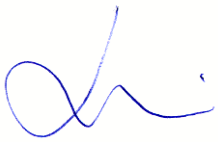
| | |
|---|---|
| **Test Report:** | 5W44287 |
| **Applicant:** | G-Wave Inc.<br>15 Ron's Edge Road<br>Springfield, New Jersey<br>07081 |
| **Apparatus:** | BDA-2PGN-1/10W-90-A |
| **FCC ID:** | Q8K2PGN10W90 |
| **In Accordance With:** | FCC Part 90, Boosters<br>Private Land Mobile Radio Services |
| **Tested By:** | Nemko Canada Inc.<br>303 River Road<br>Ottawa, Ontario<br>K1V 1H2 |
| **Authorized By:** |  <br>Jin Xu, Wireless Specialist |
| **Date:** | 27 May 2005 |
| **Total Number of Pages:** | 25 |

## Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted is accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

| | |
|---|---|
| **Apparatus Assessed:** | BDA-2PGN-1/10W-90-A |
| **Specification:** | FCC Part 90 Private Land Mobile Radio Services |
| **Compliance Status:** | Complies |
| **Exclusions:** | None |
| **Non-compliances:** | None |
| **Report Release History:** | Original Release |

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

# TABLE OF CONTENTS

# Section 1 : Equipment Under Test

## 1.1 Product Identification

The Equipment Under Test was identified as follows:

BDA-2PGN-1/10W-90-A

## 1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

| Sample No. | Description | Serial No. |
|---|---|---|
| | | |
| 1 | BDA-2PGN-1/10W-90-A | 05051001 |
| | | |
| | | |

The first samples were received on: May 11, 2005

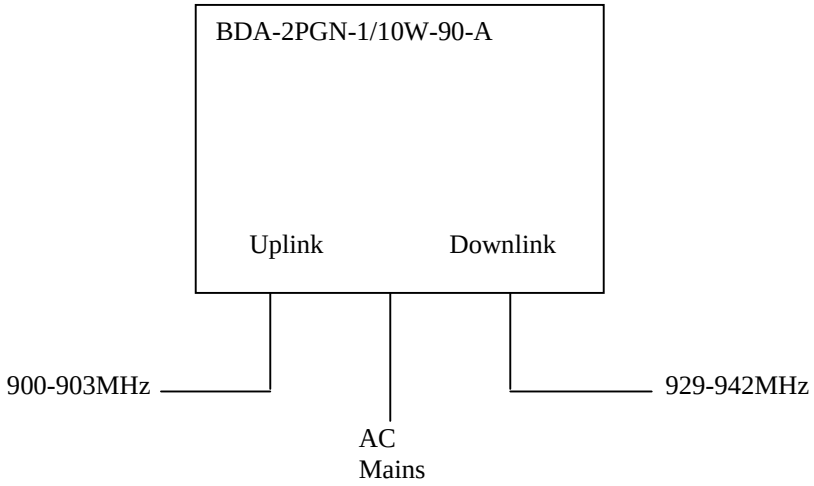
## 1.3 Theory of Operation

The BDA-2PGN-1/10W-90-A Downlink path receives RF signals from the base station and amplifies and transmits them to the subscriber. The BDA-2PGN-1/10W-90-A Uplink path receives RF signals from the subscriber and amplifies and transmits them to the base station. The Uplink and Downlink occupy two distinct frequency bands.

## 1.4 Technical Specifications of the EUT

| | |
|---|---|
| **Manufacturer:** | G-Wave Inc. |
| **Operating Frequency:** | Uplink: 900-903MHz<br>Downlink: 929-942MHz |
| **Emission Designator:** | F2D |
| **Rated Power:** | Uplink: 0.316W(25dBm)<br>Downlink: 1.585W(32dBm) |
| **Measured Power:** | Uplink: 23.89dBm<br>Downlink: 31.05dBm |
| **Rated Gain:** | 90dB |
| **Modulation:** | 2FSK, 4FSK |
| **Power Source:** | 120Vac, 60Hz |

## 1.5 Block Diagram of the EUT



# Section 2 : Test Conditions

## 2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 90 Private Land Mobile Radio Services
FCC 2-11-04/EAB/RF Amplifier, Booster, and Repeater Reminder Sheet

## 2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

## 2.3 Test Environment

All tests were performed under the following environmental conditions:

| | | |
|---|---|---|
| Temperature range | : | 15 – 30 ºC |
| Humidity range | : | 20 - 75 % |
| Pressure range | : | 86 - 106 kPa |
| Power supply range | : | +/- 5% of rated voltages |

## 2.4 Test Equipment

| Equipment | Manufacturer | Model No. | Asset/Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Spectrum Analyser | HP | 8565E | FA000981 | Mar 10/05 | Mar 10/06 |
| Signal Generator | Rohde & Schwarz | SMIQ03E | FA001269 | Mar 3/05 | Mar 3/06 |
| Signal Generator | Rohde & Schwarz | SMIQ03 | FA001091 | Aug 20/04 | Aug 20/05 |
| Power Meter | HP | E4418B | FA001678 | Mar 8/05 | Mar 8/06 |
| Power Sensor | HP | 8487A | 1261028D | Mar 29/05 | Mar 29/06 |
| 20dB Attenuator | Narda | 769-20 | FA001394 | COU | COU |
| 10dB Attenuator | Weinschel Corp | 47-10-34 | FA001739 | COU | COU |
| 10dB Attenuator | Weinschel Corp | 47-10-34 | FA001740 | COU | COU |
| Receiver | Rohde & Schwarz | ESVS-30 | FA001437 | July 26/04 | July 26/05 |
| Biconical (1) Antenna | EMCO | 3109 | FA000805 | Apr 22/05 | Apr 22/06 |
| Log Periodic Antenna #1 | EMCO | LPA-25 | FA000477 | Aug. 26/04 | Aug. 26/05 |
| Horn Antenna #1 | EMCO | 3115 | FA000649 | Dec. 22/04 | Dec. 22/05 |
| 1.0 – 2.0 GHz Amplifier | JCA | 12-400 | FA001498 | June 18/04 | June 18/05 |
| 2.0 – 4.0 GHz Amplifier | JCA | 24-600 | FA001496 | June 18/04 | June 18/05 |
| 4.0 – 8.0 GHz Amplifier | JCA | 48-600 | FA001497 | June 18/04 | June 18/05 |
| 5.0 – 18.0 GHz Amplifier | NARDA | DWT-186N23U40 | FA001409 | COU | COU |
| Spectrum Analyzer | Hewlett-Packard | 8566B | FA001309 | May 18/05 | May 18/06 |
| Spectrum Analyzer Display | Hewlett-Packard | 85662A | FA001309 | May 18/05 | May 18/06 |

# Section 3 : Observations

## 3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

## 3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

## 3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

## 3.4 Test Deleted

No Tests were deleted from this assessment.

## Section 4 : Results Summary

This section contains the following:

FCC Part 90 : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

| | |
|---|---|
| N | No : not applicable / not relevant. |
| Y | Yes : Mandatory i.e. the apparatus shall conform to these tests. |
| N/T | Not Tested, mandatory but not assessed. (See section 3.4 Test deleted) |

The results contained in this section are representative of the operation of the apparatus as originally submitted.

## 4.1 FCC Part 90 : Test Results

| Clause | Test Method | Test Description | Required | Result |
|---|---|---|---|---|
| 90.205 | 2.1046 | Output power | Y | PASS |
| 90.210 | 2.1051 | Conducted spurious emissions | Y | PASS |
| 90.210 | 2.1053 | Radiated spurious emissions | Y | PASS |
| 90.213 | 2.1055 | Frequency stability | N (1) | |
| 90.214 | — | Transient Behavior | N (2) | |
| 90.219 | — | Use of boosters | Y | PASS |
| 2-11-04/EAB/RF | 2.1049 | Occupied bandwidth | Y | PASS |
| 2-11-04/EAB/RF | — | Out of band rejection | Y | PASS |

Notes:

(1) The EUT does not contain any frequency translating circuitry.

(2) The EUT does not operate in the 150-174 MHz and 421-512 MHz frequency bands.

# Appendix A : Test Results

**Criteria: Clause 90.205 Output Power**

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized for new stations authorized after August 16, 1995 is as follows in FCC Part 90.205(a) through (r).

**Test Conditions:**

| | | | |
|---|---|---|---|
| **Sample Number:** | 1 | **Temperature:** | 26 |
| **Date:** | May 20, 2005 | **Humidity:** | 28 |
| **Modification State:** | 0 | **Tester:** | Jason Nixon |
| | | **Laboratory:** | Wireless |

**Test Results:**

| Band | Rated Power (dBm) | Measured Power (dBm) |
|---|---|---|
| Uplink | 25 | 23.89 |
| Downlink | 32 | 31.05 |

**Criteria: Clause 90.210 Conducted Spurious Emissions**

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

**Test Conditions:**

| | | | |
|---|---|---|---|
| **Sample Number:** | 1 | **Temperature:** | 26 |
| **Date:** | May 20, 2005 | **Humidity:** | 28 |
| **Modification State:** | 0 | **Tester:** | Jason Nixon |
| | | **Laboratory:** | Wireless |

**Test Results:**

See Attached Plots.

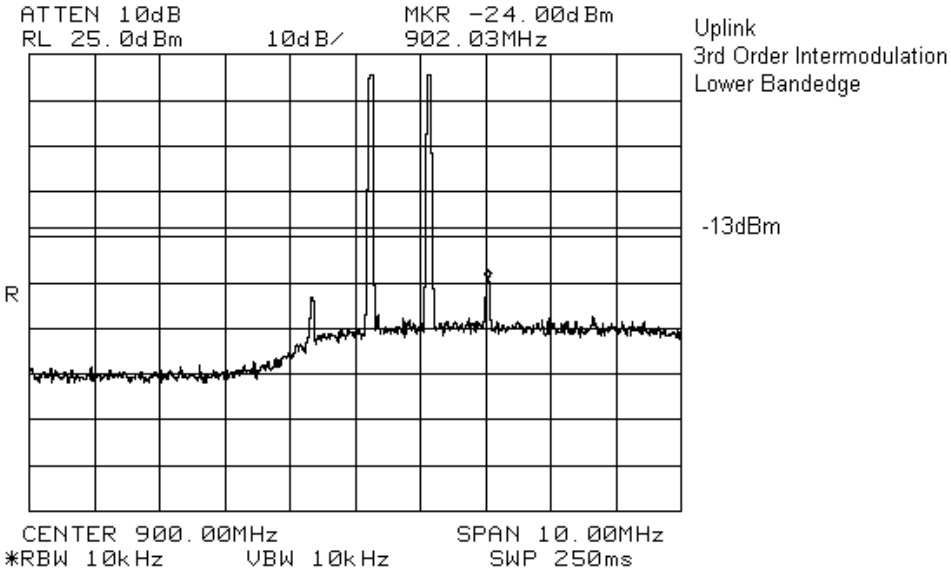
**Additional Observations:**

Measurements were performed with CW signals to simulate the 2FSK and 4FSK modulations used by the EUT.

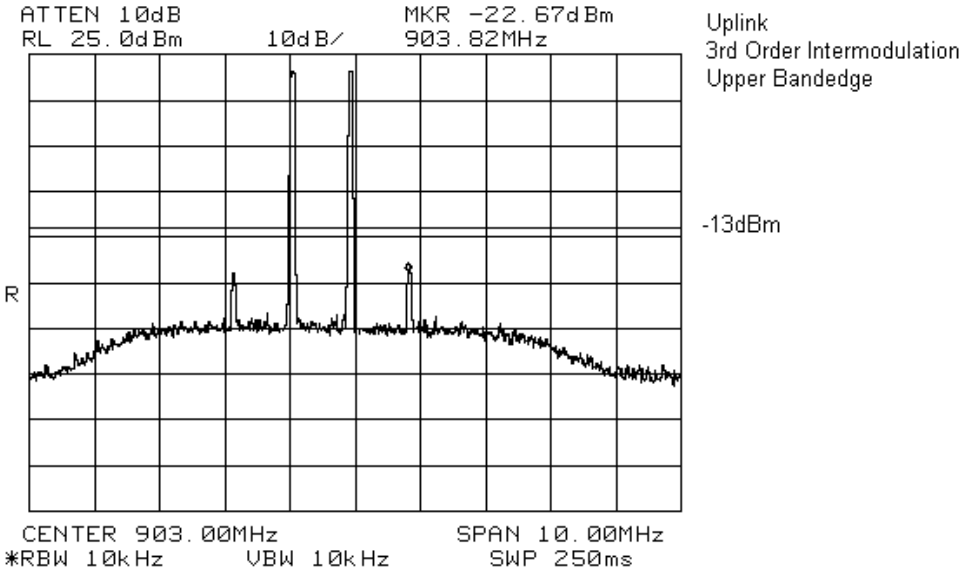
Measurements for conducted emissions outside the operating band were performed at the low, mid and high channels and only the worst case from each band has been included.

The spectrum was searched from 30MHz to 10GHz.

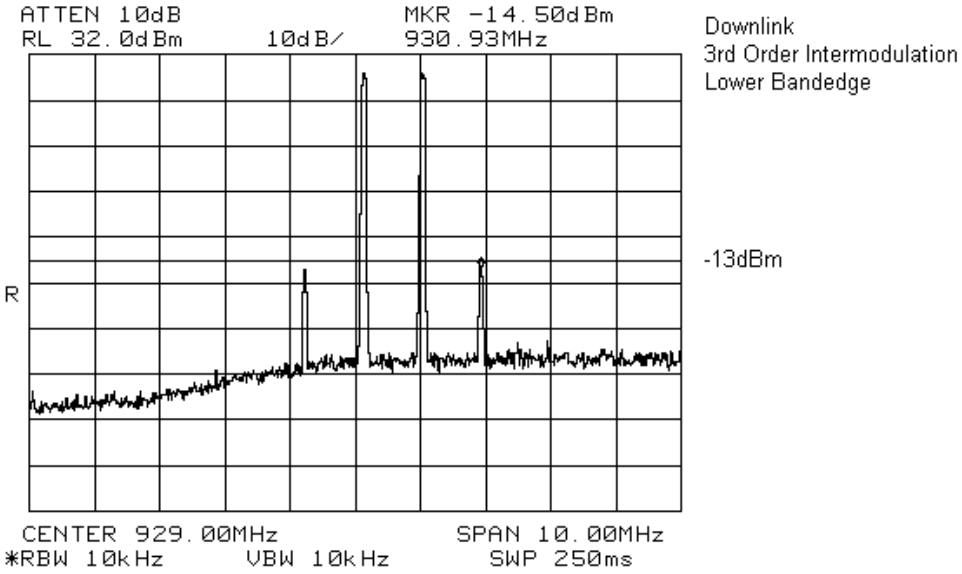
## Uplink 3rd Order Intermodulation – Lower Bandedge



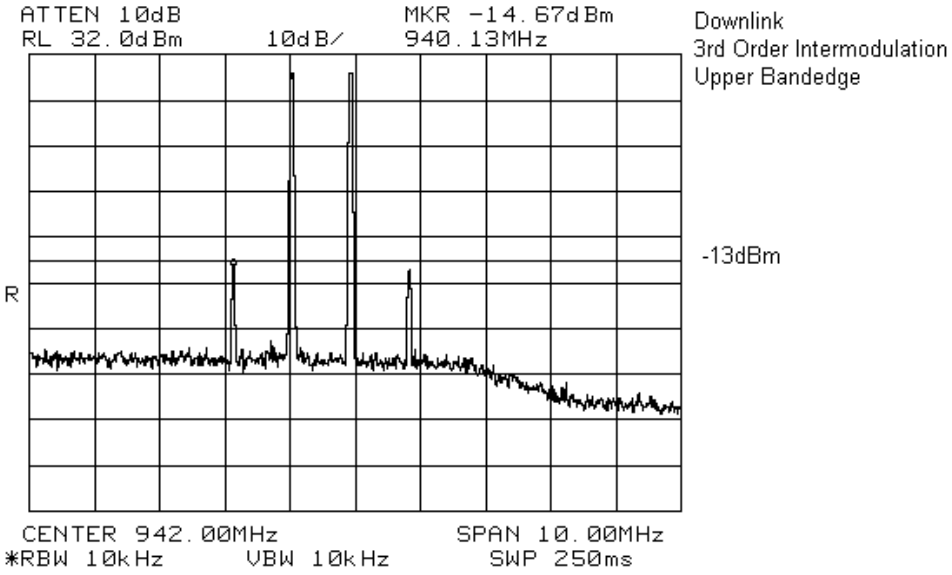

## Uplink 3rd Order Intermodulation – Upper Bandedge



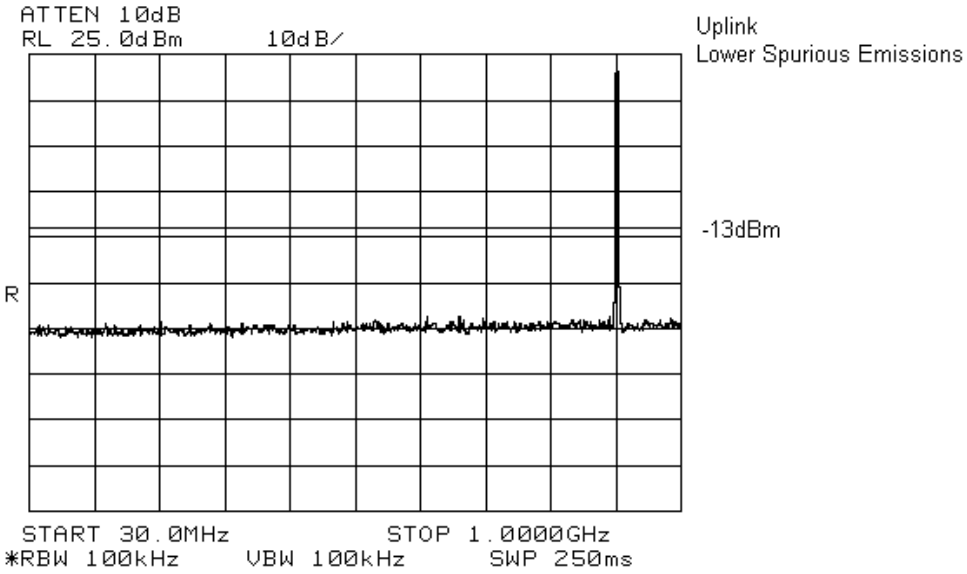
## Downlink 3rd Order Intermodulation – Lower Bandedge



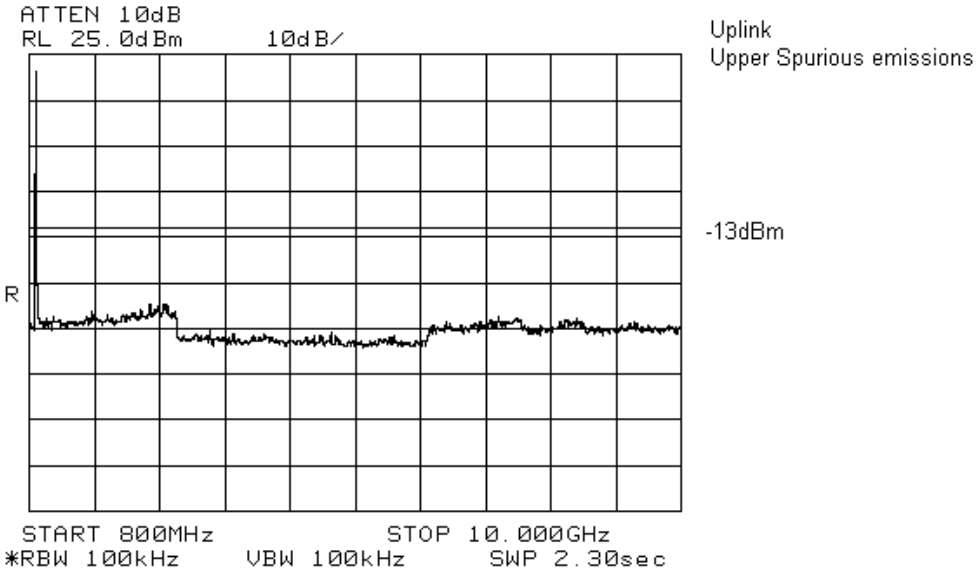

## Downlink 3rd Order Intermodulation – Upper Bandedge



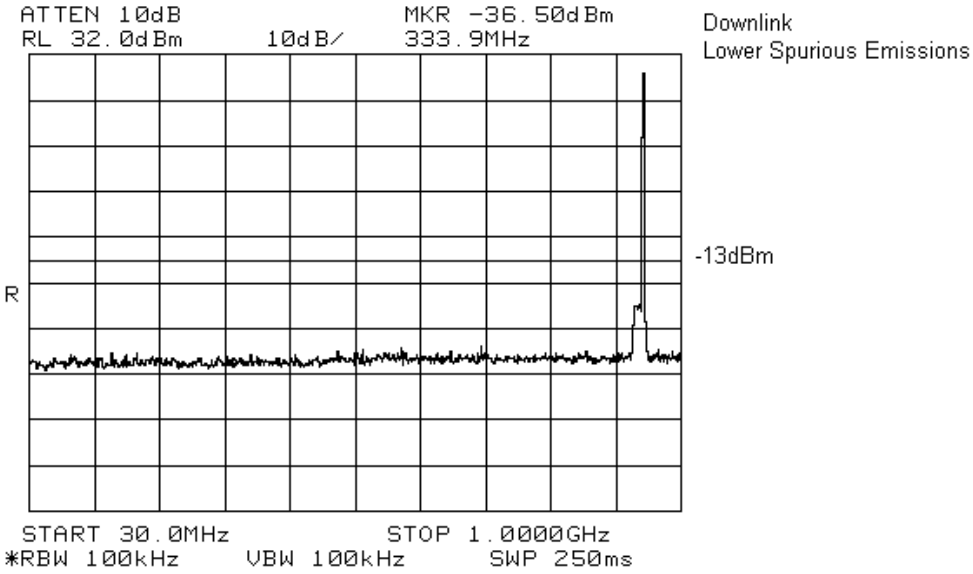
## Uplink Conducted Spurious Emissions – Lower Frequencies



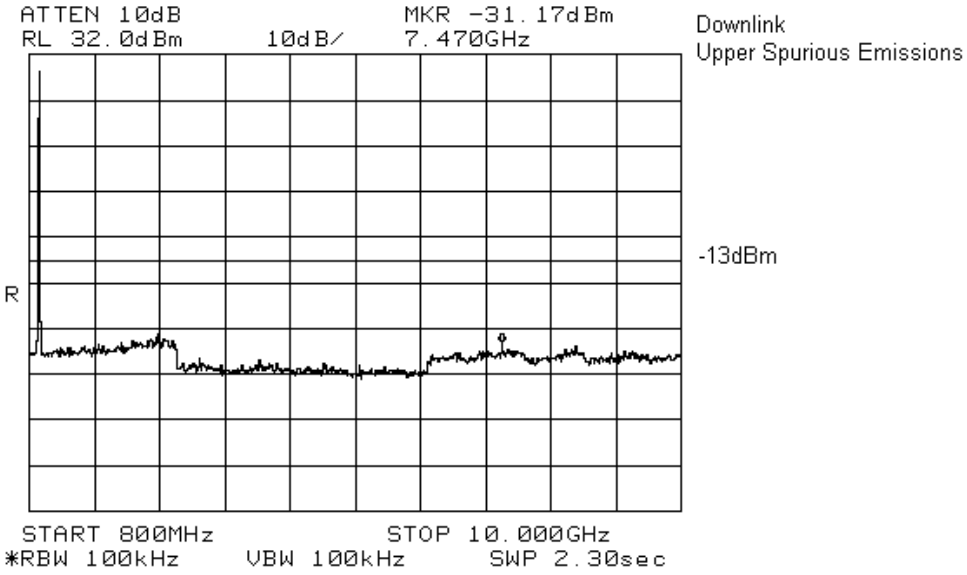

## Uplink Conducted Spurious Emissions – Upper Frequencies



## Downlink Conducted Spurious Emissions – Lower Frequencies




## Downlink Conducted Spurious Emissions – Upper Frequencies



**Criteria: Clause 90.210 Radiated Spurious Emissions**

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere, the Table below specifies the emission masks for equipment operating in the frequency bands governed under this part.

**Test Conditions:**

| | | | |
|---|---|---|---|
| **Sample Number:** | 1 | **Temperature:** | 17 |
| **Date:** | May 26, 2005 | **Humidity:** | 61 |
| **Modification State:** | 0 | **Tester:** | Jason Nixon |
| | | **Laboratory:** | OATS |

**Test Results:**

See Attached Table for Results

**Additional Observations:**

The Spectrum was searched from 30MHz to the 10GHz. No emissions within 20dB below the limit were detected.

**Criteria: Clause 2-11-04/EAB/RF Occupied Bandwidth**

Using an RBW of 300Hz or 1% of the emission bandwidth, The spectral shape of the output should look similar to the input for all modulations.

## Test Conditions:

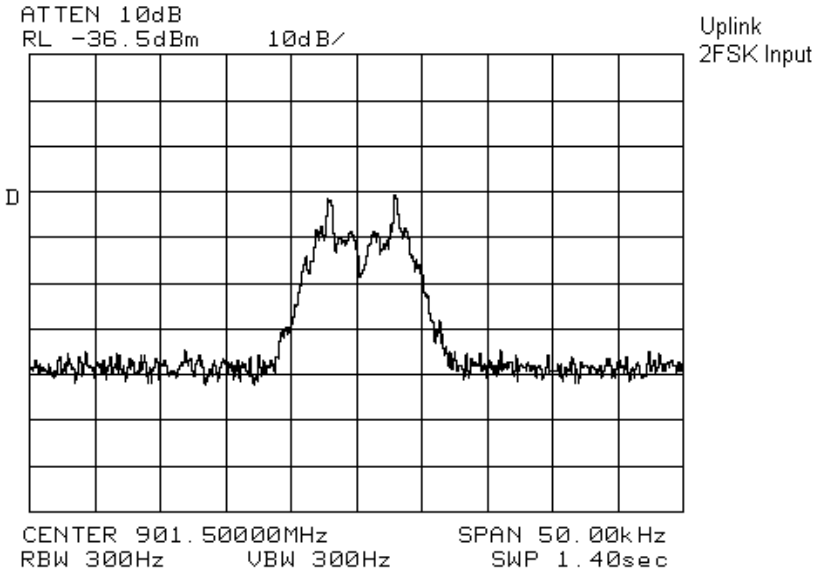
| | | | |
|---|---|---|---|
| **Sample Number:** | 1 | **Temperature:** | 26 |
| **Date:** | May 20, 2005 | **Humidity:** | 28 |
| **Modification State:** | 0 | **Tester:** | Jason Nixon |
| | | **Laboratory:** | Wireless |

## Test Results:

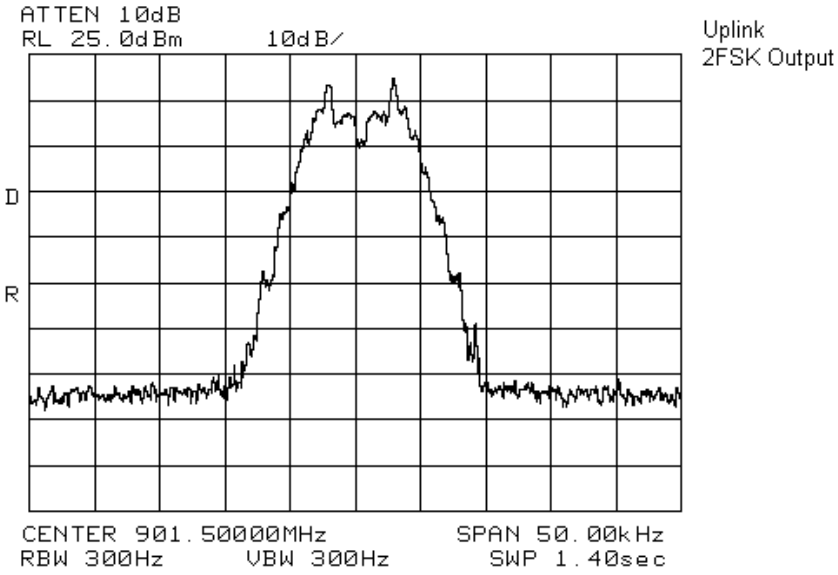
See Attached Plots.

## Additional Observations:

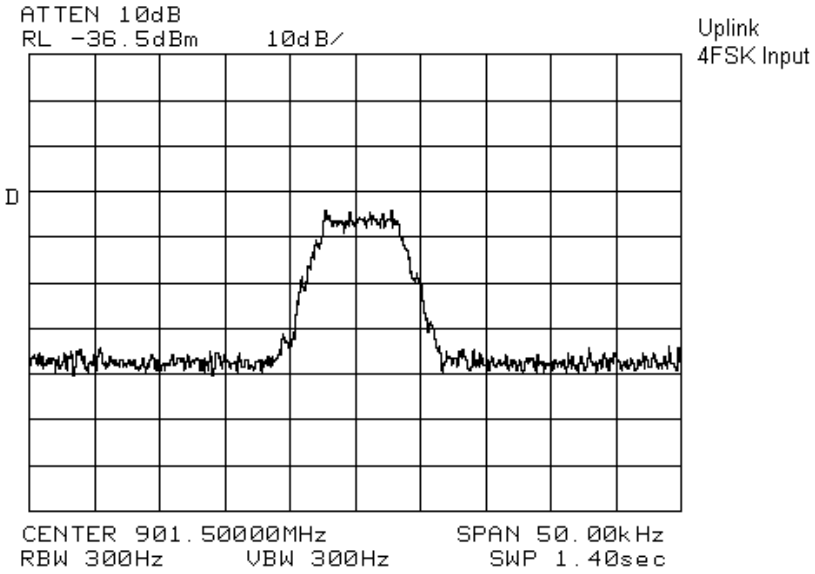
## Uplink 2FSK Input



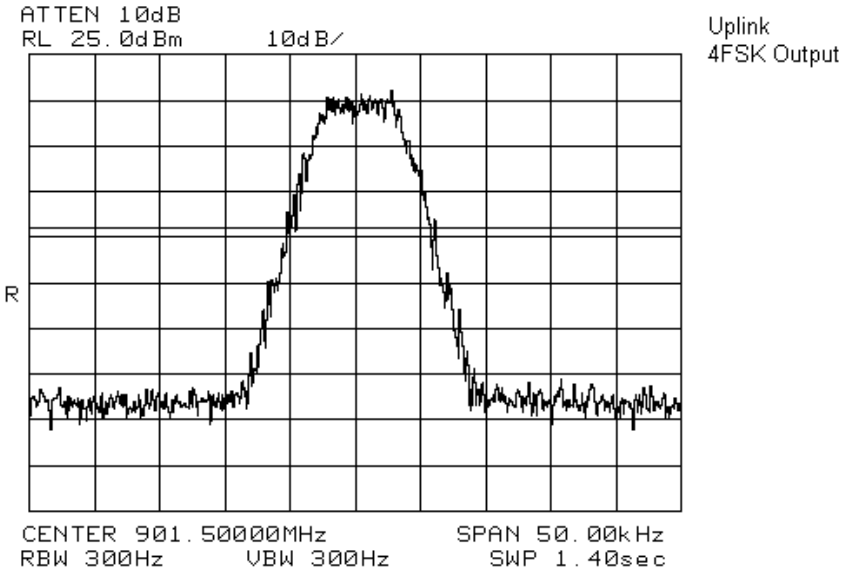

## Uplink 2 FSK Output



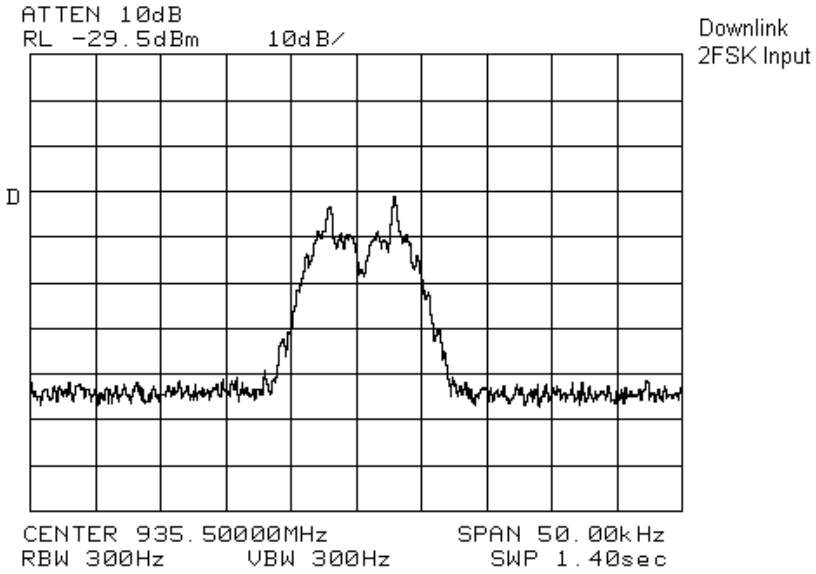
## Uplink 4FSK Input



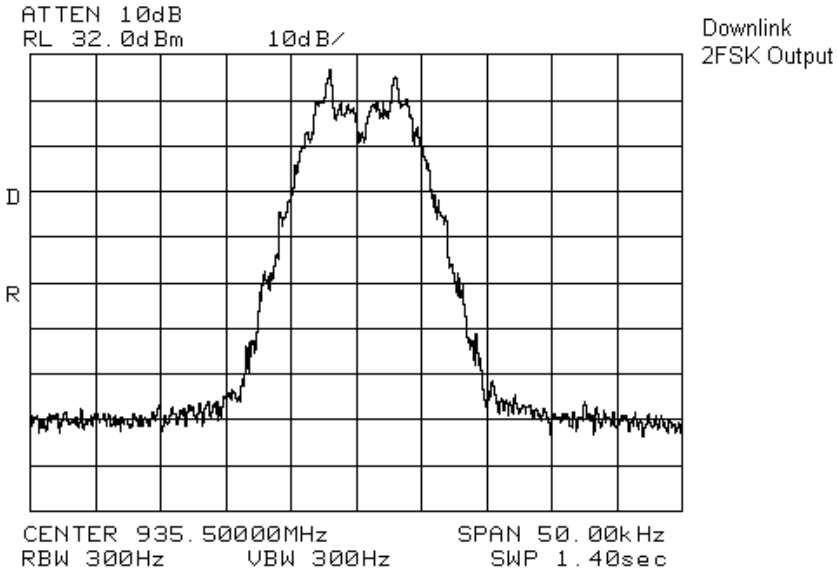

## Uplink 4FSK Output



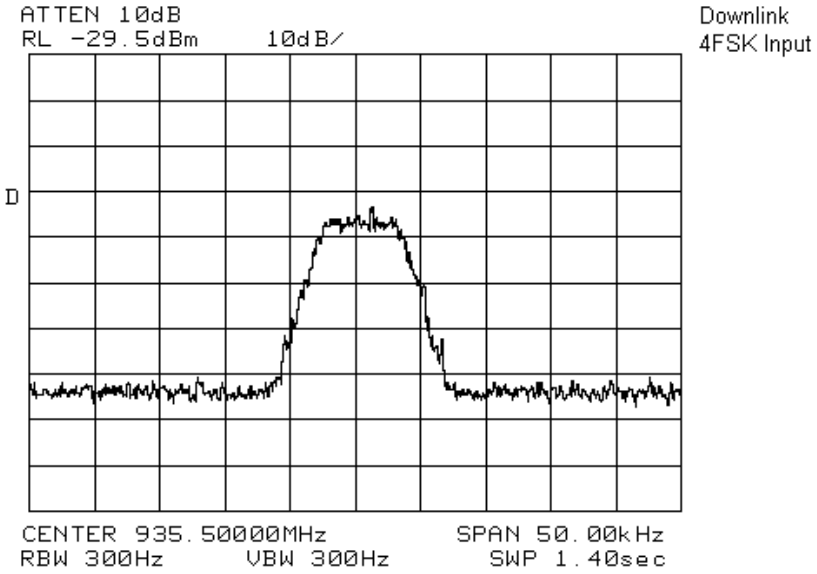
## Downlink 2FSK Input



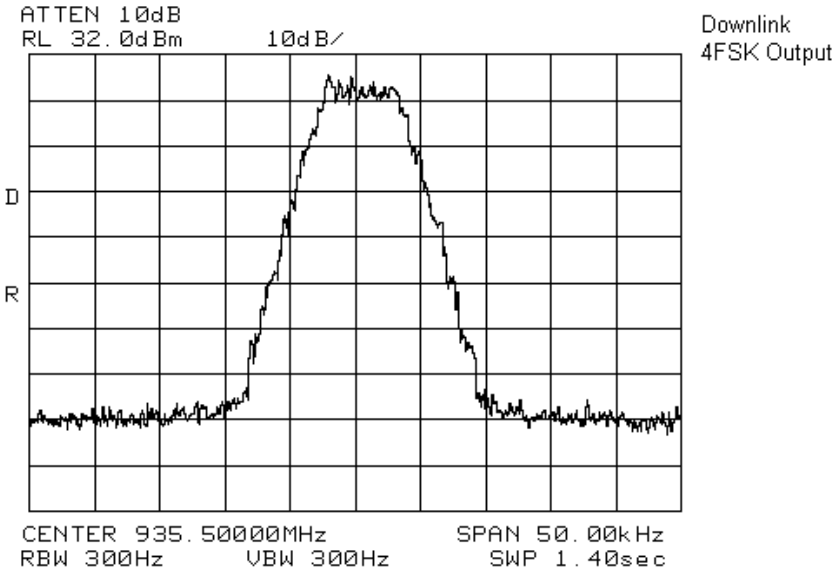

## Downlink 2FSK Output



## Downlink 4FSK Input




## Downlink 4FSK Output



**Criteria: Clause 2-11-04/EAB/RF Out of Band Rejection**

| |
|---|
| Plots showing the filter frequency response. |

**Test Conditions:**

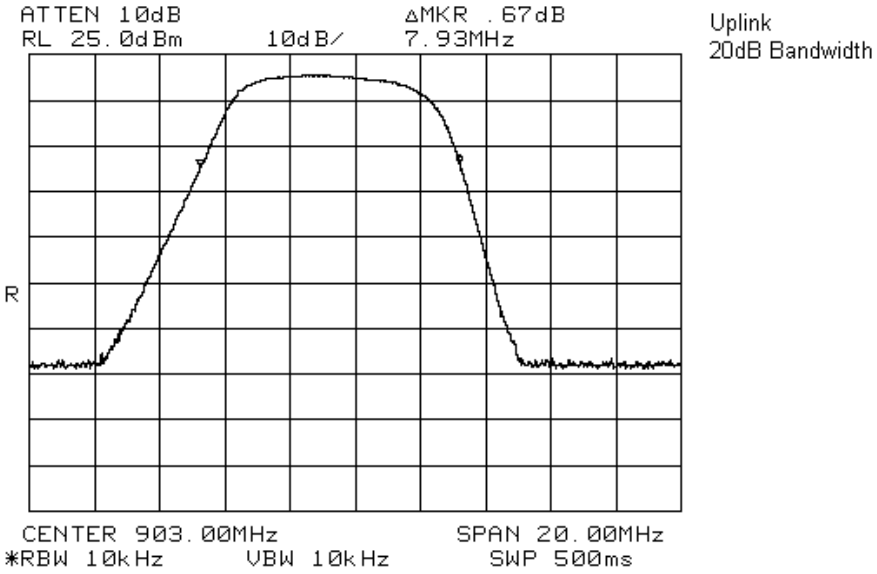
| | | | |
|---|---|---|---|
| **Sample Number:** | 1 | **Temperature:** | 26 |
| **Date:** | May 20, 2005 | **Humidity:** | 28 |
| **Modification State:** | 0 | **Tester:** | Jason Nixon |
| | | **Laboratory:** | Wireless |

**Test Results:**

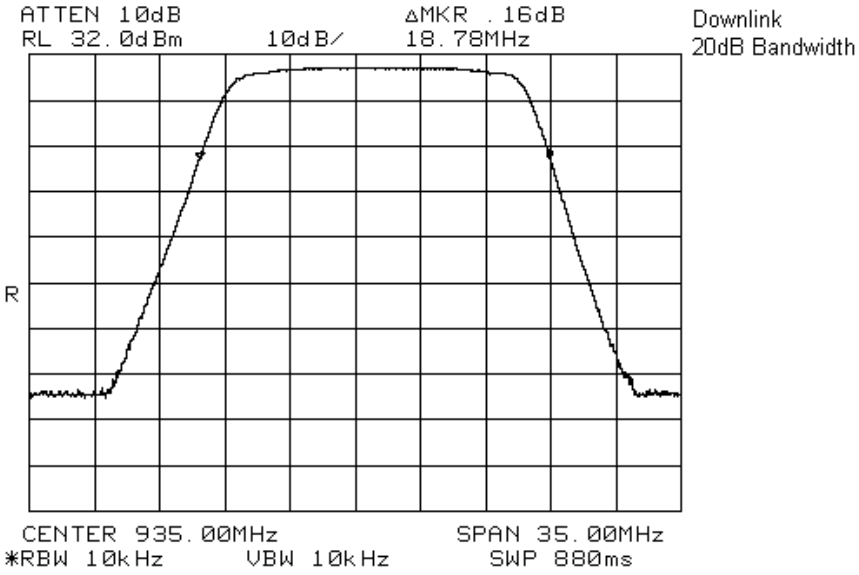
See Attached Plots.

**Additional Observations:**

## Uplink Frequency Response

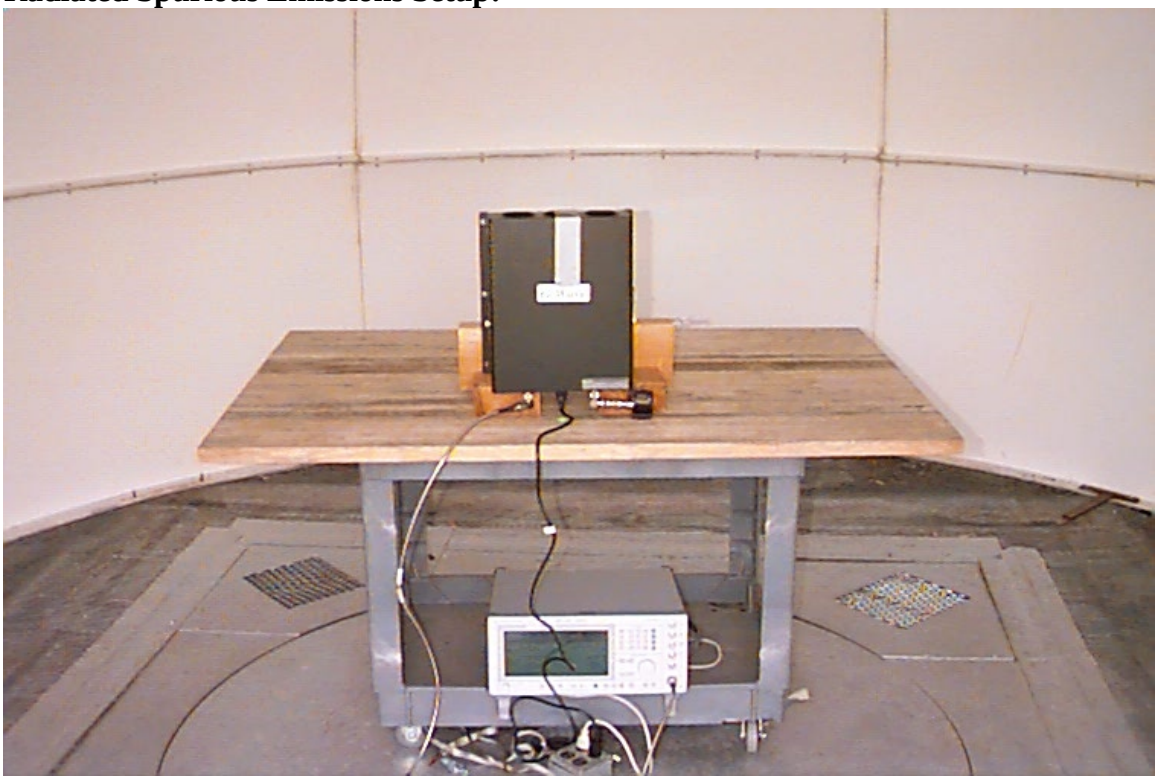



## Downlink Frequency Response



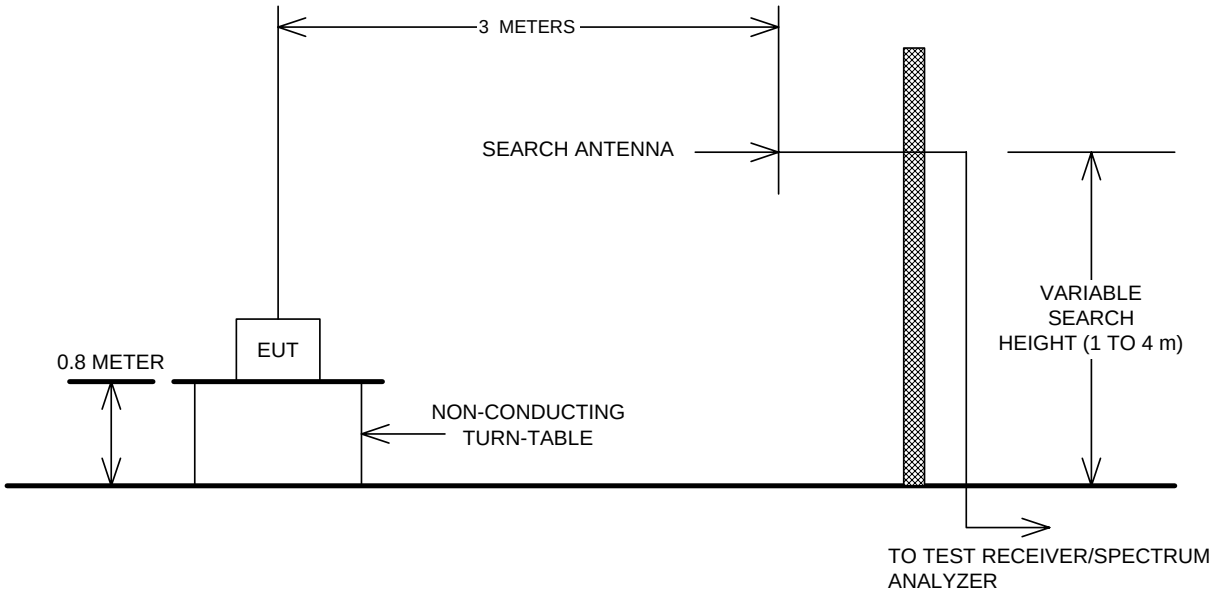
# Appendix B : Setup Photographs

**Radiated Spurious Emissions Setup:**



# Appendix C : Block Diagram of Test Setups

## Test Site For Radiated Emissions




## Conducted Emissions, Output power, Occupied Bandwidth and Out of Band Rejection