

Test Report No. 8312301366 Rev1

For Alvarion Ltd.

Equipment Under Test: BreezeACCESS VL System

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





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| Order placed by: | Alvarion Ltd. |
|------------------------------|---|
| Address: | 21A Habarzel str, Tel-Aviv, 69710, Israel |
| Sample for test selected by: | The orderer |
| The date of test: | 15/01, 22/01, 23/01/2002 |

Description of Equipment

| Under Test (EUT): | BreezeACCESS VL System |
|-------------------|------------------------|
| Manufactured by: | Alvarion Ltd. |

Reference Documents:

- CFR 47 FCC: Rules and Regulations; Part 15. "Radio frequency devices"; Subpart B: "Unintentional radiators"; Subpart C: "Intentional radiators" (2002)
 - **Test Results:** The EUT was found meeting with the requirements of CFR 47 FCC Part 15 Subpart B Sec.15.109 Subpart C Sec.15.205, 15.207,15.209, 15.247.

| This Test Report contains 44 pages | This Test Report applies only to the specimen tested and may not |
|------------------------------------|--|
| and may be used only in full. | be applied to other specimens of the same product. |



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1 Scope

This test report contains results of the tests, performed on BreezeACCESS VL System according to the relevant requirements of CFR 47 FCC Part 15 Subpart B/C.

2 BreezeACCESS VL System general description

2.1 BreezAccess VL description

BreezeACCESS VL is a high capacity, IP services oriented Broadband Wireless Access system. The system is digital modulated operating in the 5725MHz up to 5875MHz band. The system is an outdoor unit oriented. The installation configuration is a two-box configuration containing a power supply and an Ethernet bypass as and indoor unit and the radio as an outdoor unit.

The indoor power supply can be either a single power supply for a subscriber (CPE) configuration or a rack mounded power supply for a base station (BS) configuration. The outdoor radio unit is the same in both cases.

The subscriber unit is defined as a point-to-point unit.

The base station is defined as a point-to-point unit.

2.2 Architecture:

Tested unit BreezeACCESS VL system comprises the following:

- 1. The Customer Premise Equipment (CPE) BreezeACCESS VL Subscriber Unit.
- 2. The Base Station Equipment (BS) BreezeACCESS VL Access Unit.

Premise Subscriber Unit (Customer Equipment):

The Subscriber Unit (SU), installed at the customer premises, provides data connections to the Access Unit.

The Subscriber Unit is comprised of the following subparts

- 1. SU-NI Indoor unit comprising RJ45 (10/100baseT) and Power connectors
- 2. Indoor-outdoor CAT-5 cable.
- 3. SU-RA Outdoor unit with RJ45 connector (10/100BaseT) with an integrated attached antenna.

The indoor unit provides the interface to the user's equipment and is powered from the mains via its power supply unit. The indoor unit is connected to the outdoor unit via a CAT-5 cable, which also serves for transferring power, management and control signals.

Base Station Equipment:

The BreezeACCESS Access Units (AU), installed at the base station site, provide all the functionality necessary to communicate with the Remote Units and to connect to the backbone of the service provider.

Each AU connects to the network through a standard IEEE 802.3 Ethernet 10/100BaseT (RJ 45) interface.

Base Station contains

- 1. AU-BS Plugged-in indoor unit
- 2. Indoor-outdoor CAT-5 cable
- 3. AU-RE Outdoor unit with RJ45 (10/100baseT) and antenna connectors
- 4. RF cable and External antenna (installation by professional installer).



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Subscriber Unit configuration



Base Station Unit configuration



Figure 1 BreezeACCESS VL System configuration



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2.3 Radio and Modem specification:

| Frequency | 5.725-5.850 GHz | | | | | | | | |
|----------------------------------|--------------------------------------|---------------------------------|--|--------------------------------------|-----------|-----------|-------------|-----------|-----|
| Operation Mode | Time Di | Time Division Duplex | | | | | | | |
| Radio Access Method | OFDM | | | | | | | | |
| Channel Bandwidth | 20 MHz | | | | | | | | |
| Antenna | SU Ante | enna | | 21d | Bi, 10.5° | horizonta | ıl x 10.5 ° | vertical, | |
| | | | | EN | 302 085, | Class TS | 1,2,3,4,5 | complian | t |
| | Sector Antenna | | | 16dBi, 90° vertical x 6°, horizontal | | | | | |
| | EN 302 085, Class CS 3 compliant | | | | | | | | |
| AU Output Power (@ antenna port) | 15 to 25dBm, Adjustable in 1dB steps | | | | | | | | |
| SU Output Power (@ antenna port) | -17 to 25dBm, ATPC | | | | | | | | |
| Modulation | BPSK, QPSK, 16QAM, 64QAM | | | | | | | | |
| Gross bit rate (Mbps) | 6 9 12 18 24 36 | | | | | | 36 | 48 | 54 |
| Sensitivity (dBm) | -88 | -88 -87 -86 -84 -81 -77 -72 -70 | | | | | | | -70 |

2.4 Connectors:

Subscriber Unit

| Unit | Connector | Description |
|-------|-----------|--|
| SU-NI | RJ45 | 10/100Base-T Ethernet |
| | RJ45 | 10/100Base-T Ethernet + power for outdoor connection |
| | | CAT-5 shielded cable should be used |
| | AC IN | 3 pin AC power plug |
| SU-RA | RJ45 | 10/100Base-T Ethernet |

Modular Base Station Equipment

| Unit | | Connector | Description |
|----------|-------|-----------|--|
| AU-E-BS | AU-BS | RJ45 | 10/100Base-T Ethernet |
| | | RJ45 | 10/100Base-T Ethernet + power for outdoor connection |
| | | | CAT-5 shielded cable should be used |
| | AU-RE | RJ45 | 10/100Base-T Ethernet |
| | | ANT | N-Type jack, 50 ohm, lightning protected |
| BS-PS-AC | | AC IN | 3 pin AC power plug |



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2.5 Test configuration:

- 1. During the measurements according to sec.15.109 Subpart B and sec.15.207 Subpart C the BreezeACCESS VL System was configured as shown in Figures 2, 3.
- 2. The measurements according to sec.15.205, 15.209 Subpart C were performed on the Outdoor unit (ODU). The ODU was tested with two different antennas:
 - MA-WA50-1X P/N AN1165 mfr Mars Antennas
 - 5.15-5.875 GHz P/N MT-484026/NV mfr MTI Wireless Edge.



Figure 2

Subscriber Unit test setup







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3 Test specification, Methods and Procedures

Test Specification:

 CFR 47 FCC: Rules and Regulations; Part 15. "Radio frequency devices"; Subpart B: "Unintentional radiators"; Subpart C: "Intentional radiators" (2002)

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".

4 Measurements, examinations and derived results

4.1 Location of the Test Site:

The tests were conducted in the EMC laboratory of the Standards Institution of Israel in Tel-Aviv and at open test site located at Kibbutz Native Halamed Hai in Emek HaEla, Israel.

4.2 Test condition:

| Temperature: | 22 °C |
|--------------|-------|
| Humidity: | 50 % |



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4.3 Conducted emission test (Subscriber Unit, Base Station Unit):

4.3.1 <u>Requirements:</u>

EUTs conducted emission within the band 150 kHz to 30 MHz shall not exceed value required in section 15.207 (a) Subpart C.

4.3.2 <u>Test configuration:</u>

The measurements of Subscriber Unit were performed on Indoor power supply. The test configuration is shown in Fig.1.

The measurements of Base Station Unit were performed on Indoor power supply rack. The test configuration is shown in Fig.2.

Each EUT was placed on a non-metallic table in a shielded chamber at a height of 80 cm from the floor and 40 cm from the nearest wall.

4.3.3 <u>Test procedure:</u>

The EUT was operated to transmitting through the customer software. First, initial scans were performed. Final measurements were performed at the frequencies where emission exceeded the tolerance limit.

Test equipment (EMI receiver) setup was as follow:

| <u>nitial scan:</u> | |
|---------------------|-------------------------|
| Detector type | Peak |
| Vode | Max hold |
| Bandwidth | 9 kHz |
| Step size | Continuous sweep |
| Sweep time | >100 msec |
| <u>Measurements</u> | |
| Detector type | Quasi-peak, Avg (CISPR) |
| Bandwidth | 9 kHz |
| Measurement time | 200 seconds/MHz |
| Observation | >15 seconds |
| | |

4.3.4 <u>Test results:</u>

Subscriber Unit. Test results are shown in Plots #1, 2.

Base Station Unit. Test results are shown in Plots #3, 4.



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<u>Plot 1.</u> <u>Subscriber Unit</u> Conducted emissions measurement result on 110 VAC power Reference standard: FCC Part 15 sec. 15.207 Sub.C line: phase



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<u>Plot 2.</u> Subscriber Unit Conducted emissions measurement result on 110 VAC power Reference standard: FCC Part 15 sec. 15.207 Sub. C line: neutral



<u>Plot 3.</u>

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Base Station Unit Conducted emissions measurement result on 110 VAC power Reference standard: FCC Part 15 sec. 15.207 Sub. C line: phase



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Base Station Unit Conducted emissions measurement result on 110 VAC power Reference standard: FCC Part 15 sec. 15.207 Sub. C line: neutral



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4.4 Radiated emission test on BreezeAccess VL System (Base Station + Subscriber Unit):

4.4.1 <u>Requirements:</u>

EUTs radiated emission shall not exceed value required in section 15.109 Subpart B.

4.4.2 <u>Test description:</u>

The measurements were performed at the Open Area Test Site. The test configuration is shown in Fig.1, 2.

The EUT was arranged on a non-metallic table 0.8 m placed on the turn-table. The measurements were performed at a 10 m measurement distance.

The Bilog 30 MHz-2 GHz antenna was used.

The frequency range was investigated from 30 MHz to 2GHz.

The measurements were performed at each frequency at which the signal was 10 dB below the limit or less.

The level were maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna polarization from vertical to horizontal. The measuring equipment settings were:

| Initial scan: | |
|------------------|-----------------------|
| Detector type | Peak |
| Mode | Max hold |
| Bandwidth | 120 kHz |
| Step size | Continuous sweep |
| Sweep time | >1 seconds/MHz |
| Measurements: | |
| Detector type | Quasi-peak (CISPR 16) |
| Bandwidth | 120 kHz |
| Measurement time | 20 seconds/MHz |
| Observation | >15 seconds |

4.4.3 <u>Radiated emission test results:</u>

Test results are presented in Table 1.



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Table 1. Radiated emission test results

EUT: BreezeACCESS VL System Specified limit: FCC Part 15 sec.15.109 Sub. B

| Frequency | Turn- table Angle | Antenna Polariz. | Antenna Height | Emission Level Note 1 | Limit @ 3 m | Margin Note 2 | Results |
|-----------|-------------------------|---------------------|-------------------|-----------------------------|----------------|------------------|----------|
| (MHz) | (°) | | (m) | (dBµV/m) | (dBµV/m) | (dB) | |
| 32.48 | 307 | V | 2.5 | 35.2 | 39 | 3.8 | Complies |
| 61.13 | 360 | V | 2.5 | 27.4 | 39 | 11.6 | Complies |
| 75.36 | 360 | V | 2.5 | 31.5 | 39 | 7.5 | Complies |
| 78.08 | 357 | V | 2.5 | 30.6 | 39 | 8.4 | Complies |
| 80.39 | 356 | V | 2.5 | 30.7 | 39 | 8.3 | Complies |
| 86.89 | 138 | V | 2.0 | 32.2 | 39 | 6.8 | Complies |
| 129.4 | 282 | V | 1.3 | 30.9 | 43.5 | 12.6 | Complies |
| 143.8 | 73 | V | 1.7 | 31.6 | 43.5 | 11.9 | Complies |
| 175.6 | 76 | V | 1.5 | 31.5 | 43.5 | 12.0 | Complies |
| 188.5 | 76 | V | 1.3 | 29.3 | 43.5 | 14.2 | Complies |
| 211.9 | 358 | V | 1.3 | 28.3 | 43.5 | 15.2 | Complies |
| 236.7 | 350 | V | 1.3 | 33.9 | 46.5 | 12.6 | Complies |
| 249.4 | 40 | V | 1.4 | 29.3 | 46.5 | 17.2 | Complies |
| 277.1 | 1 | V | 1.3 | 32.0 | 46.5 | 14.5 | Complies |
| 750.5 | 31 | Н | 1.3 | 35.8 | 46.5 | 10.7 | Complies |

Note 1: Emission level = E Reading $(dB\mu V)$ + Cable loss (dB) + Antenna Factor (dB/m) + 10 dB Where 10 dB is an extrapolation distance factor. For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: Margin (dB) = Limit (dB μ V/m) – Emission level (dB μ V/m)



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4.5 Radiated emission test on Outdoor Radio Unit - spurious:

4.5.1 <u>Requirements:</u>

EUTs radiated emission shall not exceed value required in section 15.209 Subpart C.

4.5.2 <u>EUT configuration:</u>

The EUT was tested with two different antennas:

- 1. MA-WA50-1X P/N AN1165 mfr Mars Antennas
- 2. 5.15-5.875 GHz P/N MT-484026/NV mfr MTI Wireless Edge.

4.5.3 <u>Test procedure:</u>

The measurements were performed in the anechoic chamber. The EUT was arranged on a non-metallic table 0.8 m placed on the turntable.

Measuring antennas used: Up to 18 GHz - Double Ridge EMCO model 3115 above 18 GHz - Alpha TRG model A361

Antenna height = 1 m.

Polarization: Vertical/Horizontal

Measurement distance = 1m.

The frequency range was investigated up to 40 GHz.

The measurements were performed in vertical and horizontal polarization, the maximum reading recorded.

Measuring detector function and bandwidths:

| Detector type | Peak |
|----------------------|---------|
| Resolution bandwidth | 1MHz |
| Video bandwidth | 1 MHz |
| Detector type | Average |
| Resolution bandwidth | 1MHz |
| Video bandwidth | 3 kHz* |

4.5.4 <u>Radiated emission test results and calculation ratio:</u>

The radiated emission was measured from Outdoor Unit with both antennas. The difference between readings was negligible so the test results for both antennas are shown in table #2.

The emission level was calculated as:

E Reading (dB μ V) + measuring cable loss (dB) + measuring antenna factor (dB/m) + Distance correction factor

For measuring cable loss and measuring antenna factor refer to Appendix 2. Distance correction factor = -9.5 dB (an extrapolation reading from 1 m measuring distance to 3m specified distance)



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| Frequency (GHz) | Emission Level (dBμV/m) | | Liı @ (dBu | nit 3m V/m) | Maı (d | rgin B) | Results | |
|--------------------|-------------------------------|------|------------------|-------------------|-----------|------------|----------|--|
| | Average | Peak | Average | Peak | Average | Peak | | |
| | | • | LOW 5.74 | 40 GHz | · – – | • | • | |
| 11.48 | 35.1 | 47.3 | | | 18.9 | 26.7 | Complies | |
| 17.22 | 39.8 | 52.6 | | | 14.2 | 21.4 | Complies | |
| 22.96 | 44.1 | 56.3 | 54 | 74 | 9.9 | 17.7 | Complies | |
| 28.700 | 38.6 | 50.8 | | | 5.4 | 23.2 | Complies | |
| 34.440 | 45.2 | 57.8 | | | 8.8 | 16.2 | Complies | |
| MIDDLE 5.785 GHz | | | | | | | | |
| 11.57 | 36.2 | 48.1 | | | 17.8 | 25.9 | Complies | |
| 17.35 | 39.8 | 51.4 | | | 14.2 | 22.6 | Complies | |
| 23.14 | 44.4 | 56.7 | 54 | 74 | 9.6 | 17.3 | Complies | |
| 28.925 | 38.2 | 51.8 | | | 15.8 | 22.2 | Complies | |
| 34.710 | 44.9 | 57.3 | | | 9.1 | 16.7 | Complies | |
| | | | HIGH 5.8 | 35 GHz | | | | |
| 11.67 | 36.4 | 48.8 | | | 17.6 | 25.2 | Complies | |
| 17.51 | 39.6 | 51.5 | | | 14.4 | 22.5 | Complies | |
| 23.34 | 44.8 | 56.8 | 54 | 74 | 9.2 | 29.2 | Complies | |
| 29.175 | 39.2 | 48.2 | | | 14.8 | 25.8 | Complies | |
| 35.010 | 45.9 | 57.6 | | | 8.1 | 16.4 | Complies | |

Table 2. Spurious emissions test results



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4.6 Radiated emission test on Outdoor Radio Unit - restricted bands:

4.6.1 <u>Requirements:</u>

Radiated emission in restricted bands should meet the requirements sec. 15.205 Subpart C.

4.6.2 <u>EUT configuration:</u>

The EUT was tested with two antennas:

4.6.3 <u>Test procedure:</u>

The measurements were performed in the anechoic chamber. The EUT was arranged on a non-metallic table 0.8 m placed on the turntable.

Measuring antennas used: Double Ridge **EMCO** model 3115 Antenna height = 1 m. Measurement distance = 1m. Measuring detector function and bandwidths:

| Detector type | Peak |
|----------------------|-------|
| Resolution bandwidth | 1MHz |
| Video bandwidth | 1 MHz |

4.6.4 <u>Test results and calculation ratio:</u>

The spurious emissions were found in the band - 10.6-12.7 GHz.

The test results for MA-WA50-1X P/N AN1165 antenna are shown in Plots #5 to # 7. The test results for 5.15-5.875 GHz P/N MT-484026/NV antenna are shown in Plots #8 to #10.



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Radiated emissions measured in restricted band 10.6-12.7 GHzAntenna:MA-WA50-1X P/N AN1165

| (bp) | 13:54:0 | 02 Jan | 23,20 | 03 | | | | | | |
|-------------------|---------------------------------|---------------|----------------------------|--------|---------|-----|------|---------|--------------------|-------------------------|
| Ref 54 | .99 dB | Vų | #Atten | 0 dB | | | | Mkr1 | 12.5 28.88 | 06 GHz dB µ V |
| Peak Log | Free | 1 12. | 51 GHz | | | | | | | |
| dB/ | QP | 23. | 78 aBµ 8 dBµ\ 98 dBµ | | | | | | | |
| | MMM | 20. Ambydd | ao adt Militer og | Multim | Lawruld | mmy | Nump | LunyM | ybullion" | AMANA |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| V1 S2 S3 FC | | | | | | | | | | |
| A AA | | | | | | | | | | |
| | | | | | | | | | | |
| PA | | | | | | | | | | |
| Start 1 #Res B | tart 10.6 GHz Res BW 1 MHz # | | | #V | BW 1 M | Hz | | S Sv | top 12. Jeep 11 | .7 GHz .8 ms |







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Plot #7 HIGH frequency

Radiated emissions measured in restricted band 10.6-12.7 GHzAntenna:5.15-5.875 GHz P/N MT-484026/NV

| (bp) | 14:37:5 | 57 Jan | 23,20 | 03 | | | | | | |
|-------------------|----------------|-------------------|---------------------------|---------|---------|-----------|--------|-------|---------------|-------------------------|
| Ref 61 | .99 dB | γų | #Atten | 0 dB | | | | Mkr1 | 10.8 28.13 | 04 GHz dB µ V |
| Peak | Eroc | . 10 | 8 CU→ | | | | | | | |
| 10 | | <u>10.</u> 31. | 0 0H2 44 dB⊫ 15 dB∎ | N I | | | | | | |
| | Ävg | 19. | 35 dBF | Ň | | | | | | |
| | Marrie | mm | Awrow | Manhap | NAMANAM | whenwalth | anna | mm | mhhim | molym |
| | | | | | | | | | | |
| | | | | | | | | | | |
| V1 S2 | | | | | | | | | | |
| A AA | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Start 1 Res Bl | Start 10.6 GHz | | | | S S | top 12. | .7 GHz | | | |
| | 1 I I IIZ | | | <i></i> | | | | ~ ~ ~ | ovh II | . 0 1113 |

Plot #8 LOW frequency



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Plot #9 MID frequency

| (bp) | 14:43:2 | 26 Jan | 23,20 | 03 | | | | | | |
|---------|-------------------------|---------------|------------------|-------------|---------------|---------------|------------|-----------|----------|---------------|
| | | | _ | | | | | Mkr1 | 11.8 | 04 GHz |
| Ref 61 | .99 dB | 3 µ V | #Atten | 0 dB | | | | | 27.79 | dB µ V |
| Peak | | | | | | | | | | |
| Log | Free | <u> 11</u> . | 8 GHz | | | | | | | |
| | Peak IND | K 32. | 44 aB∎ 51 dB∎ | | | | | | | |
| ab/ | Åva | 19. | 87 dBH | iŭ 🕂 | | | | | | |
| | | | • • • • | - | | | | | | |
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| | L | | | | | | | | | |
| | | | | | | | | | | |
| Start 1 | 0.6 G | | | | 1 | 1 | 1 | S | ton 12 | .7 GHz |
| Res Bl | 1 1 MHz | 2 | #VBW 1 MHz | | | Šř | /eep 11 | .8 ms | | |
| | Plot #10 HIGH frequency | | | | | | | | | |

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4.7 Conducted emission tests on Outdoor Radio Unit:

4.7.1 <u>Minimum bandwidth</u>

Requirements:

The minimum 6dB bandwidth shall be at least 500 kHz as required in sec. 15.247 (a) (2) Subpart C.

Test result:

The measured minimum bandwidth is shown in Plot #11. Measured: 16.65MHz.

4.7.2 Maximum peak output power

Requirements:

The maximum peak output power shall not exceed 1 Watt as required in sec. 15.247 (b) (3) Subpart C.

Test results:

The measurements were taken at three carrier frequencies, in the band 30 MHz – 26 GHz and in the band 26 GHz – 40 GHz.

Calculations:

- 1. Maximum setting of RBW=VBW is 3MHz
- 2. 6dB band width = 18MHz @ RBW=VBW=3MHz.
- 3. Peak power measured = 21.3dBm.
- 4. Peak power calculation = 21.3+10*log (18/3)=29dBm

The measured results are shown in Plots #12 to #20. The maximum peak output power in range 30 MHz – 40 GHz does not exceed 30 dBm (1 Watt).



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4.7.3 <u>Spurious</u>

Requirements:

In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the RF power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, as required in sec. 15.247 (c) Subpart C.

Test results:

The measured results are shown in Plots #21 to #22.

4.7.4 <u>Peak power spectral density</u>

Requirements:

The peak power spectral density shall not be greater than 8dBm in any 3kHz band as required in section 15.247 (d).

Test results:

The measured results are shown in Plots #23- #25.



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Plot # 12 Maximum peak output power. Freq. - LOW



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Plot # 14 Maximum peak output power. Freq. - HIGH



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Plot # 16 Conducted emission in freq. range 100 kHz – 26 GHz/Freq. - MID



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Plot # 18 Conducted emission in freq. range 26- 40 GHz/Freq. - LOW



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Plot # 20 Conducted emission in freq. range 26- 40 GHz/Freq. - HIGH



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Plot # 22 Conducted RF power 20dB below/Freq. - HIGH



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Plot # 23 Peak power spectral density/Freq. - LOW



Plot # 24 Peak power spectral density/Freq. - MID



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Plot # 25 Peak power spectral density/Freq. - HIGH



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5 Compliance with specification

| Test | FCC Part 15 | Test result | |
|--|--------------------|-------------|--|
| Radiated emission | Sec.15.109 | Complies | |
| Radiated emissions in restricted bands | Sec.15.205 | Complies | |
| Conducted emission | Sec.15.207 | Complies | |
| Spurious radiated emission | Sec.15.209 | Complies | |
| Minimum bandwidth | Sec.15.247 (a) (2) | Complies | |
| Maximum peak output power | Sec.15.247 (b) (3) | Complies | |
| Conducted spurious | Sec.15.247 (c) | Complies | |
| Peak power density | Sec.15.247 (d) | Complies | |

Name: Eng. Yuri Rozenberg Position: Head of EMC Branch Telematics Laboratory 18 February, 2003

Synd.

Name Albert Herzenshtein Position: Testing Engineer

Test report written by: Galit Grodetsky



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6 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 analyzer 10 KHz-26.5 GHz | HP | E7405a | SII 4944 | 04/02 | 04/03 |
| Spectrum analyzer 9 KHz-50 GHz | HP | 8565E | 3517A00347 | 07/02 | 07/03 |
| Antenna Double Ridge 1-18 GHz | EMCO | 3115 | SII4873 | 03/02 | 03/03 |
| Antenna Standard Gain Horn 18-40 GHz | WILTRON | Alpha TRG A361 | 861A/590 | 01/02 | 01/03 |
| LISN 9 kHz – 30 MHz | FCC | LISN- 50/250-32-4- 16 | SII 5023 | 05/02 | 05/03 |
| Transient limiter 0.009-200 MHz | HP | 11947A | 31074A3105 | 05/02 | 05/03 |
| Attenuator 20 dB | HP | 8491B | 3929M50394 | 05/02 | 05/03 |



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7 Appendix 2: Antenna Factor and Cable Loss

Antenna Factor Double Ridged Guide Antenna mfr EMCO model 3115

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

Antenna Factor Standard Gain Horn 2600 – 4000 MHz Alpha TRG Model A361

| Point | Frequency (MHz) | Antenna Factor (dB/m) |
|-------|-----------------|-----------------------|
| 1 | 26000 | 35.22 |
| 2 | 27000 | 35.40 |
| 3 | 28000 | 35.52 |
| 4 | 29000 | 35.64 |
| 5 | 30000 | 35.76 |
| 6 | 31000 | 35.90 |
| 7 | 32000 | 36.07 |
| 8 | 33000 | 36.16 |
| 9 | 34000 | 36.31 |
| 10 | 35000 | 36.46 |
| 11 | 36000 | 36.60 |
| 12 | 37000 | 36.74 |
| 13 | 38000 | 36.93 |
| 14 | 39000 | 37.21 |
| 15 | 40000 | 37.28 |



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8 Appendix 3: Test configuration illustration



Photo #1. BreezeAccess VL System: Base Station + Subscriber Unit Radiated emission test



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Photo #2. BreezeAccess VL System: Base Station Radiated emission test



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Photo #3 BreezeAccess VL System Subscriber Unit Radiated emission test



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Photo #4. BreezeAccess VL System: Base Station + Subscriber Unit Radiated emission test



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Photo #5. BreezeAccess VL System: Subscriber Unit Conducted emission test



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Photo #6 Spurious emissions test. Antenna 5.15-5.875 GHz P/N MT-484026/NV



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Photo #7 Spurious emission test, antenna MA-WA50-1X P/N AN1165 mfr Mars Antennas



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Photo #8 Spurious emission test, antenna MA-WA50-1X P/N AN1165 mfr Mars Antennas



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Photo #9 Spurious emissions test. Antenna .15-5.875 GHz P/N MT-484026/NV



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Photo #10 Outdoor unit. PCB component side



Photo #11 Outdoor unit. PCB printed side



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Photo # 12 AU-BS – Plugged-in indoor unit



Photo #13 AU-BS Power supply PC-2700



Photo #14 AU-IDU PC-1270