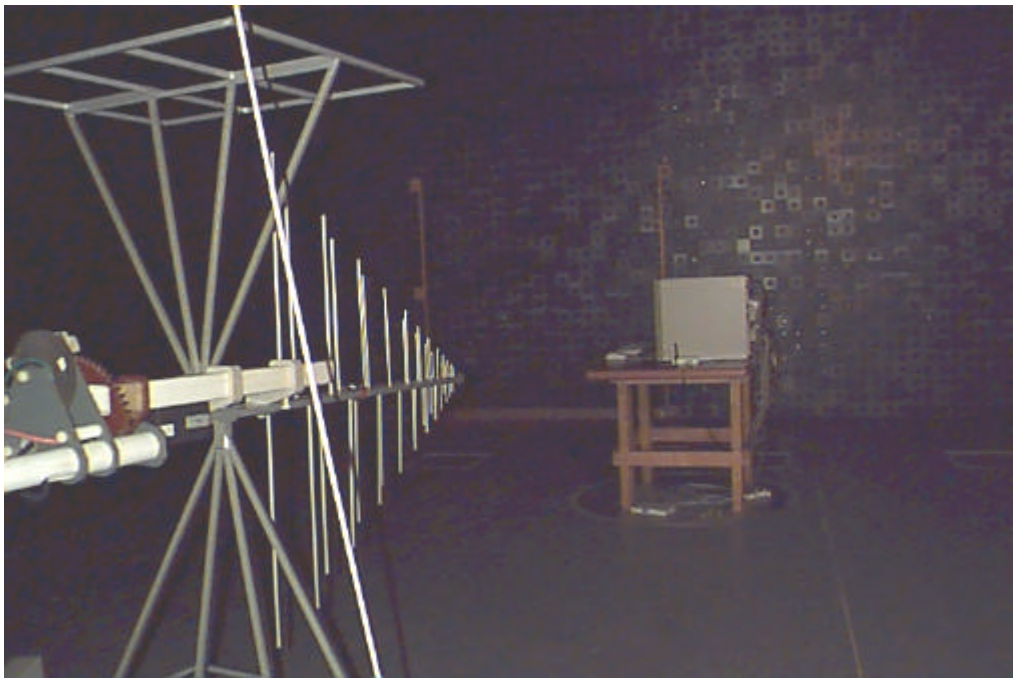
Figure 3.8.1
Radiated emission test setup



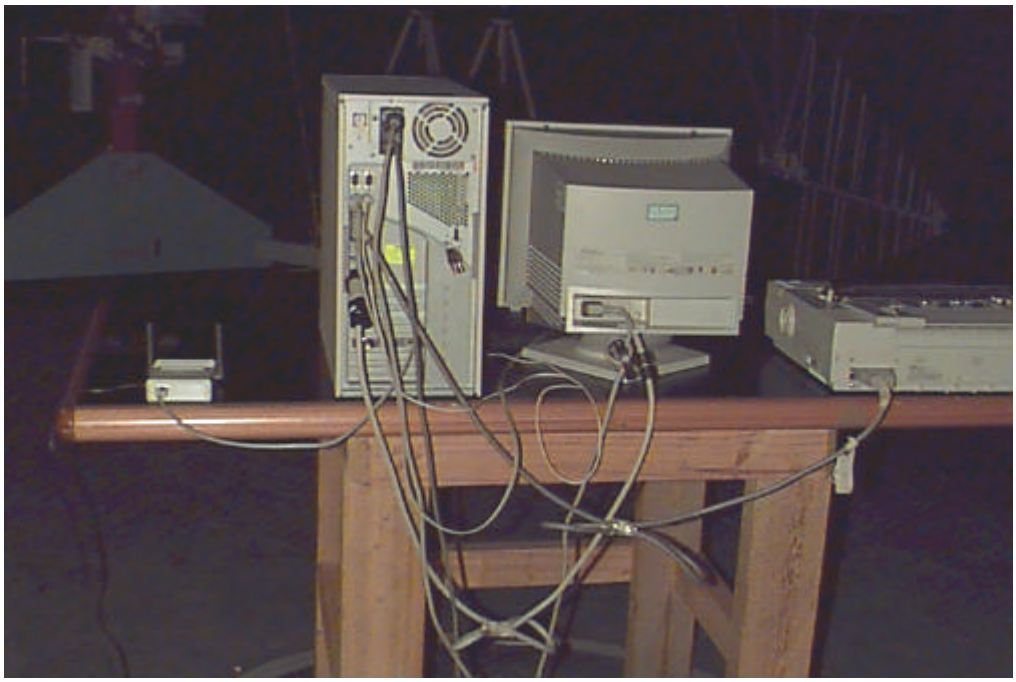
Photograph No. 3.8.1
Radiated emission measurement test setup
AP-10D with 2 dBi external antenna

Photograph No. 3.8.2
Radiated emission measurement test setup
AP-10D with 2 dBi external antenna

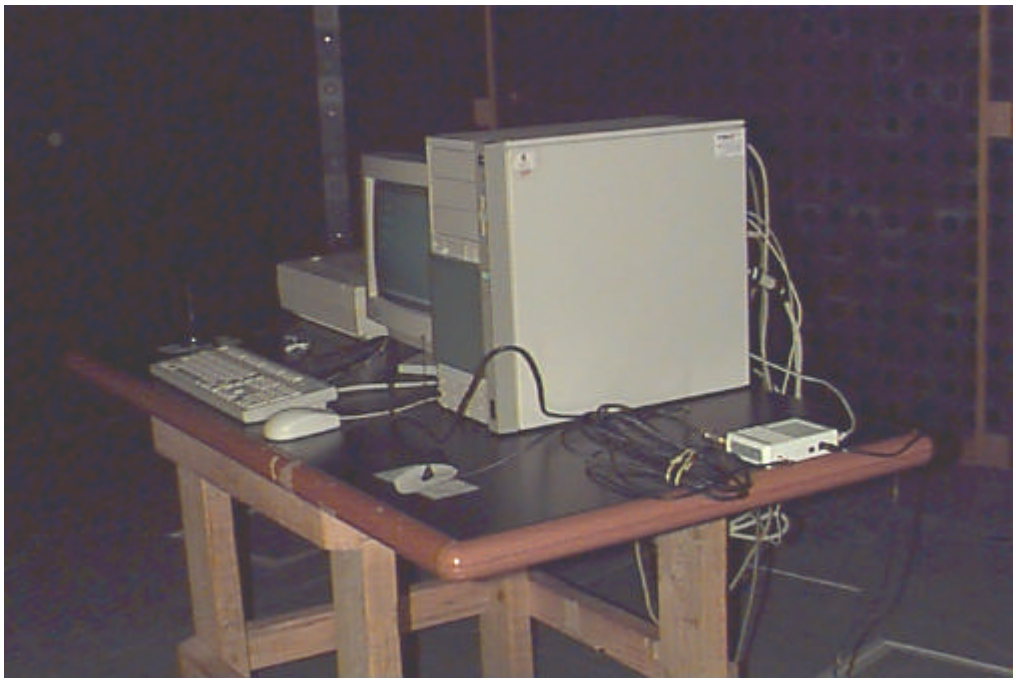
Photograph No. 3.8.3
Radiated emission measurement test setup
AP-10D with 2 dBi external antenna



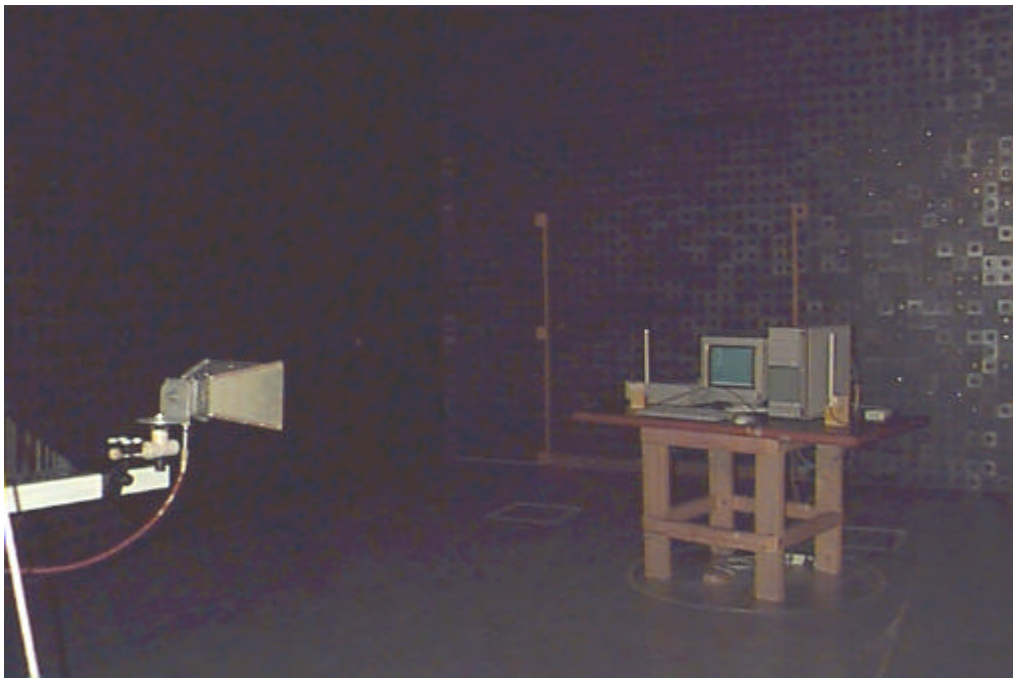
Photograph No. 3.8.4
Radiated emission measurement test setup
AP-10D with integral antenna



Photograph No. 3.8.5
Radiated emission measurement test setup
AP-10D with 5 dBi magnetic mount antenna



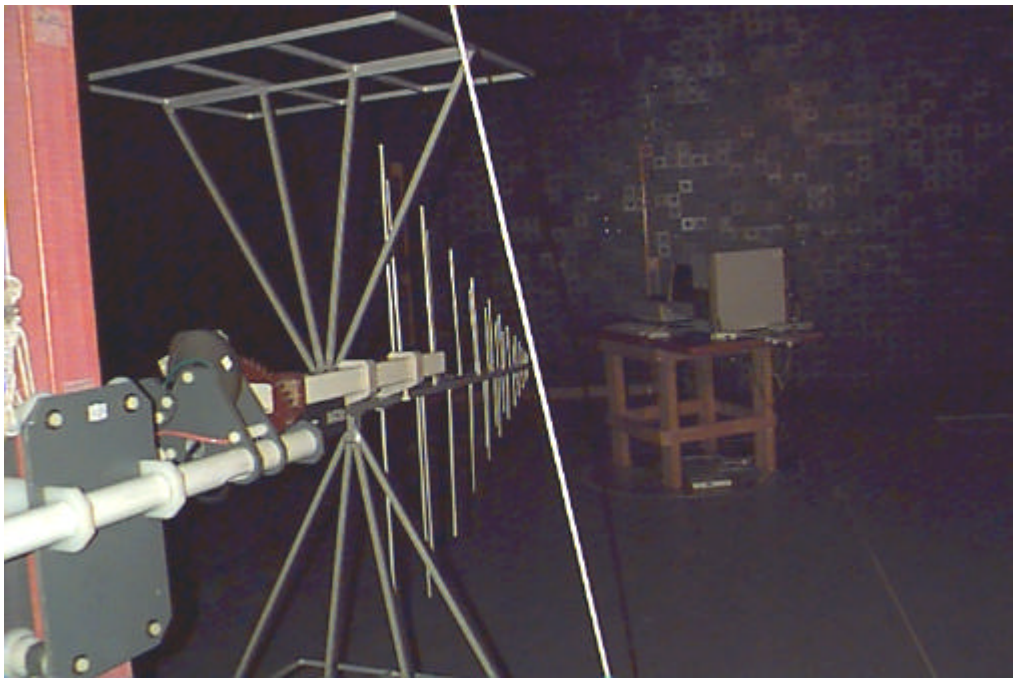
Photograph No. 3.8.6
Radiated emission measurement test setup
AP-10D with 6 dBi external antenna



Photograph No. 3.8.7
Radiated emission measurement test setup
SA-40 with integral antenna

Photograph No. 3.8.8
Radiated emission measurement test setup
SA-40 with integral antenna

Photograph No. 3.8.9
Radiated emission measurement test setup
SA-40 with integral antenna



3.9 Conducted Emission Measurements according to §15.107, §15.207

3.9.1 Definition of the test

This test was performed to measure conducted emissions.

3.9.2 Test set-up

The test was performed in the shielded room. The EUT was setup as shown in Figure 3.9.1 and Photographs 3.9.1 to 3.9.2.

The frequency range from 450 kHz to 30 MHz was investigated.

The measurements were performed on the EUT 120 V AC power lines (both neutral and phase) by means of the LISN, connected to the spectrum analyzer. The PC was powered via second LISN. The unused 50 Ω connector of the LISN was resistively terminated in 50 Ω when not connected to the measuring instrument. The position of the EUT cables was varied to determine maximum emission level. The peak detector (resolution bandwidth = 9 kHz) was used. The test results are shown in Tables 3.9.1, 3.9.2 and Plots 3.9.1 to 3.9.5.

Reference numbers of test equipment used

HL 0026	HL 0163	HL 0185	HL0447	HL 0672	HL 0787	HL 0817

Full description is given in Appendix A.

Table 3.9.1 Conducted emission measurements on EUT power lines

Frequency range : 450 kHz - 30 MHz
Detector : quasi peak

TEST SPECIFICATION:	FCC part 15 subpart B Class B
COMPANY:	BreezCOM Ltd.
EUT:	SA-40
DATE:	April 5, 1999
RELATIVE HUMIDITY:	50%
AMBIENT TEMPERATURE:	23°C

Frequency MHz	Line ID	Measured Conducted Emissions dB (μV)	Spec. Limit dB (μV)	Spec. Limit Margins dB	Pass/ Fail
20.885	Ph	46.54	48	1.46	Pass
20.982	Ph	46.26	48	1.74	Pass
21.176	Ph	43.39	48	4.61	Pass
21.337	N	43.99	48	4.01	Pass
22.675	Ph	43.20	48	4.80	Pass
24.222	Ph	44.07	48	3.97	Pass
24.464	Ph	43.67	48	4.33	Pass
25.016	N	43.90	48	4.10	Pass

Test parameters:
Detector type = QP (quasi peak).
Resolution bandwidth = 9 kHz.

Table calculations and abbreviations:
Conducted emission = EMI meter reading (dBμV) + cable loss (dB) +
LISN correction factor (dB). (For LISN correction factor refer to Appendix B).
Spec. limit = specification limit.
Spec. margin = dB below (negative if above) specification limit.
Line ID = Line identification (Ph - phase, N - neutral).

Test performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Table 3.9.2 Conducted emission measurements on EUT power lines

Frequency range : 450 kHz - 30 MHz
Detector : quasi peak

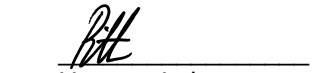
TEST SPECIFICATION:	FCC part 15 subpart B Class B
COMPANY:	BreezCOM Ltd.
EUT:	AP-10
DATE:	April 5, 1999
RELATIVE HUMIDITY:	50%
AMBIENT TEMPERATURE:	23°C

Frequency MHz	Line ID	Measured Conducted Emissions dB (μV)	Spec. Limit dB (μV)	Spec. Limit Margins dB	Pass/ Fail
0.598	Ph, N	37.90	48	10.10	Pass
1.435	Ph, N	39.10	48	8.90	Pass
2.992	Ph, N	36.85	48	11.15	Pass
4.427	Ph, N	36.98	48	11.02	Pass
4.546	Ph, N	38.10	48	9.90	Pass
5.025	Ph, N	36.70	48	11.30	Pass
5.264	Ph, N	36.76	48	11.24	Pass

Test parameters:
Detector type = QP (quasi peak).
Resolution bandwidth = 9 kHz.

Table calculations and abbreviations:
Conducted emission = EMI meter reading (dBμV) + cable loss (dB) +
LISN correction factor (dB). (For LISN correction factor refer to Appendix B).
Spec. limit = specification limit.
Spec. margin = dB below (negative if above) specification limit.
Line ID = Line identification (Ph - phase, N - neutral).

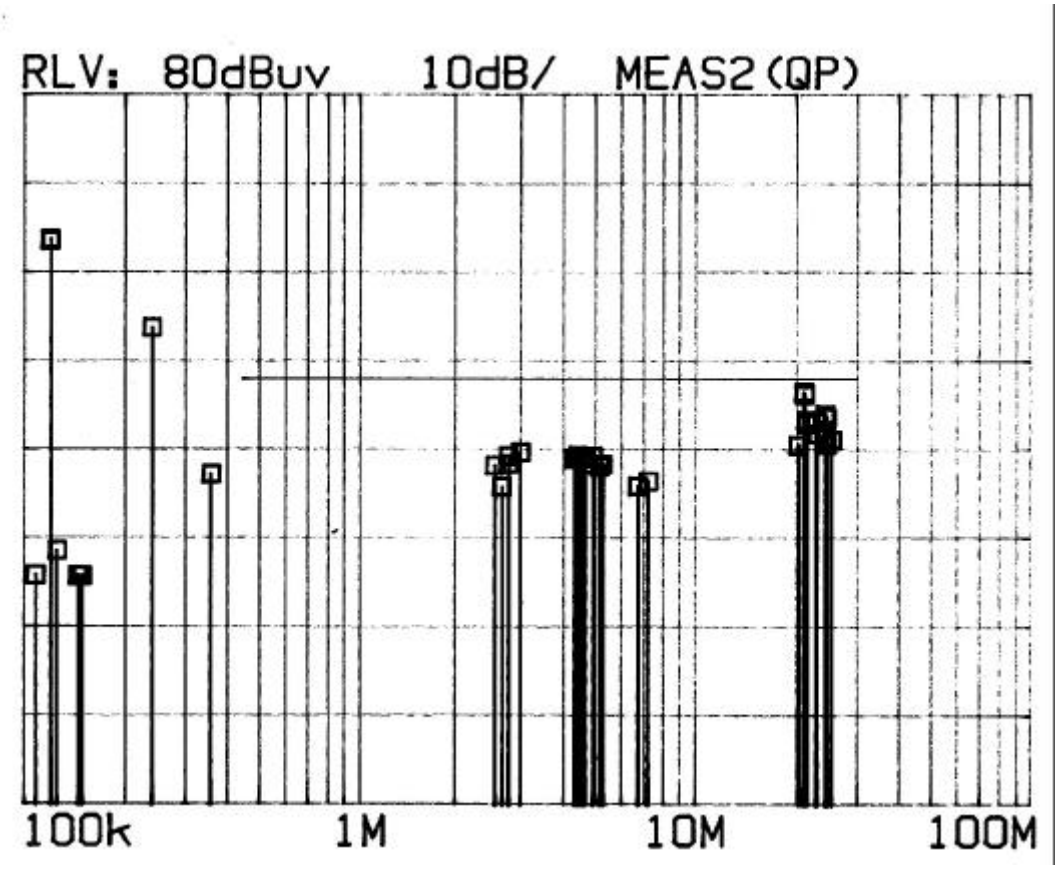
Test performed by:
Mrs. Eleonora Pitt, test engineer



Hermon Labs

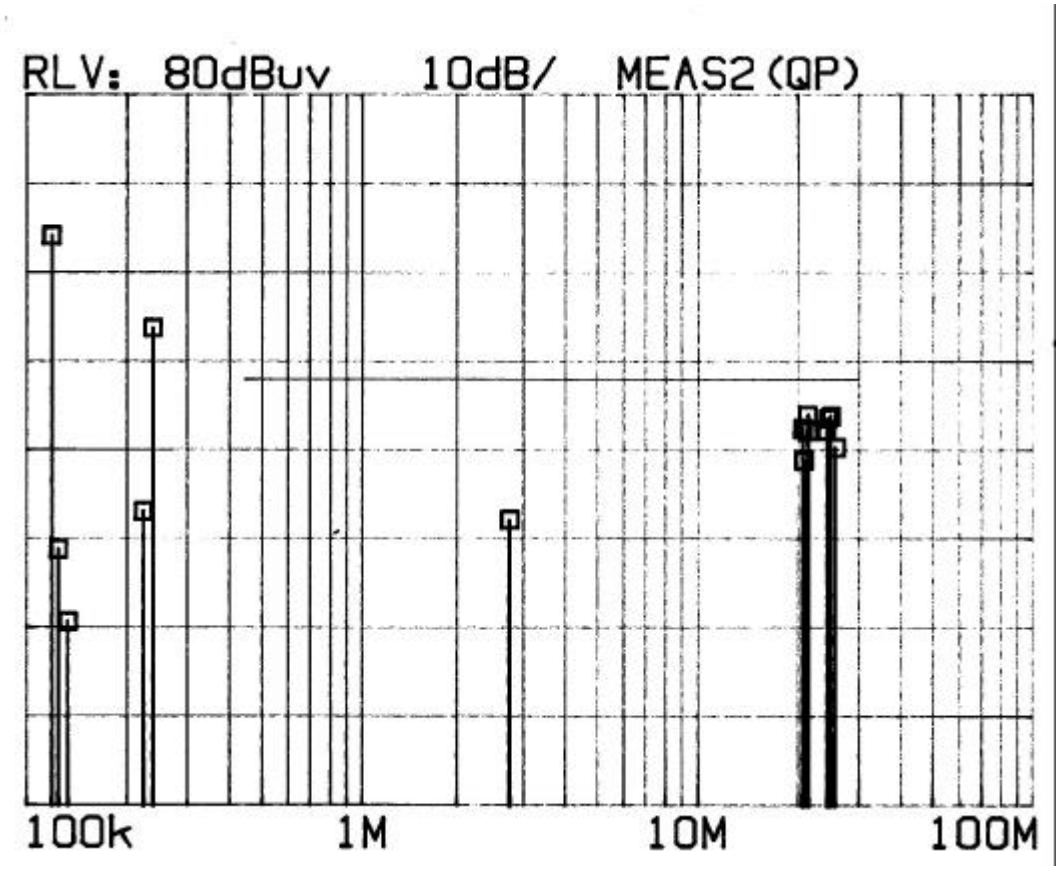
Plot 3.9.1

Test Specification: § 15.107, § 15.207
Conducted emission measurements on power line
Frequency range: 450 kHz-30 MHz
Line: phase
Detector: quasi-peak
EUT: SA-40



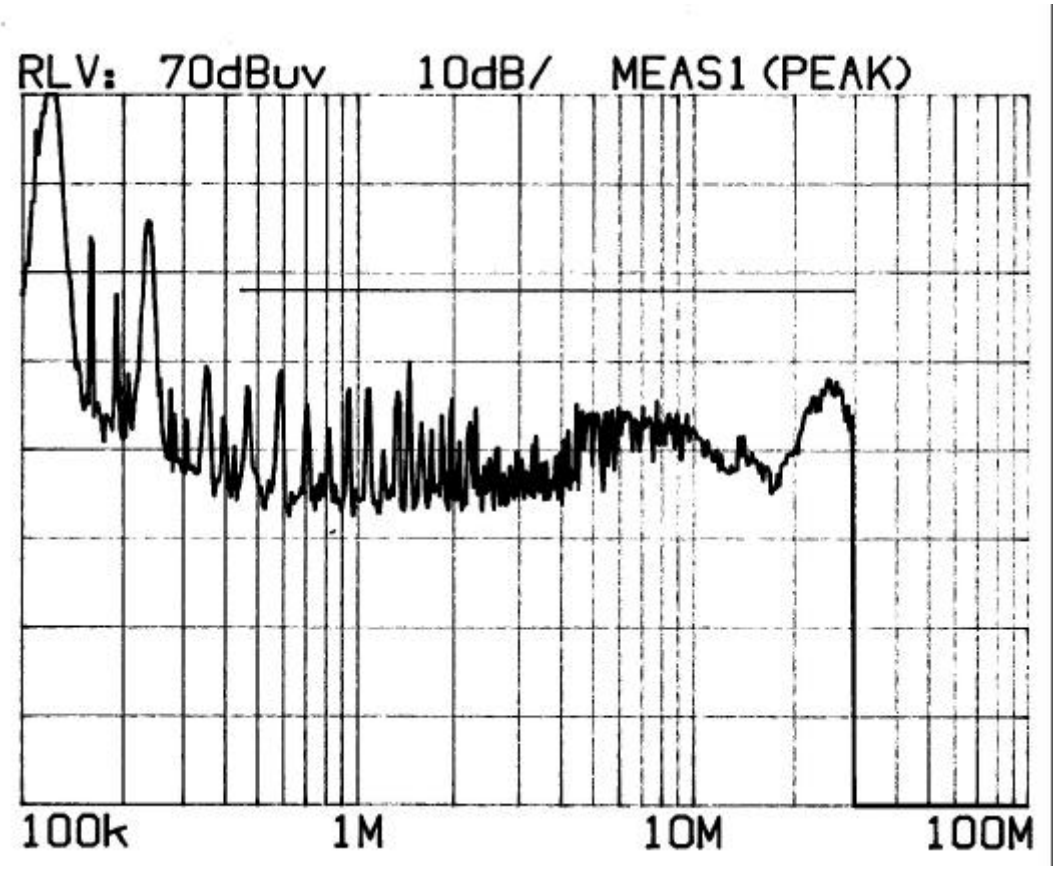
Plot 3.9.2

Test Specification: § 15.107, § 15.207
Conducted emission measurements on power line
Frequency range: 450 kHz-30 MHz
Line: neutral
Detector: quasi-peak
EUT: SA-40



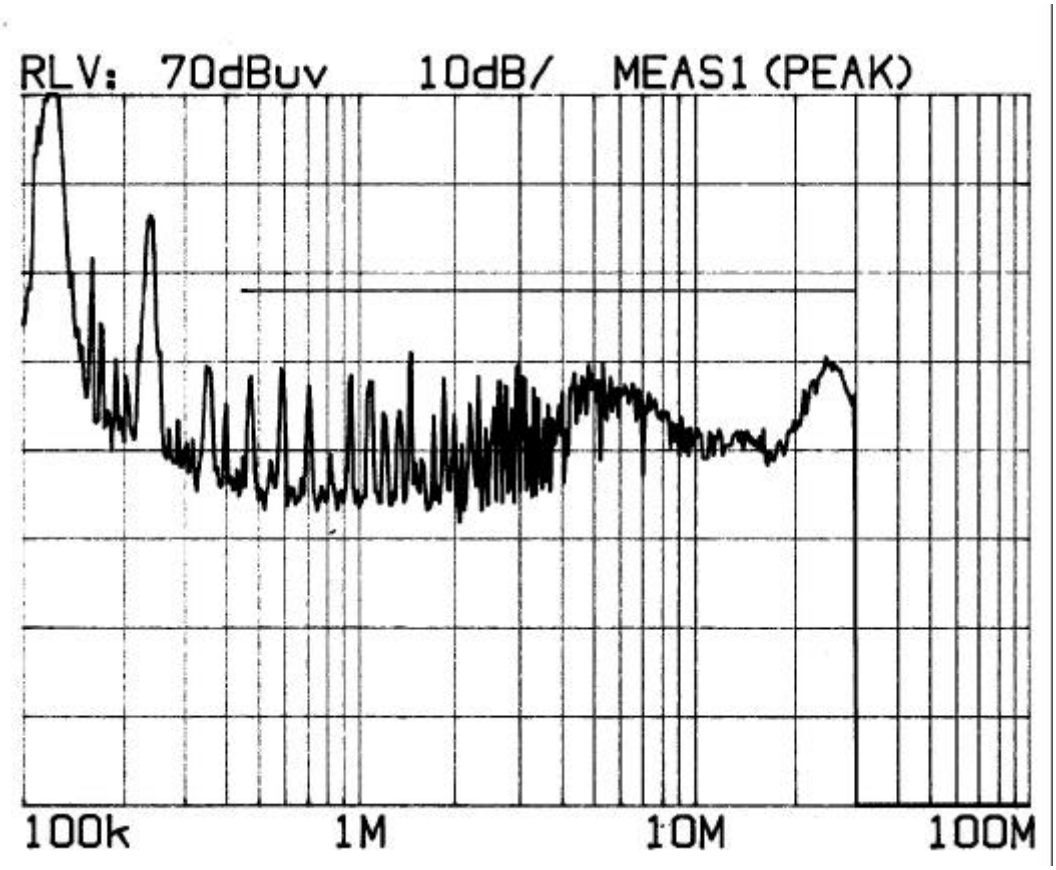
Plot 3.9.3

Test Specification: § 15.107, § 15.207
Conducted emission measurements on power line
Frequency range: 450 kHz-30 MHz
Line: phase
Detector: peak
EUT: AP-10



Plot 3.9.4

Test Specification: § 15.107, § 15.207
Conducted emission measurements on power line
Frequency range: 450 kHz-30 MHz
Line: neutral
Detector: peak
EUT: AP-10



Plot 3.9.5

Test Specification: § 15.107, § 15.207
Conducted emission measurements on power line
Frequency range: 450 kHz-30 MHz
Line: phase, neutral
Detector: quasi-peak
EUT: AP-10

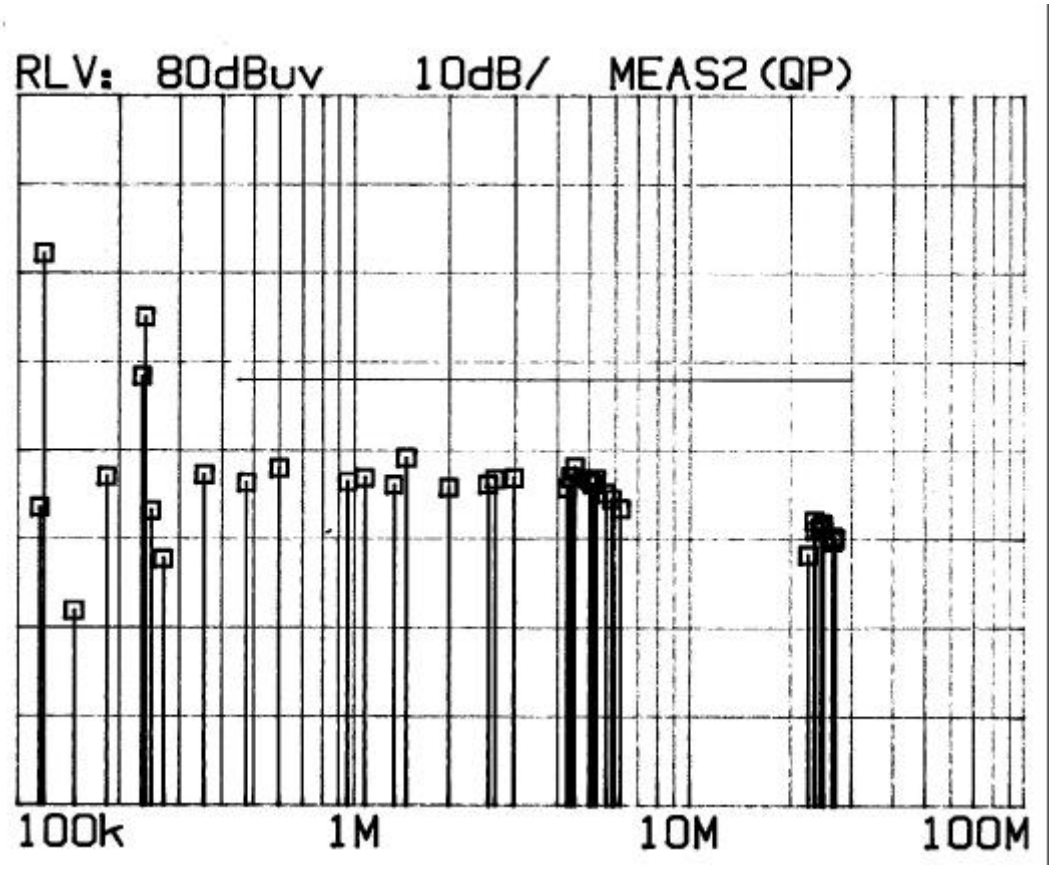
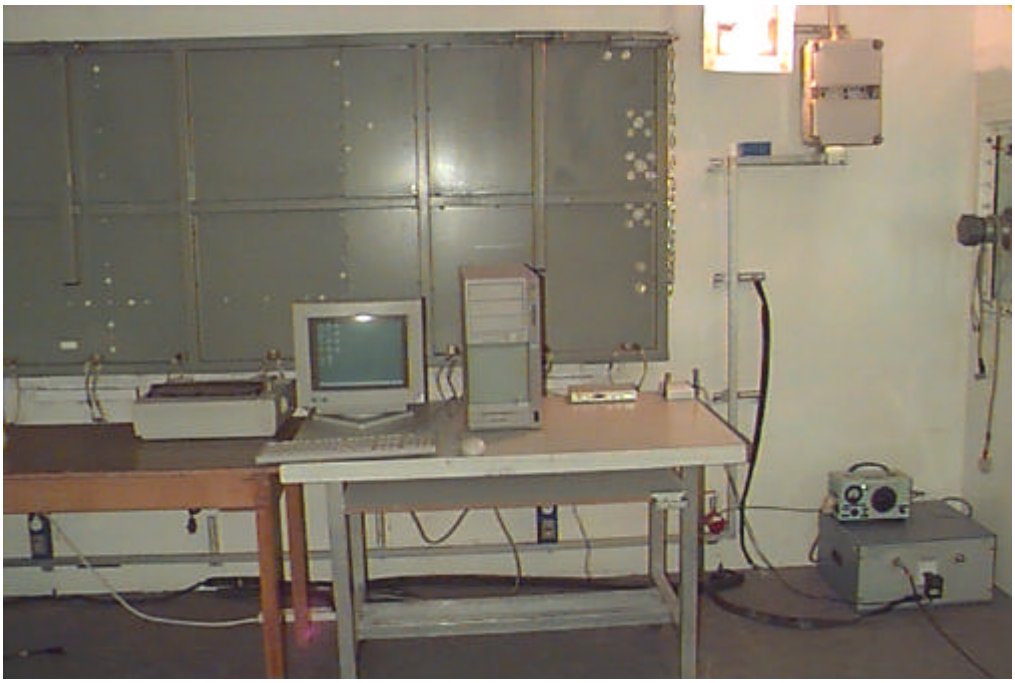


Figure 3.9.1
Conducted emission test setup

Photograph 3.9.1
Conducted emission measurement test setup
AP-10D

Photograph 3.9.2
Conducted emission measurement test setup
SA-40



4 Summary and Signatures

The EUT was found to be in compliance with the limits of FCC part 15 subpart C §15.205, §15.207, §15.209 (a), §15.247 and Subpart B, §15.107, §15.109.

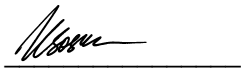
Test performed by:

Mrs. Eleonora Pitt, test engineer

_____

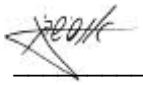
Approved by:

Dr. Edward Usoskin, C.E.O.



Responsible Person from Breezcom Ltd.

Mr. Itzik Raiskin RF group manager



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	8/99
0026	3460	Spectrum Analyzer, 100 Hz-2.2 GHz	Anritsu	MS 2601A	8/99
0032	3577	Biconical Antenna, 20-200 MHz	Electro-Metrics	BIA-25/30	4/00
0034	1988	Log Periodic Antenna, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	4/00
0038	028	Antenna Mast, 1-4 m	Hermon Labs	AM-1	2/00 Check
0041	2811	Ridged Guide Horn Antenna, 1-18 GHz	Electro-Metrics,	RGA 50/60	7/99
0056	2627	Attenuator, 50 Ohm, 2 W, 0 - 18 GHz, 30 dB	Hewlett Packard	8492A	6/99
0163	1314	LISN, 9kHz-100MHz	Electro-Metrics	ANS-25/2	11/99
0185	1765	Graphics Plotter	Hewlett Packard	7475A	NA
0275	040	Table non-metallic, adjustable height, 1.5 x 1.0 x 0.8 m	Hermon Labs	TNM	3/00 Check
0287	042	Turntable, Motorized Diameter, 2m	Hermon Labs	TMD-2	4/00 Check
0412	8769	Cable coax, Microwave, DC-18 GHz, N-N, 3 m	Gore	36Q01Q0111 8.2	9/99
0447	0447	LISN, 16/2, 300 V RMS	Hermon Labs	LISN 16-1	12/99
0465	023	Anechoic Chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	10/99
0521	0319	Spectrum Analyzer with RF filter section (EMI Receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	7/99
0547	400	Amplifier, GaAs FET, 6-18 GHz, 2 W, 30 dB, 12 V/ 1.2 A, N.F4.5 dB	Avantek	AMT-12407 M	12/99
0554	4300	Amplifier, 2-18 GHz	Miteq	ADF4	12/99
0566	3566	Antenna, Biconical, 20-200 MHz	Electro-Metrics	BIA 25/30	4/00
0593	101	Antenna Mast, 1-4 m/ 1-6 m Pneumatic	Hermon Labs	AM-F1	4/00 check
0594	102	Turntable for Anechoic Chamber, flush mounted, d=1.2 m, pneumatic	Hermon Labs	WDC1	11/99
0604	9611-1011	Antenna Biconilog Log-Periodic/T Bow-Tie, 26 - 2000 MHz	EMCO	3141	7/99

HL Serial No.	Serial No.	Description	Manufacturer	Model No.	Due Calibr.
0672	027	Shielded Room 4.6(L) x 4.2(W) x2.4(H) m	Hermon Labs	SR-3	5/99 Check
0787	1877	Transient limiter	Hewlett Packard	11947A-8ZE	11/99
0815	151	Cable, coax, RG-214, 7.3 m, N-type connectors, inside anechoic chamber	Hermon Labs	C214-7	8/99
0816	152	Cable, coax, RG-214, 8 m, N-type connectors, outside anechoic chamber	Hermon Labs	C214-8	8/99
0817	153	Cable, coax, RG-58, 8 m, N-type connectors	Hermon Labs	C58-8	8/99
1175	84	Microwave 5 m cable	Gore	84C01C0224 5.2	2/00

APPENDIX B-Test Equipment Correction Factors

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).

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

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 is to be added to receiver meter reading in dB(μV) to convert to field intensity in dB(μV/meter).