

**Test Report:** 1W03937.1

**Applicant:** SmartSight Networks  
1800 Berlier, Suite 440  
Laval, Quebec  
H7L 4S4

**Equipment Under Test:  
(EUT)** SmartSight 1000

**In Accordance With:** **FCC Part 15, Subpart C**  
Direct Sequence Transmitters 2400-2483.5MHz

**Tested By:** Nemko Canada Inc.  
3325 River Road, R.R. 5  
Ottawa, Ontario K1V 1H2

**Authorized By:**  
  
R. Grant, Wireless Group Manager

**Date:**

**Total Number of Pages:** 36

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EQUIPMENT: SmartSight 1000

## Section 1. Summary Of Test Results

### General

**All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, Subpart C, Paragraph 15.247 for Direct Sequence Spread Spectrum devices.



New Submission



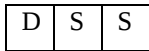
Production Unit



Class II Permissive Change



Pre-Production Unit



Equipment Code



Family Listing

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST  
SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



**NVLAP LAB CODE: 100351-0**

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
Glen Westwell, Wireless Technologist

TESTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
Wayne Clarke, Wireless Technologist

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*EQUIPMENT: SmartSight 1000*

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**Summary Of Test Data**

| <b>Name Of Test</b>                    | <b>Para. No.</b> | <b>Result</b> |
|----------------------------------------|------------------|---------------|
| Powerline Conducted Emissions          | 15.207 (a)       | Complies      |
| Occupied Bandwidth                     | 15.247 (a)(2)    | Complies      |
| Peak Power Output                      | 15.247 (b)       | Complies      |
| Spurious Emissions (Antenna Conducted) | 15.247 (c)       | Complies      |
| Spurious Emissions (Radiated)          | 15.247 (c)       | Complies      |
| Transmitter Power Density              | 15.247 (d)       | Complies      |
| Processing Gain                        | 15.247 (e)       | Complies      |

**Test Conditions:**

**Indoor**                      Temperature: 22 °C  
                                    Humidity:     34 %

**Outdoor**                    Temperature: 25 °C  
                                    Humidity:     32 %

*EQUIPMENT: SmartSight 1000*

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## **Section 2.        General Equipment Specification**

**Manufacturer:** SmartSight Networks

**Model No.:** SmartSight 1000

**Serial No.:** None

**Date Received In Laboratory:** June 22, 2001

**Nemko Identification No.:** Item #1

### **Transmitter**

**Power Input:** 120 VAC

**Frequency Range:** 2412 to 2462MHz

**Tunable Bands:** One

**6 dB Bandwidth:** 14.8MHz

**Type of Modulation** DQPSK

**Data Rate:** 2 Mbps

**Channel Spacing:** 5MHz

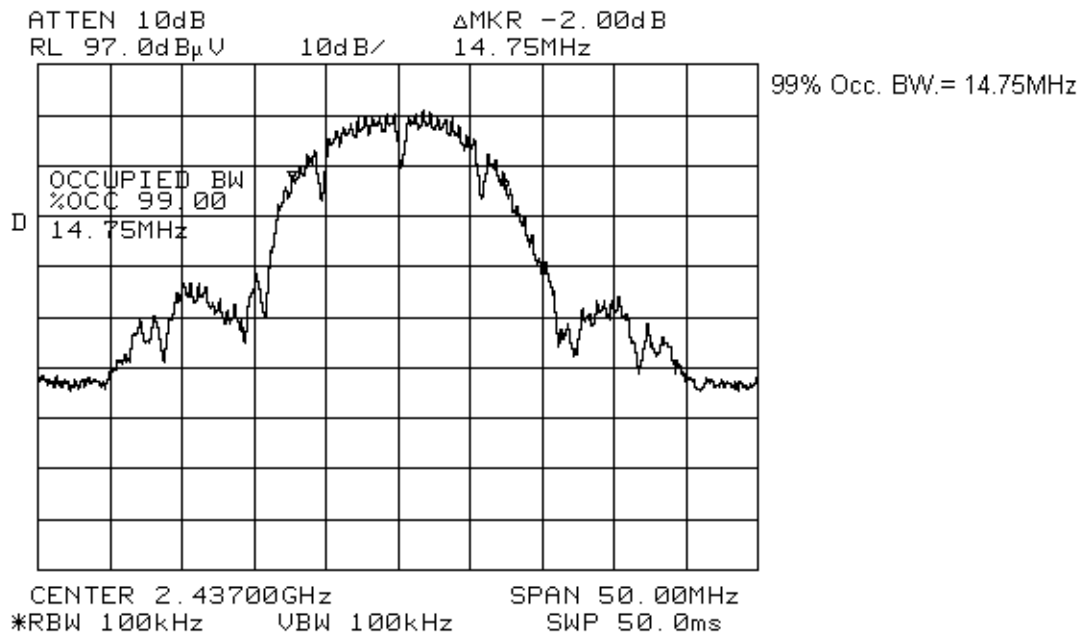
**Emissions Designator:** 14M8G1F

**Output Impedance:** 50ohm

**RF Power Output (Rated):** +14dBm  $\pm$ 1dB

**Power Output Adjustment Capability:** None

EQUIPMENT: SmartSight 1000



*EQUIPMENT: SmartSight 1000*

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### **Section 3. Powerline Conducted Emissions**

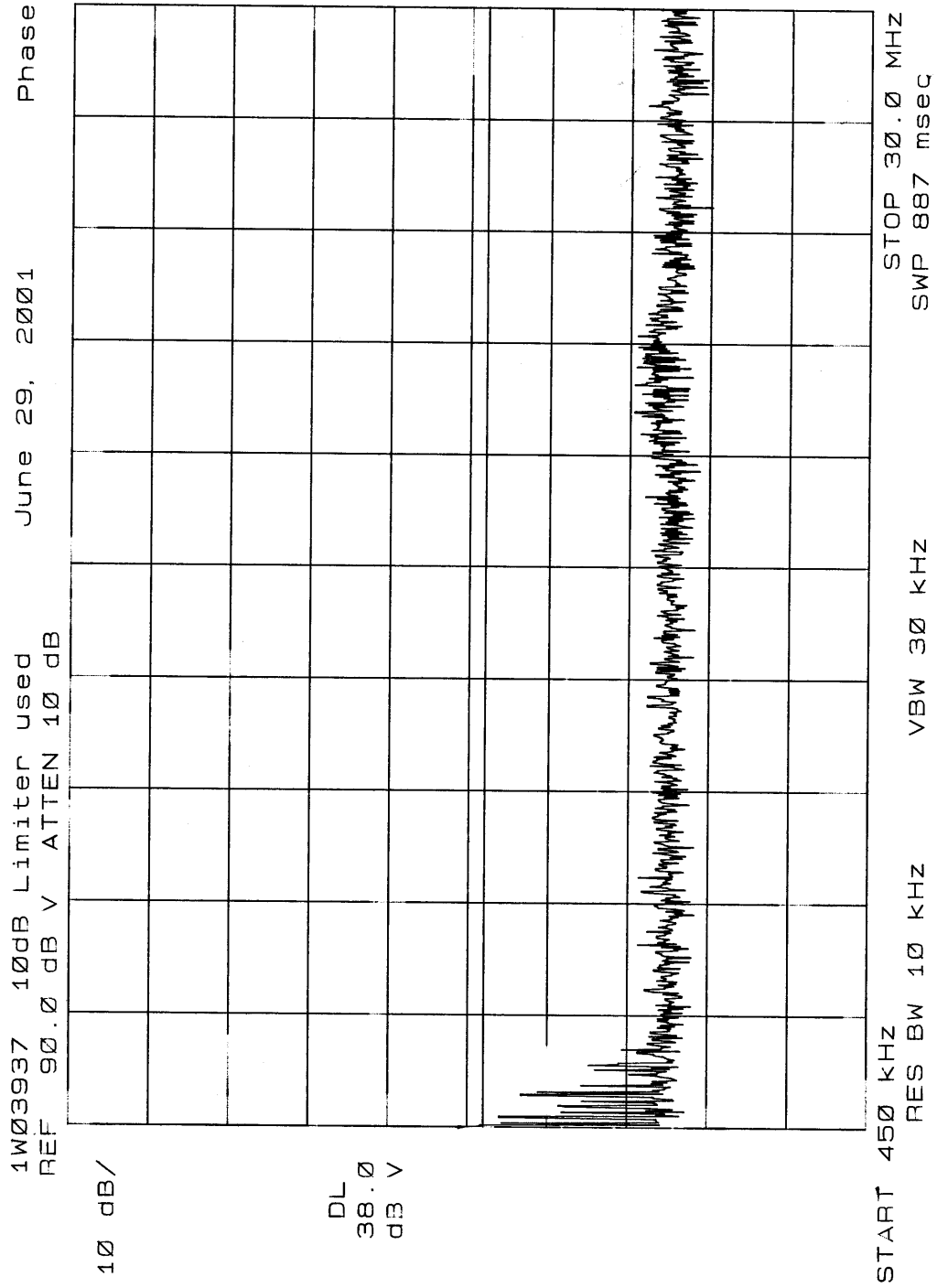
**Para. No.: 15.207(a)**

|                                        |                                    |
|----------------------------------------|------------------------------------|
| <b>Test Performed By:</b> Wayne Clarke | <b>Date of Test:</b> June 29, 2001 |
|----------------------------------------|------------------------------------|

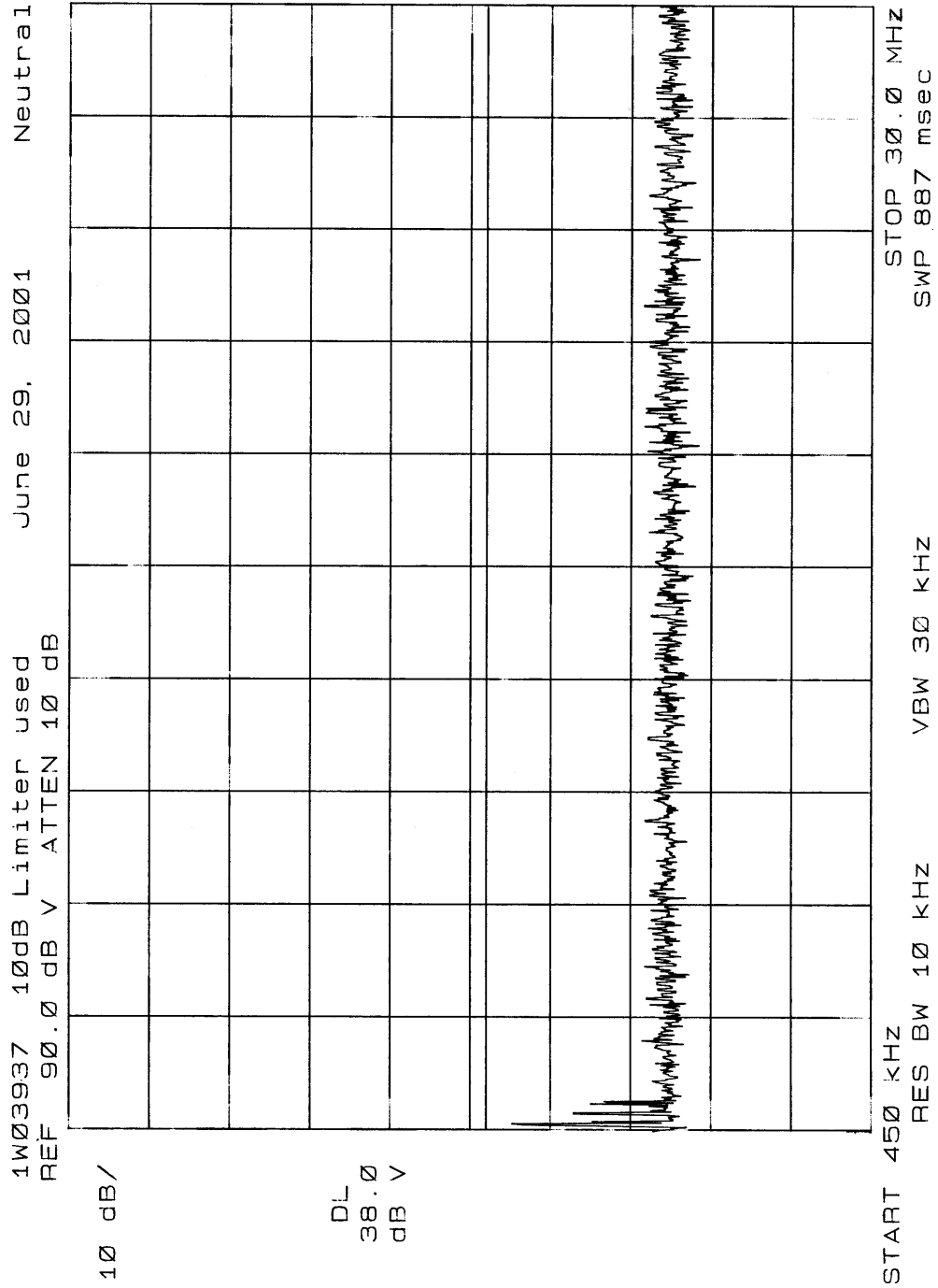
**Test Results:** Complies. See attached graph.

**Measurement Data:** See attached graph.

EQUIPMENT: SmartSight 1000



EQUIPMENT: SmartSight 1000

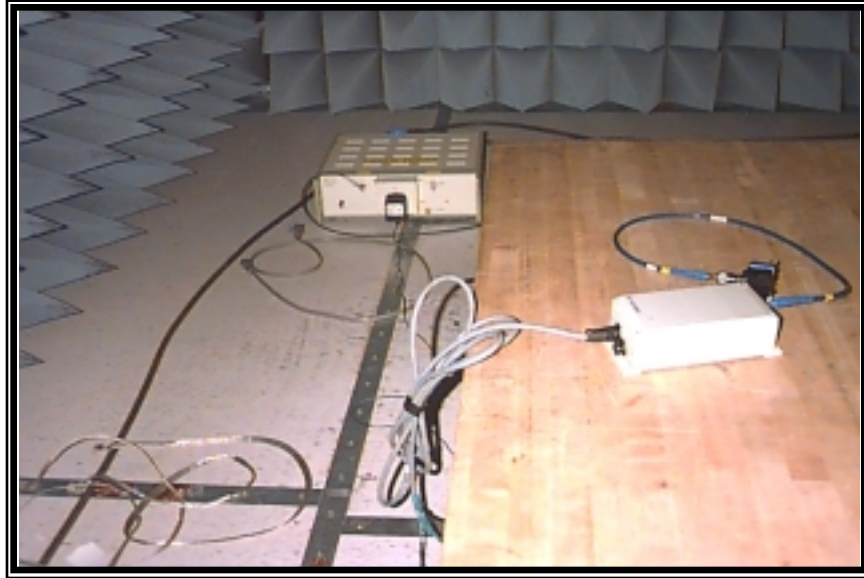


*EQUIPMENT: SmartSight 1000*

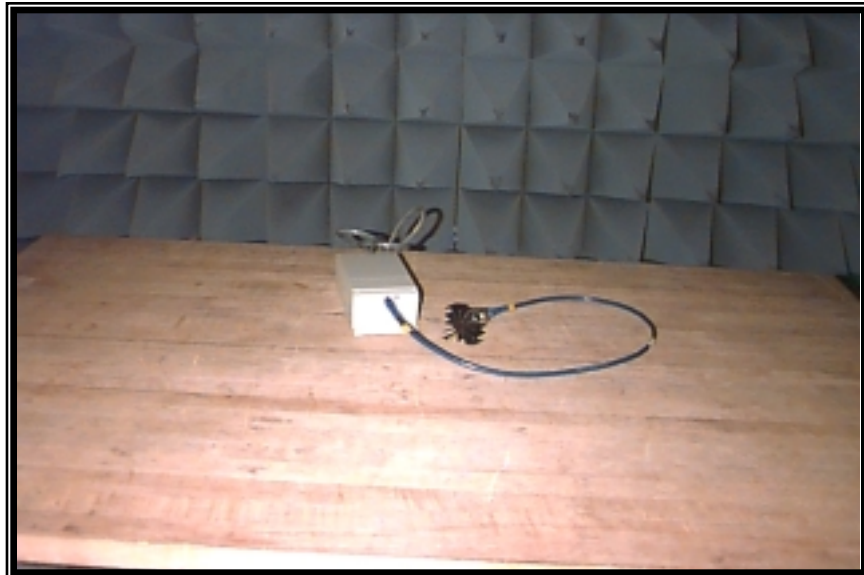
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**Conducted Photographs (Worst Case Configuration)**

**Side View**



**Front View**



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## **Section 4.        Occupied Bandwidth**

**Para. No.: 15.247(a)(2)**

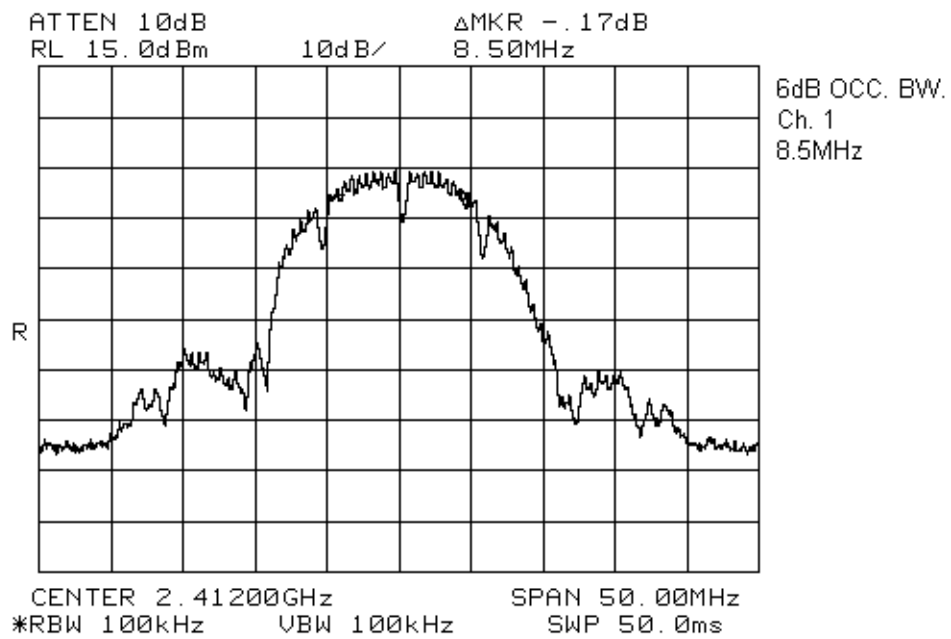
|                                        |                                    |
|----------------------------------------|------------------------------------|
| <b>Test Performed By:</b> Wayne Clarke | <b>Date of Test:</b> June 29, 2001 |
|----------------------------------------|------------------------------------|

**Test Results:**                      Complies. The 6 dB bandwidth is 8.5MHz.  
See attached graph.

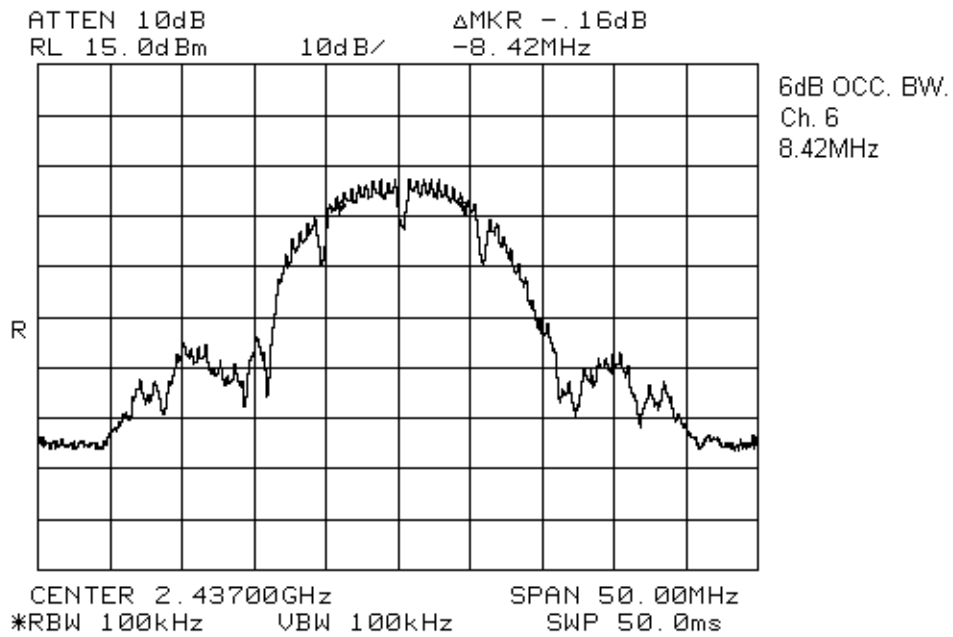
**Measurement Data:**              See attached graph.

EQUIPMENT: SmartSight 1000

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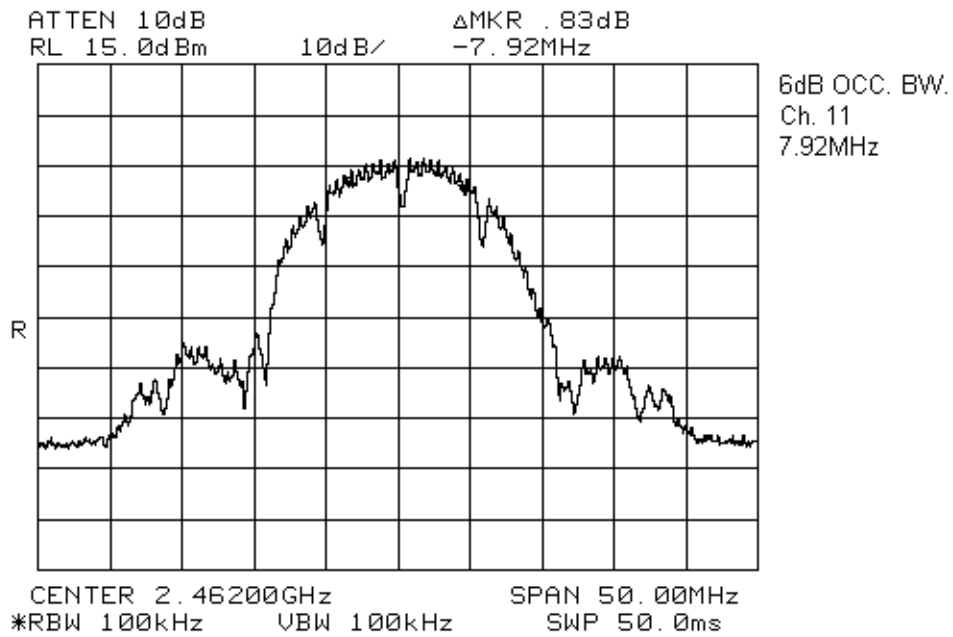


EQUIPMENT: SmartSight 1000



EQUIPMENT: SmartSight 1000

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EQUIPMENT: SmartSight 1000

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## Section 5. Peak Power Output

Para. No.: 15.247(b)

|                                 |                             |
|---------------------------------|-----------------------------|
| Test Performed By: Wayne Clarke | Date of Test: July 16, 2001 |
|---------------------------------|-----------------------------|

**Test Results:** Complies. The maximum peak power output of the transmitter is 0.0257 watts (14.1dBm).

**Measurement Data:** Detachable antenna? ☒ Yes ☐ No

Standard Connector Professionally Installed.

- (1) O/P Power at Antenna Connector
  - Channel 1: 14.1dBm = 0.0257W
  - Channel 6: 13.6dBm = 0.0229W
  - Channel 12: 13.5dBm = 0.0224W
- (2) Antenna Gain: 16dBi  
13dBi
- (3) EIRP = 14.1dBm + 16dBi = 30.1dBm

*EQUIPMENT: SmartSight 1000*

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**Section 6.        Spurious Emissions (Antenna Conducted)**

**Para. No.: 15.247**

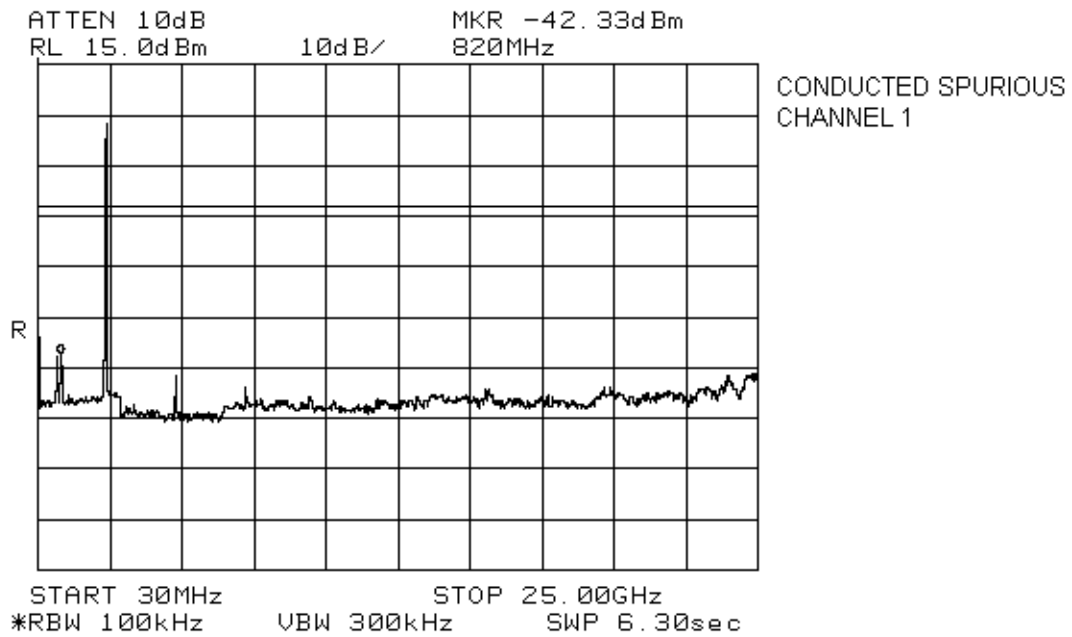
|                                        |                                    |
|----------------------------------------|------------------------------------|
| <b>Test Performed By:</b> Wayne Clarke | <b>Date of Test:</b> June 28, 2001 |
|----------------------------------------|------------------------------------|

**Test Results:**                      Complies.

**Measurement Data:**              See attached graphs.

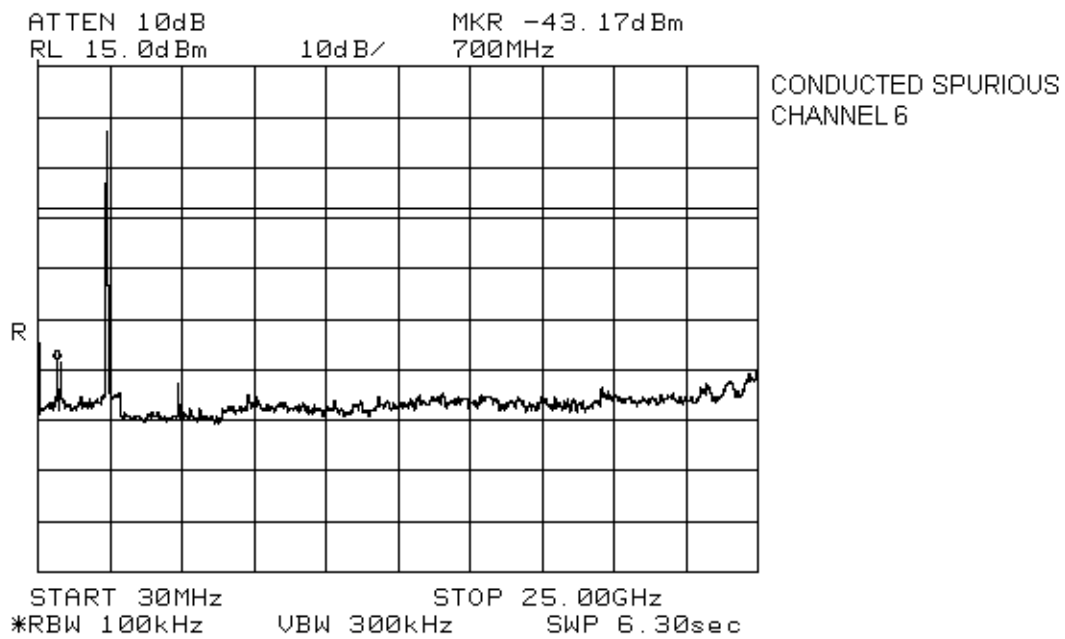
EQUIPMENT: SmartSight 1000

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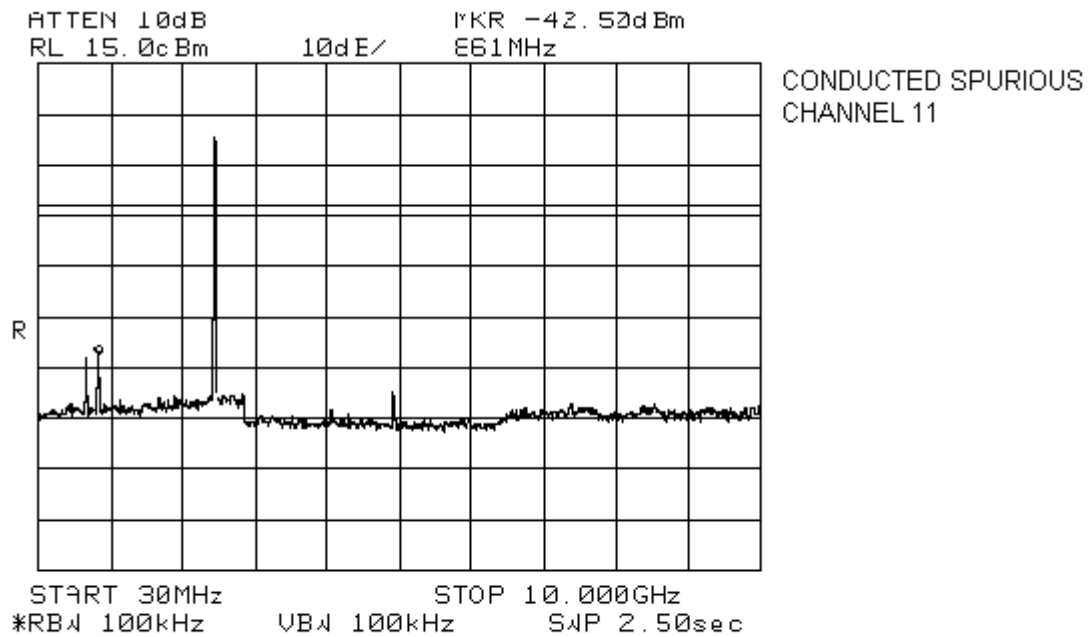


EQUIPMENT: SmartSight 1000

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EQUIPMENT: SmartSight 1000



*EQUIPMENT: SmartSight 1000*

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## **Section 7.        Spurious Emissions (Radiated)**

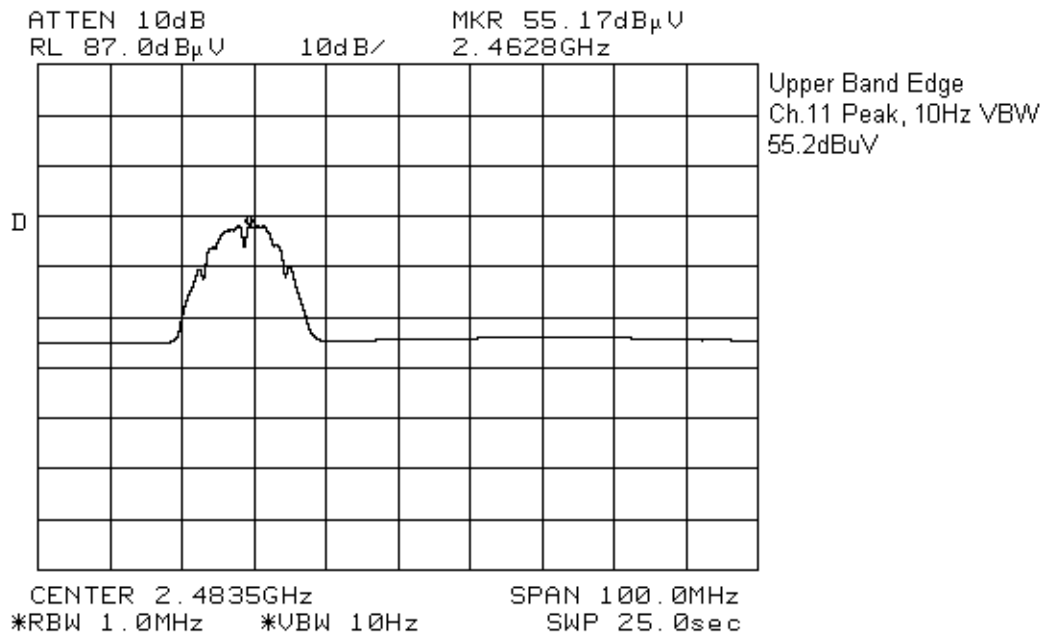
**Para. No.: 15.247(c)**

|                                         |                                    |
|-----------------------------------------|------------------------------------|
| <b>Test Performed By:</b> Glen Westwell | <b>Date of Test:</b> July 16, 2001 |
|-----------------------------------------|------------------------------------|

**Test Results:**                      Complies. The worst-case emission level is 52.1 dB $\mu$ V/m @ 3m at 7311.0 MHz. This is 1.9 dB below the specification limit.

**Measurement Data:**              See attached graphs.

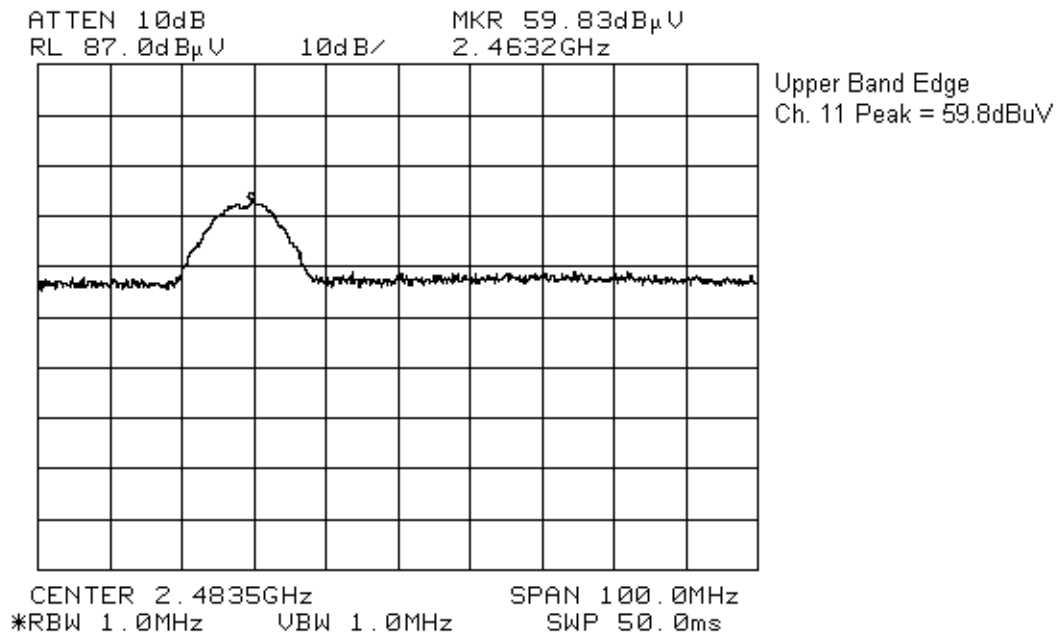
EQUIPMENT: SmartSight 1000



| Peak Rx<br>Signal (dBμV) | Antenna<br>Factor | Marker Delta<br>100kHz RBW (dB) | Field Strength<br>(dBμV) | Limit<br>(dBμV) | Margin<br>(dB) |
|--------------------------|-------------------|---------------------------------|--------------------------|-----------------|----------------|
| 55.2                     | 36.1              | -57.3                           | 34                       | 54              | 20             |

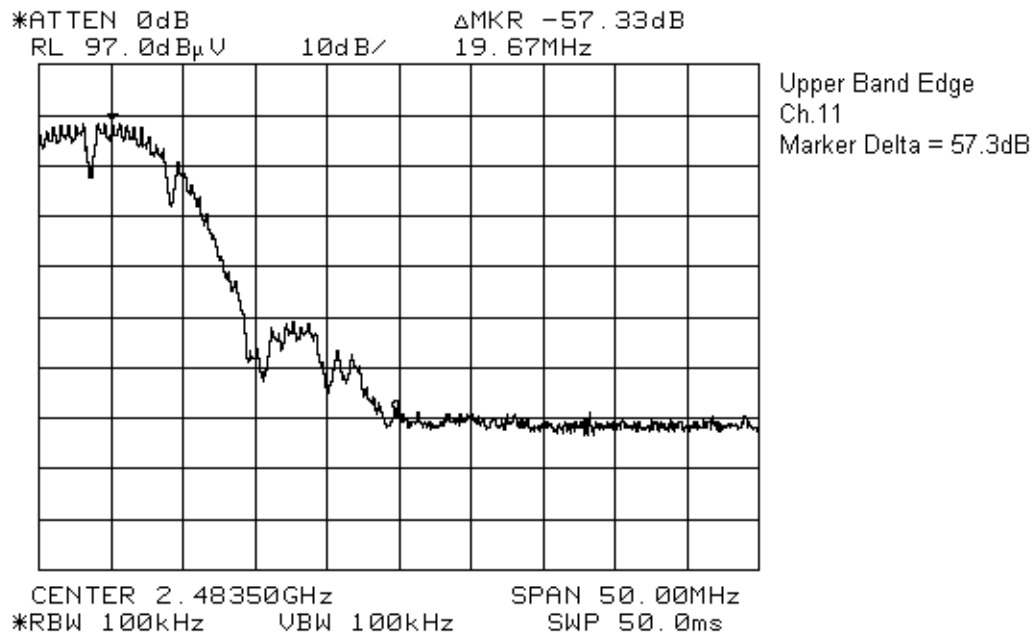
EQUIPMENT: SmartSight 1000

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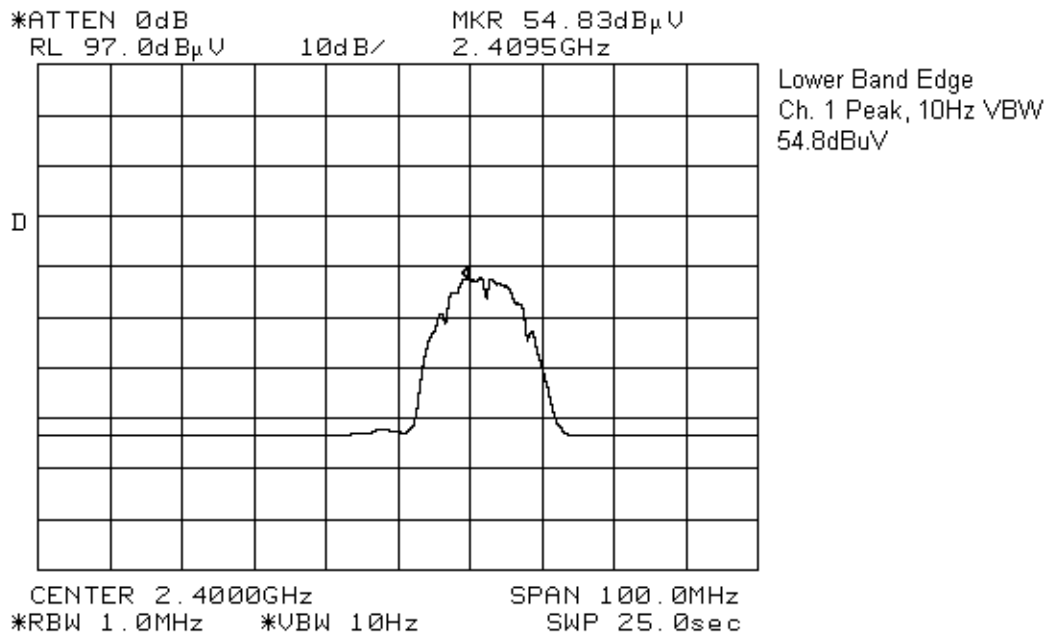


EQUIPMENT: SmartSight 1000

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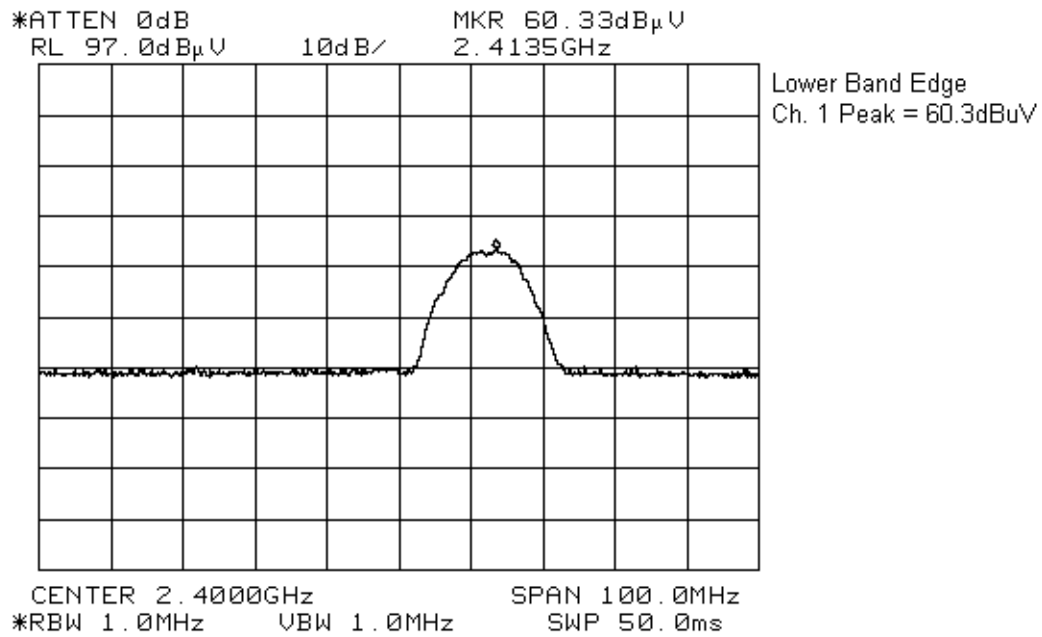
EQUIPMENT: SmartSight 1000



| Peak Rx<br>Signal (dBμV) | Antenna<br>Factor | Marker Delta<br>100kHz RBW (dB) | Field Strength<br>(dBμV) | Limit<br>(dBμV) | Margin<br>(dB) |
|--------------------------|-------------------|---------------------------------|--------------------------|-----------------|----------------|
| 54.8                     | 36.1              | -37.7                           | 53.2                     | 70.9            | 17.7           |

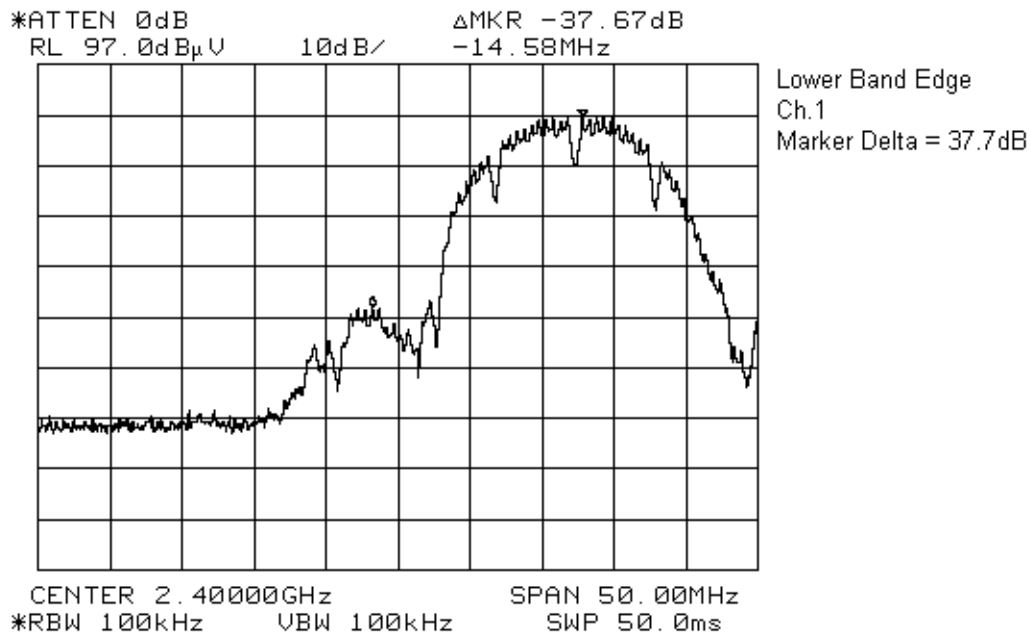
EQUIPMENT: SmartSight 1000

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EQUIPMENT: SmartSight 1000

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EQUIPMENT: SmartSight 1000

**Test Data - Radiated Emissions (PEAK)**

| Test Distance<br>(meters) : 3                                                                                                                                                                                                                                                        |           | Range:<br>A Tower |                            | Receiver:<br>HP 8565E    |                         | RBW(kHz):<br>1000      |                               | Detector:<br>Peak |                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------|----------------------------|--------------------------|-------------------------|------------------------|-------------------------------|-------------------|----------------|
| Freq.<br>(MHz)                                                                                                                                                                                                                                                                       | Ant.<br>* | Pol.<br>(V/H)     | RCVD<br>Signal<br>(dBμV/m) | Ant.<br>Factor<br>(dB)** | Amp.<br>Gain<br>(dB)*** | Dist.<br>Corr.<br>(dB) | Field<br>Strength<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| <b>Channel 1</b>                                                                                                                                                                                                                                                                     |           |                   |                            |                          |                         |                        |                               |                   |                |
| 4824.0                                                                                                                                                                                                                                                                               |           | V                 | 56.5                       | 43.7                     | -56.0                   |                        | 44.2                          | 54.0              | 9.8            |
| 4824.0                                                                                                                                                                                                                                                                               |           | H                 | 60.2                       | 43.7                     | -56.0                   |                        | 47.9                          | 54.0              | 6.1            |
| 7236.0                                                                                                                                                                                                                                                                               |           | V                 | 51.3                       | 50.8                     | -55.6                   |                        | 45.5                          | 54.0              | 8.5            |
| 7236.0                                                                                                                                                                                                                                                                               |           | H                 | 55.6                       | 50.8                     | -55.6                   |                        | 49.8                          | 54.0              | 4.2            |
| <b>Channel 6</b>                                                                                                                                                                                                                                                                     |           |                   |                            |                          |                         |                        |                               |                   |                |
| 4874.0                                                                                                                                                                                                                                                                               |           | V                 | 61.2                       | 43.8                     | -55.6                   |                        | 49.4                          | 54.0              | 4.6            |
| 4874.0                                                                                                                                                                                                                                                                               |           | H                 | 60.8                       | 43.8                     | -55.6                   |                        | 49.0                          | 54.0              | 5.0            |
| 7311.0                                                                                                                                                                                                                                                                               |           | V                 | 57.2                       | 50.9                     | -56.3                   |                        | 52.1                          | 54.0              | 1.9            |
| 7311.0                                                                                                                                                                                                                                                                               |           | H                 | 57.0                       | 50.9                     | -56.3                   |                        | 51.6                          | 54.0              | 2.4            |
| <b>Channel 11</b>                                                                                                                                                                                                                                                                    |           |                   |                            |                          |                         |                        |                               |                   |                |
| 4924.0                                                                                                                                                                                                                                                                               |           | V                 | 56.5                       | 44.0                     | -55.2                   |                        | 45.3                          | 54.0              | 8.7            |
| 4924.0                                                                                                                                                                                                                                                                               |           | H                 | 35.7                       | 44.0                     | -55.2                   |                        | 44.5                          | 54.0              | 9.5            |
| 7386.0                                                                                                                                                                                                                                                                               |           | V                 | N.D.                       | 51.1                     | -56.0                   |                        | N/A                           | 54.0              | N/A            |
| 7386.0                                                                                                                                                                                                                                                                               |           | H                 | N.D.                       | 51.5                     | -56.0                   |                        | N/A                           | 54.0              | N/A            |
| <b>Notes:</b><br>B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole<br>* Re-measured using dipole antenna.<br>** Includes cable loss when amplifier is not used.<br>*** Includes cable loss.<br>( ) Denotes failing emission level.<br>N.D. = Not Detected |           |                   |                            |                          |                         |                        |                               |                   |                |

All emissions were searched up to the 10<sup>th</sup> harmonic.

*EQUIPMENT: SmartSight 1000*

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**Section 8. Transmitter Power Density**

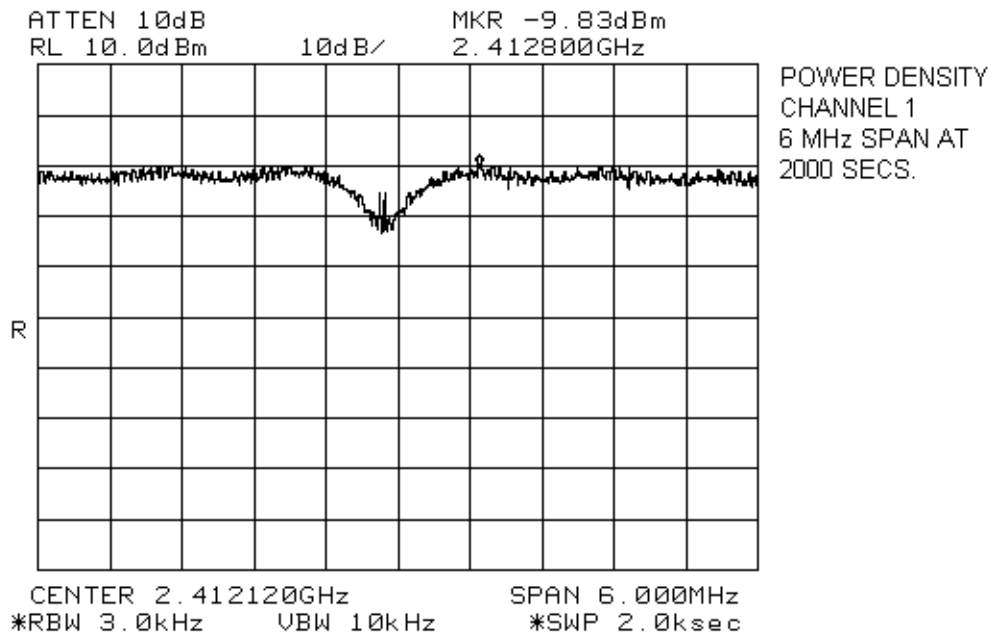
**Para. No.: 15.247(d)**

|                                        |                                    |
|----------------------------------------|------------------------------------|
| <b>Test Performed By:</b> Wayne Clarke | <b>Date of Test:</b> June 29, 2001 |
|----------------------------------------|------------------------------------|

**Test Results:** Complies.

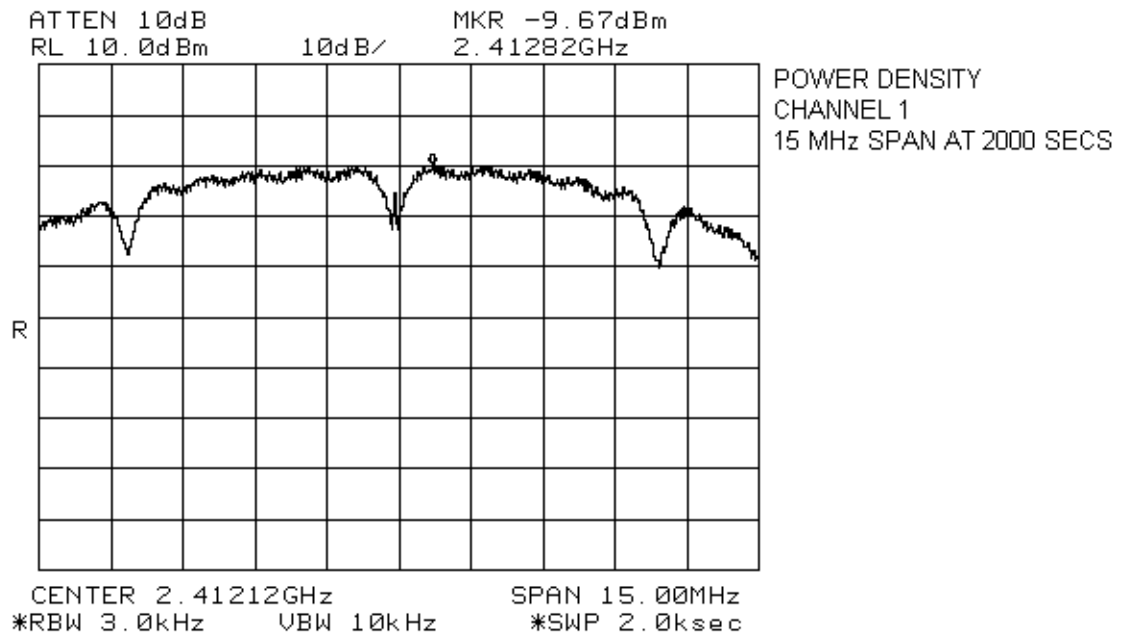
**Measurement Data:** See attached graphs.

EQUIPMENT: SmartSight 1000



EQUIPMENT: SmartSight 1000

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*EQUIPMENT: SmartSight 1000*

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## **Section 9.        Processing Gain**

**Para. No.: 15.247(e)**

|                                        |                                   |
|----------------------------------------|-----------------------------------|
| <b>Test Performed By:</b> Manufacturer | <b>Date of Test:</b> May 30, 2001 |
|----------------------------------------|-----------------------------------|

**Test Results:**                      Complies. The processing gain of the system is >10dB.

**Measurement Data:**              See attached data.

EQUIPMENT: SmartSight 1000

**Lucent Technologies**

Bell Labs Innovations

Nederland B.V.

Zadelstede 1-10  
3431 JZ Nieuwegein  
The Netherlands  
Phone: +31 30 6097666  
Fax: +31 30 6097556

FCC...

Nieuwegein, 30 May 2001

Re: Processing Gain WaveLAN/Orinoco PC Cards

Add. Info to Processing Gain report:

For Chip/symbol rate etc. see the table below:

| Bit rate     | Chip/symbol rate | Bit/symbol rate | Chip/bit rate |
|--------------|------------------|-----------------|---------------|
| 1 Mbit/sec   | 11               | 1, DBPSK        | 11            |
| 2 Mbit/sec   | 11               | 2, DQPSK        | 5.5           |
| 5.5 Mbit/sec | 8                | 4, CCK          | 2             |
| 11 Mbit/sec  | 8                | 8, CCK          | 1             |

## Extra Information:

- For 1 and 2 Mbp/s DQPSK modulation using a fixed spreading sequence the symbol rate is 1 MSymbol/s. The symbol length is 11 chips. Each chip duration is 1/11 uS. A symbol duration is 1 uS.

The chip/symbol rate is 11. The theoretical process gain is  $10 \cdot \text{LOG}(11) = 10 \text{ dB}$ .

- For 5.5 and 11 Mbp/s CCK where the spreading sequence is a function of the transmitted data, the symbol rate is 8/11 MSymbol/s. The symbol length is 8 chips. Each chip duration is 1/11 uS. A symbol duration is 8/11 uS.

The chip/symbol rate is 8.

The theoretical process gain is  $10 \cdot \text{LOG}(8) = 9 \text{ dB}$ . Due to the fact that only 256 code sequences out of the 65536 code sequences that are available are used, there is coding gain. Therefore the processing gain of a CCK system consists of spreading gain and coding gain together. As such a CCK system does meet the FCC requirement for a process gain of minimal 10 dB.

## Explanation:

The Lucent High Speed modulation is compliant to draft standard extension IEEE 802.11b for 5.5 and 11 Mbit/s signaling rates. For this modulation technique the Symbol length is 8 Chips (1 Symbol duration equals 8/11 uS). However, the 8 Chips are not a fixed spreading sequence as is the case for the 1 and 2 Mbit/s modulation technique. These 8 Chips, applied in a QPSK modulation, use 256 unique patterns out of the 65536 different possible patterns, whereby each pattern represents a specific data sequence (4 or 8 bits). Thus this type of modulation introduces Coding Gain, since only 256 patterns are used out of 65536 possible combinations.

Therefore it can be concluded that the system employs Coding Gain in addition to Spreading Gain.

The Processing Gain of the system is taken as the combined result of Coding and Spreading Gain, so a Processing Gain of 10 dB can be met with 8 Chips per Symbol.

Lucent has shown by a CW jammer margin test that a SIR of 10 dB can be met, while meeting the system specified BER. It is our understanding that this is compliant with the FCC ruling.

Therefore the test report shows that the Lucent product, operating at 1, 2, 5.5 and 11 Mbit/s meets a Processing Gain of at least 10 dB, under the conditions as specified by the FCC.

Sincerely yours,

Bert Vos, Certifications Support,

*EQUIPMENT: SmartSight 1000***Section 10. Test Equipment List**

| CAL CYCLE | EQUIPMENT                   | MANUFACTURER    | MODEL       | SERIAL     | LAST CAL.  | NEXT CAL.  |
|-----------|-----------------------------|-----------------|-------------|------------|------------|------------|
| 1 Year    | Spectrum Analyzer           | Hewlett Packard | 8565E       | FA000981   | June 08/01 | June 08/02 |
| 1 Year    | Spectrum Analyzer-1         | Hewlett Packard | 8566B       | 2311A02238 | Dec. 10/00 | Dec. 10/01 |
| 1 Year    | Spectrum Analyzer Display-1 | Hewlett Packard | 8566B       | 2314A04759 | Dec. 10/00 | Dec. 10/01 |
| 1 Year    | Quasi-peak adapter-1        | Hewlett-Packard | 85650A      | 2043A00302 | Dec. 14/00 | Dec. 14/01 |
| 1 Year    | Attenuator                  | Narda           | 768-10      | 9709       | Oct. 8/99  | Oct. 8/00  |
| 1 Year    | LISN                        | Tegam           | 95300-50    | T-12855/56 | Oct. 19/00 | Oct. 19/01 |
| 1 Year    | Horn Antenna                | EMCO #1         | 3115        | 3132       | Dec. 11/00 | Dec. 11/01 |
| 1 Year    | RF AMP                      | JCA             | 4-8 GHz     | FA001497   | May 31/01  | May 31/02  |
| 1 Year    | Plotter                     | Hewlett Packard | 7550A       | FA001129   | NCR        | NCR        |
| 1 Year    | Notch Filter                | K&L             | 3TNF-1-2000 | 127        | Aug. 23/99 | Aug. 23/00 |
|           | High Pass Filter            | K&L             | 11SH10-4000 | FA001340   | COU        | COU        |
| 1 Year    | Power Meter                 | Hewlett Packard | E4448B      | FA001413   | Jan. 16/01 | Jan. 16/02 |
| 1 Year    | Power Sensor                | Hewlett Packard | 8487A       | FA001419   | Jan. 16/01 | Jan. 16/02 |

NA: Not Applicable  
NCR: No Cal Required  
COU: CAL On Use

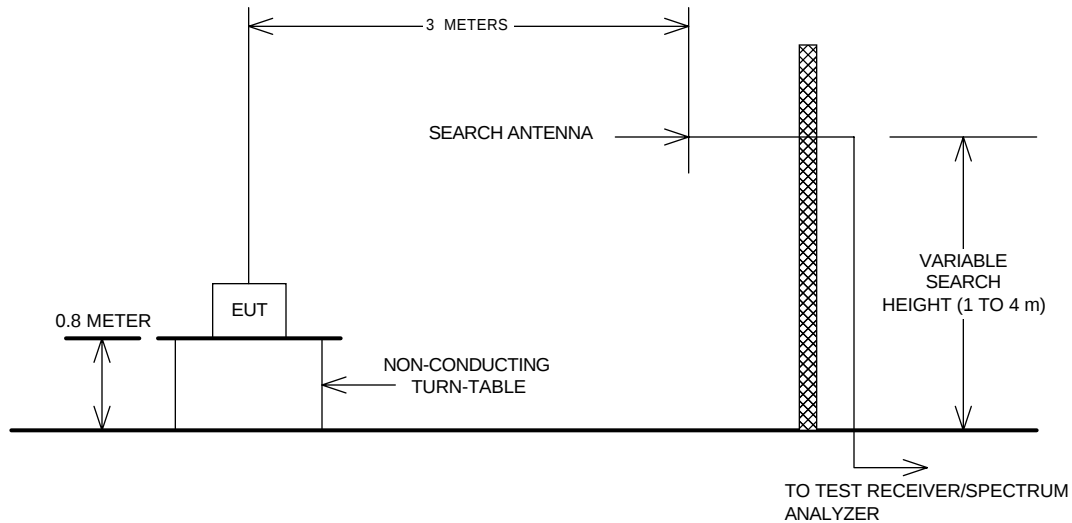
*EQUIPMENT: SmartSight 1000*

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**Annex A**  
**Block Diagrams**

EQUIPMENT: SmartSight 1000

## Test Site For Radiated Emissions



### Below 1 GHz

Peak detector.

RBW = 100 kHz

### Above 1 GHz For Peak Emission Levels

Peak detector

RBW = 1 MHz

VBW = >RBW

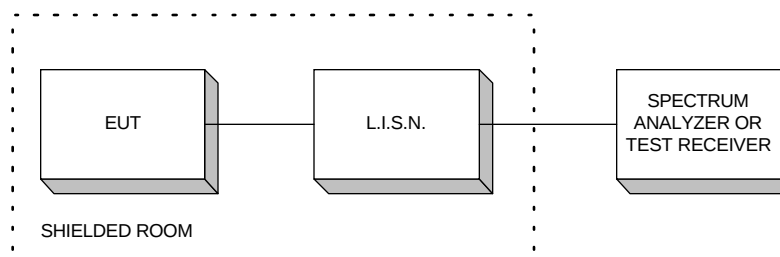
### Above 1 GHz For Average Emission Levels

Peak detector

RBW = 1 MHz

VBW = 10 Hz

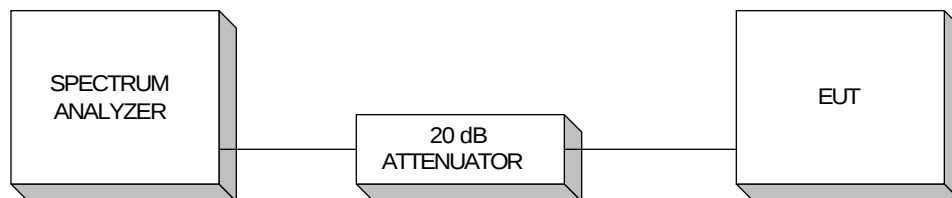
## Conducted Emissions



EQUIPMENT: SmartSight 1000

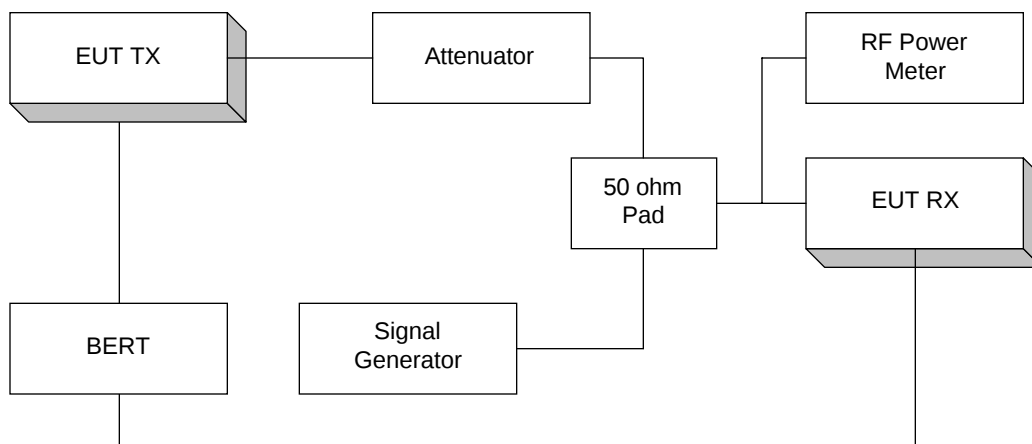
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### Transmitter Power Density & Peak Power At Antenna Terminals



If the EUT has an integral (non-detachable) antenna, the above test is performed as a radiated measurement and the result is reported as EIRP.

### Processing Gain



NOTE: This is a typical setup. The setup may vary slightly since many devices have BER test functions built into the device.