

## EMISSIONS TEST REPORT FOR A LOW POWER TRANSMITTER

### I. GENERAL INFORMATION

Requirement: Federal Communications Commissions

Test Requirements: 15.205, 15.207, 15.209, 15.247

Applicant: Alvarion Ltd.

Product ID: **FCC ID: LKT-IF-900**

### II. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

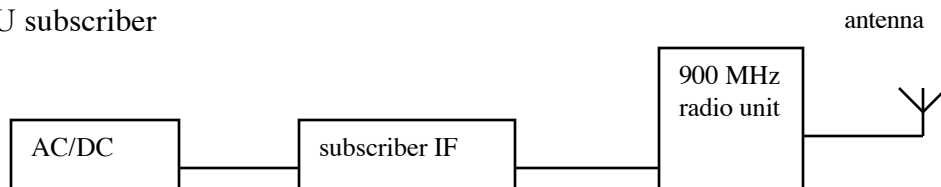
The EUT is a DTS transmitter operating under section 15.247 of FCC Rules. The EUT is a hybrid system, using a frequency hopping function along with digital modulation of the RF carrier.

#### RF Specifications

|                          |                                                 |
|--------------------------|-------------------------------------------------|
| RF Frequency Band        | 904 – 926 MHz                                   |
| RF Channels              | Programmable in 1 MHz steps                     |
| Modulation Type          | GFSK DTS/FHSS hybrid                            |
| Transmitter Output Power | 24 dBm typical, variable in approx. 1 dB steps  |
| Antennas                 | 12.1 dBi vertical omni<br>9 dBi horizontal omni |

Product test configuration:

SU subscriber



The IF card delivers a 440 MHz modulated signal and DC power to the radio units. The IF card is identical to the ones used in other Alvarion 2.4 GHz and 5.7 GHz products.

The interface between the Outdoor and Indoor Units is identical to all of BreezeACCESS systems. The subscriber IF circuitry is the same as the base station IF circuitry.

Antennas are outdoor fixed mounted.

Alvarion Ltd.  
FCC ID: LKT-IF-900  
Class 2 permissive change

902-928 MHz DTS Systems

### **III. TEST LOCATION**

All other FCC tests were performed at

Compliance Certification Services  
571F Monterey Road  
Morgan Hill, CA 95037

T.N. Cokenias  
EMC Consultant/Agent for Alvarion Ltd.

20 December 2003

## **TEST PROCEDURES**

Radiated emissions tests were performed in a 5m anechoic chamber. Frequency range examined was 1 – 9.28 GHz. Testing was performed in accordance with ANSI C63.4.

### **Radiated Emissions**

**Test Requirement: 15.109, 15.205, 15.209, 15.247**

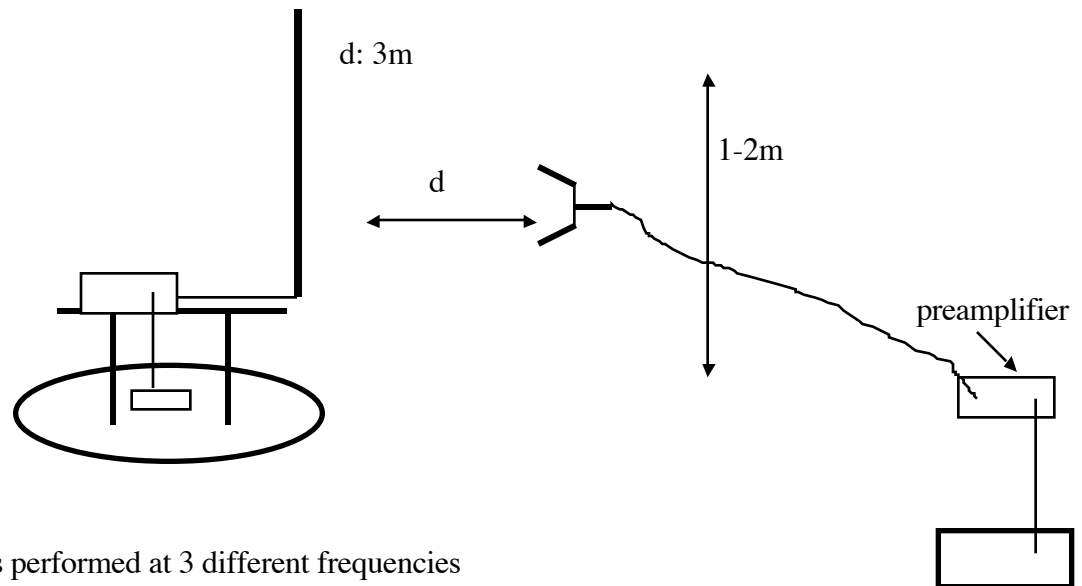
#### **Measurement equipment used:**

HP 8593 Spectrum Analyzer, 9 kHz-26.5 GHz  
Chase Biconolog antenna  
EMCO 3115 Horn antenna, 1-18 GHz  
Miteq 924341pre-amplifier, 1 – 26.5 GHz  
High pass filter, fp = 1800 MHz

#### **Test Procedures, 1- 26 GHz:**

1. The EUT was placed on a wooden table resting on a turntable on the open air test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.
3. Radiated emissions were investigated for a LOW channel, a MID channel, and HIGH channel. Emissions were investigated to the 10<sup>th</sup> harmonic.
4. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

## Radiated Test Set-up, 1-40 GHz



**Figure 2**

Testing was performed at 3 different frequencies

| Channel | Frequency, MHz |
|---------|----------------|
| Low     | 905            |
| Mid     | 915            |
| High    | 926            |

Radiated emissions were performed at each frequency for 3 different transmitter antennas.

Antenna tested:

| Antenna Type    | Gain                 | Antenna Manufacturer  | Model Number |
|-----------------|----------------------|-----------------------|--------------|
| vertical omni   | 12.2 dBi<br>(10 dBd) | Antel International   | BCD-85010    |
| horizontal omni | 9 dBi                | Pacific Wireless Inc. | PAWSAH9-9    |

**Test Results:** Worst case results are presented. Refer to attached Excel spread sheet files.

Test Engr: William Zhuang  
 Project #:  
 Company Name: ALVARIUN LTD.  
 EUT Descrip.: Outdoor Radio Unit w/ PAWSAH9-9 Omni Vertical  
 EUT M/N: FCC ID: LKT-IF-900  
 Test Target: 15.209  
 Mode Oper: CONT TX Max Pwr 8FSK

**Test Equipment:**

|                    |                       |                    |              |
|--------------------|-----------------------|--------------------|--------------|
| EMCO Horn 1-18GHz  | Pre-amplifier 1-26GHz | Spectrum Analyzer  | Horn > 18GHz |
| T73; S/N: 6717 @1m | T86 Miteq 924341      | HP 8593EM Analyzer |              |

Hi Frequency Cables

|          |              |              |           |
|----------|--------------|--------------|-----------|
| b (2 ft) | e (2 ~ 3 ft) | e (4 ~ 6 ft) | b (12 ft) |
|----------|--------------|--------------|-----------|

**Peak Measurements:**

1 MHz Resolution Bandwidth  
 1MHz Video Bandwidth

**Average Measurements:**

1 MHz Resolution Bandwidth  
 10Hz Video Bandwidth

| f<br>GHz                                                       | Dist<br>feet | Read Pk<br>dBuV | Read Avg.<br>dBuV | AF<br>dB/m | CL<br>dB | Amp<br>dB | D Corr<br>dB | HPF | Peak<br>dBuV/m | Avg<br>dBuV/m | Pk Lim<br>dBuV/m | Avg Lim<br>dBuV/m | Pk Mar<br>dB | Avg Mar<br>dB | Notes     |
|----------------------------------------------------------------|--------------|-----------------|-------------------|------------|----------|-----------|--------------|-----|----------------|---------------|------------------|-------------------|--------------|---------------|-----------|
| 1.807                                                          | 9.8          | 48.0            | 35.4              | 27.7       | 1.3      | -44.1     | 0.0          | 1.0 | 33.9           | 21.3          | 74.0             | 54.0              | -40.1        | -32.7         | Low Ch H  |
| 1.807                                                          | 9.8          | 48.0            | 35.4              | 27.7       | 1.3      | -44.1     | 0.0          | 1.0 | 33.9           | 21.3          | 74.0             | 54.0              | -40.1        | -32.7         | Low Ch V  |
| 2.715                                                          | 9.8          | 48.6            | 36.2              | 30.7       | 1.9      | -44.0     | 0.0          | 1.0 | 38.2           | 25.9          | 74.0             | 54.0              | -35.8        | -28.1         | Low Ch H  |
| 2.715                                                          | 9.8          | 48.5            | 36.2              | 30.7       | 1.9      | -44.0     | 0.0          | 1.0 | 38.1           | 25.8          | 74.0             | 54.0              | -35.9        | -28.2         | Low Ch V  |
| 1.830                                                          | 9.8          | 47.6            | 35.3              | 27.8       | 1.3      | -44.1     | 0.0          | 1.0 | 33.7           | 21.3          | 74.0             | 54.0              | -40.3        | -32.7         | Mid Ch V  |
| 1.830                                                          | 9.8          | 47.6            | 35.3              | 27.8       | 1.3      | -44.1     | 0.0          | 1.0 | 33.6           | 21.3          | 74.0             | 54.0              | -40.4        | -32.7         | Mid Ch H  |
| 2.745                                                          | 9.8          | 49.1            | 36.4              | 30.8       | 1.9      | -44.0     | 0.0          | 1.0 | 38.8           | 26.1          | 74.0             | 54.0              | -35.2        | -27.9         | Mid Ch V  |
| 2.745                                                          | 9.8          | 48.7            | 36.5              | 30.8       | 1.9      | -44.0     | 0.0          | 1.0 | 38.4           | 26.2          | 74.0             | 54.0              | -35.6        | -27.8         | Mid Ch H  |
| 1.852                                                          | 9.8          | 48.7            | 35.4              | 27.9       | 1.4      | -44.1     | 0.0          | 1.0 | 34.9           | 21.5          | 74.0             | 54.0              | -39.1        | -32.5         | High Ch H |
| 1.852                                                          | 9.8          | 47.8            | 35.4              | 27.9       | 1.4      | -44.1     | 0.0          | 1.0 | 34.0           | 21.5          | 74.0             | 54.0              | -40.0        | -32.5         | High Ch V |
| 2.778                                                          | 9.8          | 49.5            | 36.8              | 30.9       | 1.9      | -44.0     | 0.0          | 1.0 | 39.4           | 26.6          | 74.0             | 54.0              | -34.6        | -27.4         | High Ch V |
| 2.778                                                          | 9.8          | 49.1            | 36.5              | 30.9       | 1.9      | -44.0     | 0.0          | 1.0 | 39.0           | 26.4          | 74.0             | 54.0              | -35.0        | -27.6         | High Ch H |
| All of above are noise floor, and no signal found up to 10 GHz |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               |           |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               | H         |

|      |                       |        |                                |         |                              |
|------|-----------------------|--------|--------------------------------|---------|------------------------------|
| f    | Measurement Frequency | Amp    | Preamp Gain                    | Avg Lim | Average Field Strength Limit |
| Dist | Distance to Antenna   | D Corr | Distance Correct to 3 meters   | Pk Lim  | Peak Field Strength Limit    |
| Read | Analyzer Reading      | Avg    | Average Field Strength @ 3 m   | Avg Mar | Margin vs. Average Limit     |
| AF   | Antenna Factor        | Peak   | Calculated Peak Field Strength | Pk Mar  | Margin vs. Peak Limit        |
| CL   | Cable Loss            | HPF    | High Pass Filter               |         |                              |

01/04/04      **High Frequency Measurement**  
**Compliance Certification Services, Morgan Hill Open Field Site**

Test Engr: William Zhuang  
Project #:  
Company Name: ALVARIUN LTD.  
EUT Descrip.: Outdoor Radio Unit w/ PAWSAH9-9 Omni Horizontal  
EUT M/N: FCC ID: LKT-IF-900  
Test Target: 15.209  
Mode Oper: CONT TX Max Pwr 8FSK

**Test Equipment:**

|                    |                       |                    |              |
|--------------------|-----------------------|--------------------|--------------|
| EMCO Horn 1-18GHz  | Pre-amplifier 1-26GHz | Spectrum Analyzer  | Horn > 18GHz |
| T73; S/N: 6717 @1m | T86 Miteq 924341      | HP 8593EM Analyzer |              |

Hi Frequency Cables

|          |              |              |           |
|----------|--------------|--------------|-----------|
| b (2 ft) | e (2 ~ 3 ft) | e (4 ~ 6 ft) | b (12 ft) |
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**Peak Measurements:**  
1 MHz Resolution Bandwidth  
1MHz Video Bandwidth

**Average Measurements:**  
1 MHz Resolution Bandwidth  
10Hz Video Bandwidth

| f<br>GHz                                                       | Dist<br>feet | Read Pk<br>dBuV | Read Avg.<br>dBuV | AF<br>dB/m | CL<br>dB | Amp<br>dB | D Corr<br>dB | HPF | Peak<br>dBuV/m | Avg<br>dBuV/m | Pk Lim<br>dBuV/m | Avg Lim<br>dBuV/m | Pk Mar<br>dB | Avg Mar<br>dB | Notes     |
|----------------------------------------------------------------|--------------|-----------------|-------------------|------------|----------|-----------|--------------|-----|----------------|---------------|------------------|-------------------|--------------|---------------|-----------|
| 1.807                                                          | 9.8          | 48.8            | 36.4              | 27.7       | 1.3      | -44.1     | 0.0          | 1.0 | 34.7           | 22.3          | 74.0             | 54.0              | -39.3        | -31.7         | Low Ch H  |
| 1.807                                                          | 9.8          | 49.2            | 37.2              | 27.7       | 1.3      | -44.1     | 0.0          | 1.0 | 35.1           | 23.1          | 74.0             | 54.0              | -38.9        | -30.9         | Low Ch V  |
| 2.715                                                          | 9.8          | 46.9            | 36.4              | 30.7       | 1.9      | -44.0     | 0.0          | 1.0 | 36.6           | 26.0          | 74.0             | 54.0              | -37.4        | -28.0         | Low Ch H  |
| 2.715                                                          | 9.8          | 50.0            | 37.0              | 30.7       | 1.9      | -44.0     | 0.0          | 1.0 | 39.6           | 26.6          | 74.0             | 54.0              | -34.4        | -27.4         | Low Ch V  |
| 1.830                                                          | 9.8          | 48.3            | 42.3              | 27.8       | 1.3      | -44.1     | 0.0          | 1.0 | 34.4           | 28.4          | 74.0             | 54.0              | -39.6        | -25.6         | Mid Ch V  |
| 1.830                                                          | 9.8          | 47.8            | 43.1              | 27.8       | 1.3      | -44.1     | 0.0          | 1.0 | 33.9           | 29.1          | 74.0             | 54.0              | -40.1        | -24.9         | Mid Ch H  |
| 2.745                                                          | 9.8          | 50.1            | 36.9              | 30.8       | 1.9      | -44.0     | 0.0          | 1.0 | 39.8           | 26.6          | 74.0             | 54.0              | -34.2        | -27.4         | Mid Ch V  |
| 2.745                                                          | 9.8          | 49.8            | 36.8              | 30.8       | 1.9      | -44.0     | 0.0          | 1.0 | 39.5           | 26.5          | 74.0             | 54.0              | -34.5        | -27.5         | Mid Ch H  |
| 1.852                                                          | 9.8          | 47.9            | 35.5              | 27.9       | 1.4      | -44.1     | 0.0          | 1.0 | 34.0           | 21.7          | 74.0             | 54.0              | -40.0        | -32.3         | High Ch H |
| 1.852                                                          | 9.8          | 48.0            | 35.5              | 27.9       | 1.4      | -44.1     | 0.0          | 1.0 | 34.2           | 21.7          | 74.0             | 54.0              | -39.8        | -32.3         | High Ch V |
| 2.778                                                          | 9.8          | 49.3            | 36.8              | 30.9       | 1.9      | -44.0     | 0.0          | 1.0 | 39.1           | 26.7          | 74.0             | 54.0              | -34.9        | -27.3         | High Ch V |
| 2.778                                                          | 9.8          | 50.0            | 38.0              | 30.9       | 1.9      | -44.0     | 0.0          | 1.0 | 39.8           | 27.8          | 74.0             | 54.0              | -34.2        | -26.2         | High Ch H |
| All of above are noise floor, and no signal found up to 10 GHz |              |                 |                   |            |          |           |              |     | 1.0            |               |                  |                   |              |               |           |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | V         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |
|                                                                |              |                 |                   |            |          |           |              | 1.0 |                |               |                  |                   |              |               | H         |

|      |                       |        |                                |         |                              |
|------|-----------------------|--------|--------------------------------|---------|------------------------------|
| f    | Measurement Frequency | Amp    | Preamp Gain                    | Avg Lim | Average Field Strength Limit |
| Dist | Distance to Antenna   | D Corr | Distance Correct to 3 meters   | Pk Lim  | Peak Field Strength Limit    |
| Read | Analyzer Reading      | Avg    | Average Field Strength @ 3 m   | Avg Mar | Margin vs. Average Limit     |
| AF   | Antenna Factor        | Peak   | Calculated Peak Field Strength | Pk Mar  | Margin vs. Peak Limit        |
| CL   | Cable Loss            | HPF    | High Pass Filter               |         |                              |