Test Report No.8112311975

On Breezecom Ltd.
BreezeAccess 2.4 GHz Base Station with Andrew antenna

Model: AU-RE-HP-2.4

From The Standards Institution
Of Israel
Industry Division
Telematics Laboratory
EMC Section

ACCREDITED
Certificate No.1487-01

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Title: Test on BreezeAccess 2.4 GHz Base Station with Andrew antenna **Model: AU-RE-HP-2.4**

Order placed by:	Breezecom Ltd.
Address:	P.O. Box 13139 Tel Aviv 61131 Israel
Sample for test selected by:	The orderer
The date of test:	23/07/2001

Description of Equipment

Under Test (EUT):	BreezeAccess 2.4 GHz Base Station with Andrew antenna
Model:	AU-RE-HP-2.4
S/N:	S2421300
Manufactured by:	Breezecom Ltd.

Reference Documents:

- CFR 47 FCC: "Rules and Regulations";
  Part 15. "Radio frequency devices";
  Subpart C: "Intentional radiators" Sec.15.205, 15.209

Test Results: See section 4

This Test Report contains 23 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

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1 EUT Description and operation

1.1 General description:

Description of Equipment Under Test (EUT): BreezeAccess 2.4 GHz Base Station with Andrew antenna

Model: AU-RE-HP-2.4

S/N: S2421300

Manufactured by: Breezecom Ltd.

The EUT is a spread spectrum transmitter operating within the frequency band 2401 – 2478 MHz.
Type of antenna used: external model Andrew

1.2 Test requirements:

1. **Spurious emission measurements up to 10 th harmonic for 3 operating frequencies:**

- Low frequency = 2401 MHz (channel #1)
- middle frequency = 2441 MHz (channel #41)
- high frequency = 2478 MHz (channel #78).

Test requirements per FCC Part 15 Subpart C Sec.15.209.

2. **Radiated emission measurements in restricted bands :**

- 2310-2390 MHz
- 2483.5-2500 MHz

Test requirements per FCC Part 15 Subpart C per Sec.15.205.

2 Test specification, Methods and Procedures

Test Specification:

- CFR 47 FCC: "Rules and Regulations";
  Part 15. "Radio frequency devices";
  Subpart C: "Intentional radiators".Sec.15.205, 15.209

Methods and Procedures:

- 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".

3 Measurements, examinations and derived results

3.1 Location of the Test Site:

EMC laboratory of the Standards Institution of Israel in Tel-Aviv.

3.2 Test condition:

Temperature: 22 °C
Humidity: 60 %

3.3 Radiated emission test:

3.3.1 Test procedure:

The measurements were performed in the Anechoic Chamber.
The EUT was arranged on a non-metallic table 0.8 m placed on the turntable. The turntable was slowly rotated to find the maximum emissions.

All measurements were performed at 1 meter measurement distance, antenna height was about 1m.
Measuring antenna used: Double Ridge

The measuring equipment settings were:

Detector type	Average
Resolution Bandwidth	1MHz

The frequency range was investigated from 4800 MHz up to 24800 MHz using a 1-18 GHz standard gain horn.
Because of measuring Double Ridge antenna was calibrated up to 18 GHz the measurements above 18 GHz were taken for information only.

3.3.2 Radiated emission test results:

Test results are presented in table #1 to #6 (spurious emissions measurements) and in Plots #1, #2 (emissions in restricted bands).

Table 1.

Spurious emissions test results

Operating frequency Low 2401 MHz
EUT antenna polarization Vertical

Frequency (MHz)	Emission level (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)	Results
4802	46.61	53.9	7.29	Complies
7203	47.25	53.9	6.65	Complies
9604	40.3	53.9	13.6	Complies
12005	45.77	53.9	8.13	Complies
14406	30.92	53.9	22.98	Complies
16807	30.61	53.9	23.29	Complies
19208	35.6	53.9	18.3	Informative
21609	36.03	53.9	17.87	Informative
24010	38.34	53.9	15.56	Informative

Note : Emission level = E Reading (dBμV) + Cable loss (dB) + Antenna Factor (dB/m) + Distance correction factor
For Cable Loss and Antenna Factor refer to Appendix 2.
Distance correction factor = -9.5 dB (correction to extrapolation reading from 1 m to 3m specified distance)

Table 2

Spurious emissions test results

Operating frequency Low 2401 MHz
EUT antenna polarization Horizontal

Frequency (MHz)	Emission level (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)	Results
4802	41.34	53.9	12.56	Complies
70229	43.75	53.9	10.15	Complies
9604	42.18	53.9	11.72	Complies
12004	46.87	53.9	7.03	Complies
14405	30.96	53.9	22.94	Complies
16810	30.45	53.9	23.45	Complies
19210	35.00	53.9	18.9	Informative
21610	36.16	53.9	17.74	Informative
24010	38.30	53.9	15.6	Informative

Table 3.
Spurious emissions test results

Operating frequency Middle 2441 MHz
EUT antenna polarization Vertical

Frequency (MHz)	Emission Level (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)	Results
4882	37.37	53.9	16.53	Complies
7323	48.72	53.9	5.18	Complies
9764	45.2	53.9	8.7	Complies
12205	45.33	53.9	8.57	Complies
14646	30.5	53.9	23.4	Complies
17087	31.44	53.9	22.46	Complies
19528	35.46	53.9	18.44	Informative
21969	37.03	53.9	16.87	Informative
24410	38.89	53.9	15.01	Informative

Table 4.
Spurious emissions test results

Operating frequency Middle 2441 MHz
EUT antenna polarization Horizontal

Frequency (MHz)	Emission Level (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)	Results
4882	42.7	53.9	11.2	Complies
7323	47.76	53.9	6.14	Complies
9764	39.19	53.9	14.71	Complies
12205	48.26	53.9	5.64	Complies
14646	35.2	53.9	18.7	Complies
17087	31.56	53.9	22.34	Complies
19528	35.28	53.9	18.62	Informative
21969	36.95	53.9	16.95	Informative
24410	38.65	53.9	15.25	Informative

Table 5.
Spurious emissions test results

Operating frequency High 2478 MHz
EUT antenna polarization Vertical

Frequency (MHz)	Emission Level (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)	Results
4956	45.11	53.9	8.79	Complies
7434	48.79	53.9	5.11	Complies
9912	41.66	53.9	12.24	Complies
12390	34.96	53.9	18.94	Complies
14868	29.53	53.9	24.37	Complies
17346	32.33	53.9	21.57	Complies
19824	35.48	53.9	18.42	Informative
22302	35.59	53.9	18.31	Informative
24780	38.07	53.9	15.83	Informative

Table 6.
Spurious emissions test results

Operating frequency High 2478 MHz
EUT antenna polarization Horizontal

Frequency (MHz)	Emission Level (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)	Results
4956	47.11	53.9	6.79	Complies
7434	47.23	53.9	6.67	Complies
9912	43.94	53.9	9.96	Complies
12390	32.24	53.9	21.66	Complies
14868	31.42	53.9	22.48	Complies
17346	32.25	53.9	21.65	Complies
19824	35.71	53.9	18.19	Informative
22302	36.07	53.9	17.83	Informative
24780	38.59	53.9	15.31	Informative

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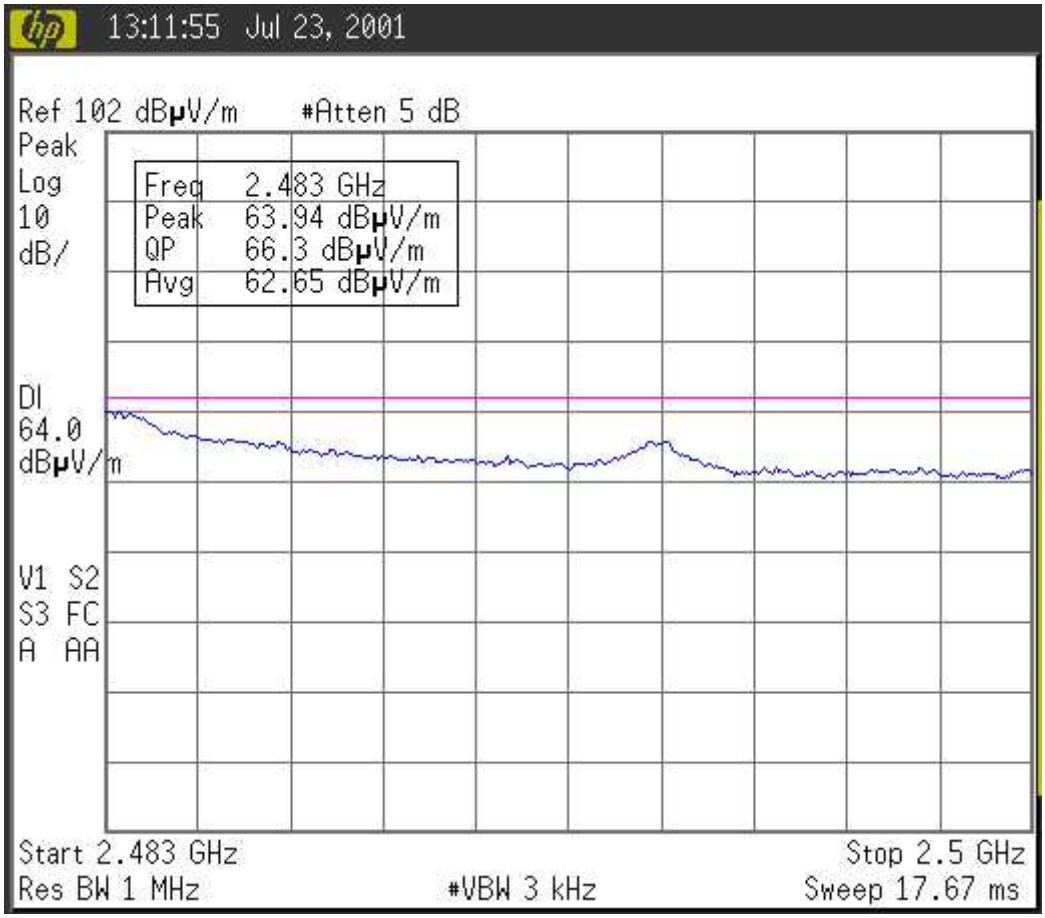
Plot #1

Radiated emissions measured in restricted band 2483.5 –2500 MHz



Note 1: The measurements were performed at 1 m distance instead of 3 m, thus the specified limit of 53.9 dBµV/m on the plot raised to 10 dB.

Note 2: The Video Bandwidth 3 kHz instead of 10 Hz was used (3 kHz VBW provides the measured result of more high level than 10 Hz VBW).

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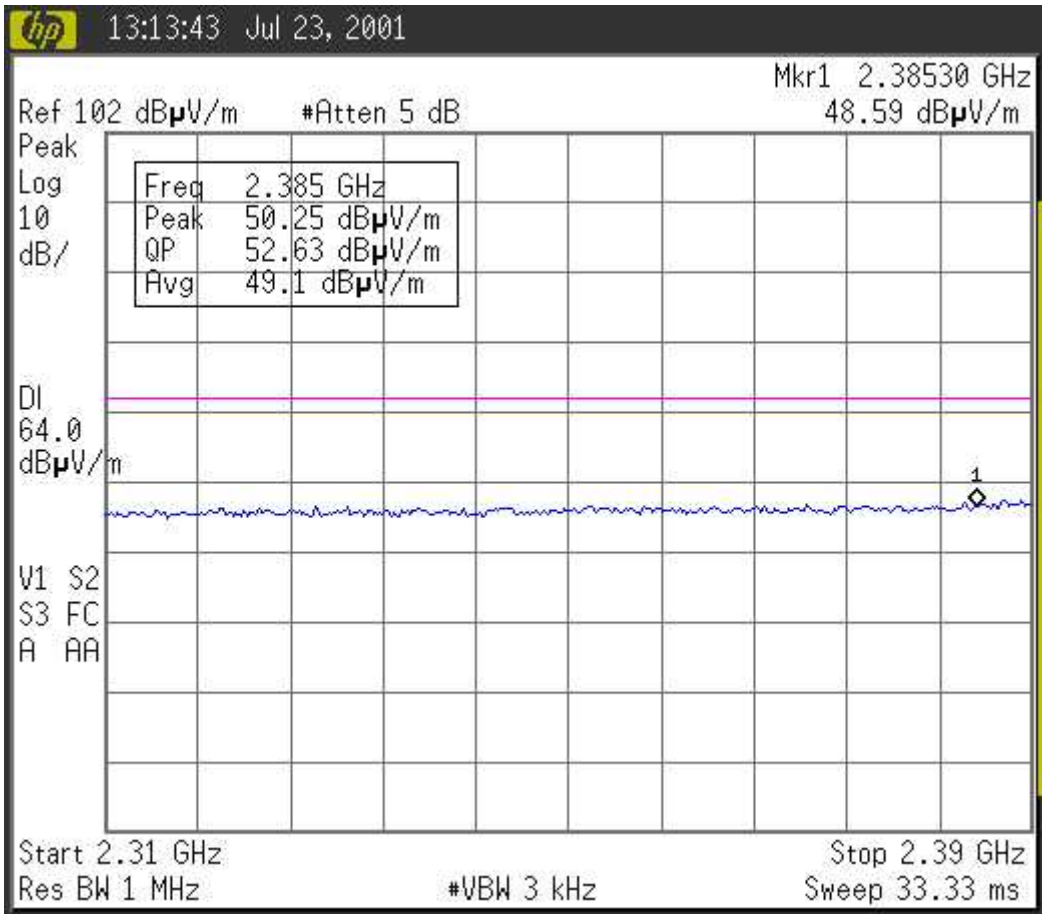
Plot #2

Radiated emissions measured in restricted band 2310–2390 MHz



4 Compliance with specification

Test	Standard	Test result
Spurious radiated emission Frequencies range to 18000 MHz	FCC Part 15 Subpart C Sec.15.209	Complies
Radiated emissions in restricted bands	FCC Part 15 Subpart C Sec.15.205	Complies

Telematics Laboratory
24 July 2001

Name: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Name Albert Herzenshtein
Position: Test Engineer

5 Appendix 1: Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding once a year.

Instrument	Manufac-turer	Model	Serial No.	Last calibration date	Next calibration date
Spectrum analyze 10 KHz-26.5 GHz	HP	E7405a	SII 4944	04/01	04/02
Antenna Double Ridge 1-18 GHz	EMCO	3115	SII4873	03/01	03/02

6 Appendix 2: Antenna Factor and Cable Loss

Cable Loss
Type: Sucoflex; Ser.No.21328/4PE; 4 m length

Point	Frequency (GHz)	Cable Loss (dB)
1	1.8 – 3.6	2.43
2	3.6 – 5.4	3.06
3	5.4-7.2	3.66
4	7.2-9.0	4.11
5	9.0-10.8	4.53
6	10.8-12.6	4.93
7	12.6-14.4	5.3
8	14.4-16.2	5.67
9	16.2-18.00	6.02

Antenna Factor
Double Ridged Guide Antenna mfr EMCO model 3115

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	24.8
2	1500	25.0
3	2000	27.4
4	2500	28.9
5	3000	31.0
6	4000	33.1
7	4500	32.5
8	5000	32.4
9	6000	53.7
10	6500	35.6
11	7000	36.4
12	7500	36.9
13	8000	37.0
14	8500	38.0
15	9000	38.6
16	9500	38.4
17	10000	38.4
18	10500	38.4
19	11000	38.9
20	11500	39.6
21	12000	39.4
22	12500	39.2
23	13000	40.3
24	13500	41.0
25	14000	41.2
26	14500	41.3
27	15000	40.0
28	15500	38.0
29	16000	38.1
30	16500	40.3
31	17000	42.2
32	17500	44.6
33	18000	46.2

7 Appendix 3: Test configuration illustration

Photo #1. EUT test setup

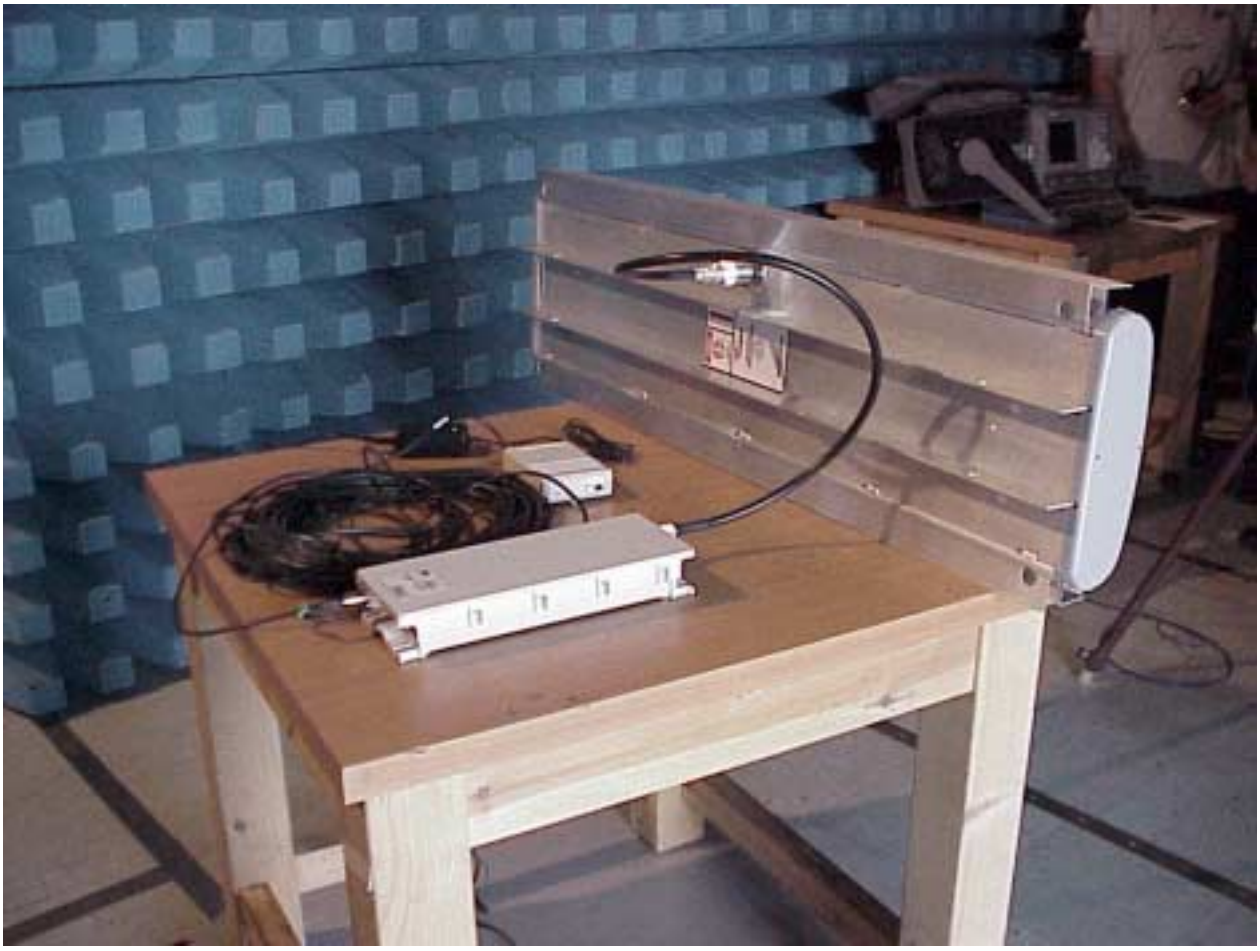


Photo #2. : EUT test setup

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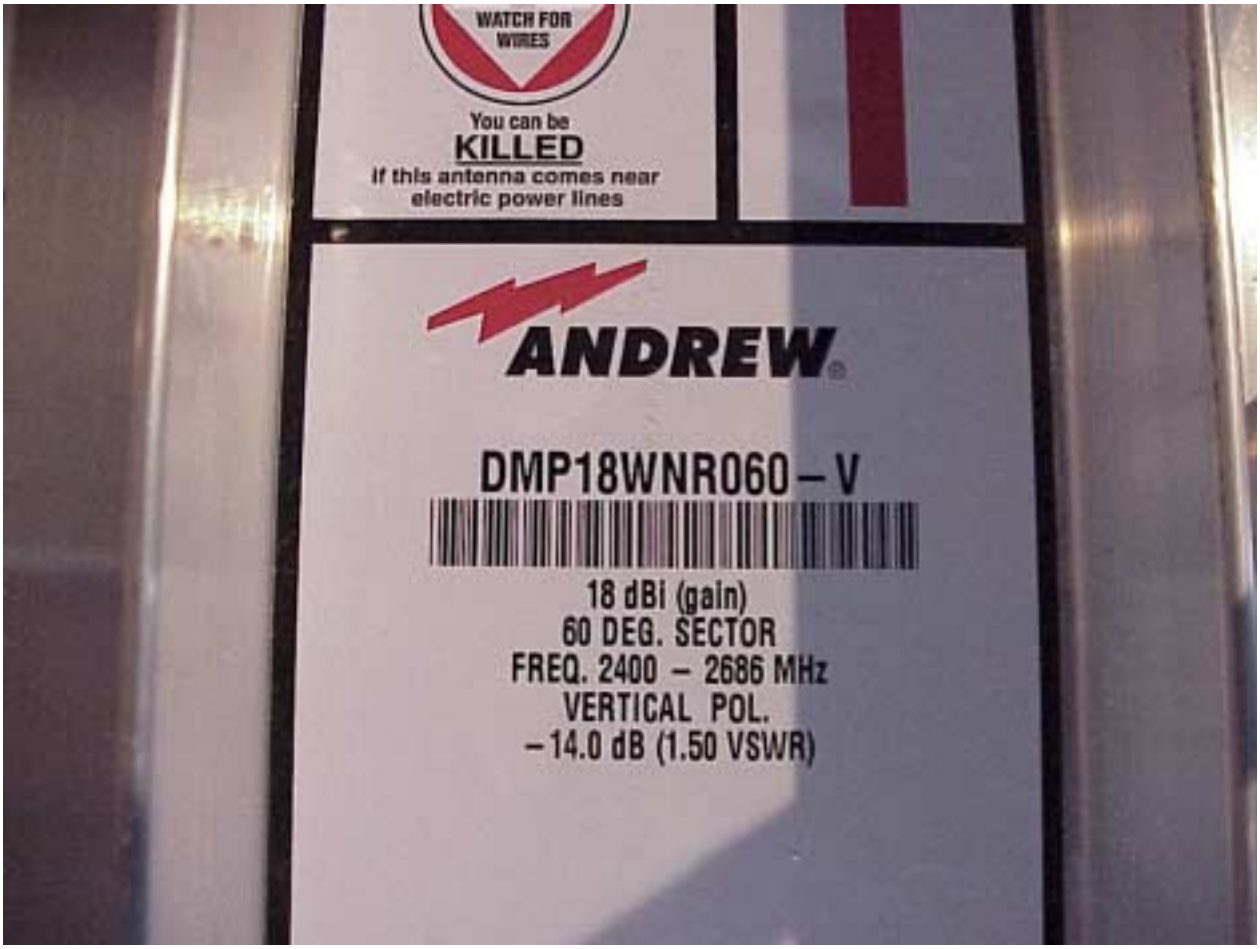

Photo #3: Andrew antenna ID label

Photo #4: EUT test setup

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Photo #5: EUT test setup

Photo #6: EUT test setup

Photo #7: EUT ID label