

**KTL Test Report:** 9L0635RUS1


**Applicant:** NextCell  
651 E. 18<sup>th</sup> Street  
Plano, TX 75074

**Equipment Under Test:  
(E.U.T.)** Spider 4 CDPD Wireless Modem

**FCC ID:** MIVWG0001A

**In Accordance With:** **FCC Part 22, Subpart H**  
800 MHz Cellular Subscriber Units

**Tested By:** KTL Dallas Inc.  
802 N. Kealy  
Lewisville, TX  
75057-0100

**Authorized By:**   
Tom Tidwell, RF Group Manager

**Date:**

**Total Number of Pages:** 48

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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*EQUIPMENT:* Spider 4 CDPD Transceiver

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**Section 1. Summary of Test Results**

Manufacturer: NextCell

Model No.: Spider 4

Serial No.: Demo Unit #2

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 22, Subpart H.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

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: 100426-0**

TESTED BY: David Light DATE: 3/23/00  
Test Technician

TESTED BY: Kevin Rose DATE: 3/24/00  
Test Technician

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*EQUIPMENT:* Spider 4 CDPD Transceiver

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**Summary Of Test Data**

| NAME OF TEST                            | PARA. NO. | SPEC.          | MEAS.          | RESULT   |
|---|-----------|----------------|----------------|----------|
| RF Power Output                         | 2.1046    | 4 W            | 4 W            | Complies |
| Audio Frequency Response                | 2.1047    | 6dB/Octave     | N/A            | N/A (1)  |
| Audio Low Pass Filter Response          | 2.1047    | Graph          | N/A            | N/A (1)  |
| Modulation Limiting                     | 2.1047    | Graph          | N/A            | Complies |
| Occupied Bandwidth (CDPD)               | 2.1049    | 22.917(d) mask | 22.917(d) mask | Complies |
| Occupied Bandwidth (Voice & SAT)        | 2.1049    | Mask           | N/A            | N/A (2)  |
| Occupies Bandwidth (WB Data & SAT)      | 2.1049    | Mask           | N/A            | N/A (2)  |
| Occupied Bandwidth (ST)                 | 2.1049    | Mask           | N/A            | N/A (2)  |
| Occupied Bandwidth (SAT)                | 2.1049    | Mask           | N/A            | N/A (2)  |
| Spurious Emissions at Antenna Terminals | 2.1051    | -13 dBm        | -21.8 dBm      | Complies |
| Spurious Emissions in RX Band           | 2.1051    | -80 dBm        | -81.5 dBm      | Complies |
| Field Strength of Spurious Emissions    | 2.1053    | 82.3 dBμV/m    | 69.5 dBμV/m    | Complies |
| Frequency Stability                     | 2.1055    | 2.5 ppm        | 0.94 ppm       | Complies |

**Footnotes:**

- (1) The E.U.T. does not provide for audio modulation. The transmission is CDPD (Cellular Digital Packet Data) only.
- (2) The main modulation of the E.U.T. is CDPD. There is no provision for audio modulation.

*EQUIPMENT:* Spider 4 CDPD Transceiver

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

|  |                                |
|--|--------------------------------|
| <b>Frequency Range:</b>                    | 824 – 849 MHz<br>869 – 894 MHz |
| <b>Tunable Bands:</b>                      | 1                              |
| <b>Necessary Bandwidth:</b>                | 28.8 kHz CDPD                  |
| <b>Type of Modulation and Designator:</b>  | 28K8FXW, 40K0L1D               |
| <b>Output Impedance:</b>                   | 50 ohms                        |
| <b>RF Power Output (rated):</b>            | 4 Watts rf output terminal     |
| <b>Number of Channels:</b>                 | 832                            |
| <b>Duty Cycle:</b>                         | Continuous                     |
| <b>Channel Spacing:</b>                    | 30 kHz                         |
| <b>Operator Selection of Frequency:</b>    | Software Controlled            |
| <b>Power Output Adjustment Capability:</b> | Software Controlled            |

**KTL Dallas**

FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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### **Modifications Made During Testing**

There were no modifications made to the equipment during testing.

*EQUIPMENT:* Spider 4 CDPD Transceiver*FCC ID:* MIVWG0001APROJECT NO.: 9L0635RUS1

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**Operational Description**

The E.U.T. is a data modem that operates in the cellular radio band. The system is comprised of two previously approved devices: The Spider modem (MIVWG9701A) and the Spider Booster (MIVWG9703A). The Spider modem is a transceiver on a PCMCIA card. The Spider Booster is a 4 watt booster amplifier that connects directly to the Spider modem. The Spider booster is installed in the trunk of a vehicle and a rf cable is connected between the output of the booster and a roof-mount antenna.

There have been no modifications to either device except that the modem is now packaged inside the booster chassis rather than being connected through a long coaxial cable. The PCMCIA card is mounted inside the booster with its original packaging. The booster has a PCMCIA header connection that accepts the modem card. SAR testing was performed on the modem for the original approval. A Maximum Permissible Exposure evaluation was performed on the booster (MIVWG9703A) for its original approval.

**System Diagram**

*EQUIPMENT:* Spider 4 CDPD Transceiver

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**Section 3. RF Power Output**

|                               |                   |
|-------------------------------|-------------------|
| NAME OF TEST: RF Power Output | PARA. NO.: 2.1046 |
| TESTED BY: David Light        | DATE: 3/23/00     |

**Test Results:** Complies.

**Measurement Data:**

| Channel | Output Power (dBm) | Rated Power (dBm) | Measured / Rated (dB) |
|---------|--------------------|-------------------|-----------------------|
| 383     | +36.1              | +36.0             | +0.1                  |
|         |                    |                   |                       |

**Equipment Used:** G3893, G3894, G1017

**Measurement Uncertainty:** +/- 0.65 dB

**Temperature:** 20 °C

**Relative Humidity:** 40 %



*EQUIPMENT:* Spider 4 CDPD Transceiver

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**Section 4. Modulation Characteristics**

|  |                   |
|--|-------------------|
| NAME OF TEST: Modulation Characteristics<br>Audio Frequency Response | PARA. NO.: 2.1047 |
| TESTED BY:   | DATE:             |

**Test Results:** Complies.

**Measurement Data:** See attached graph

**Equipment Used:**

**Measurement Uncertainty:**

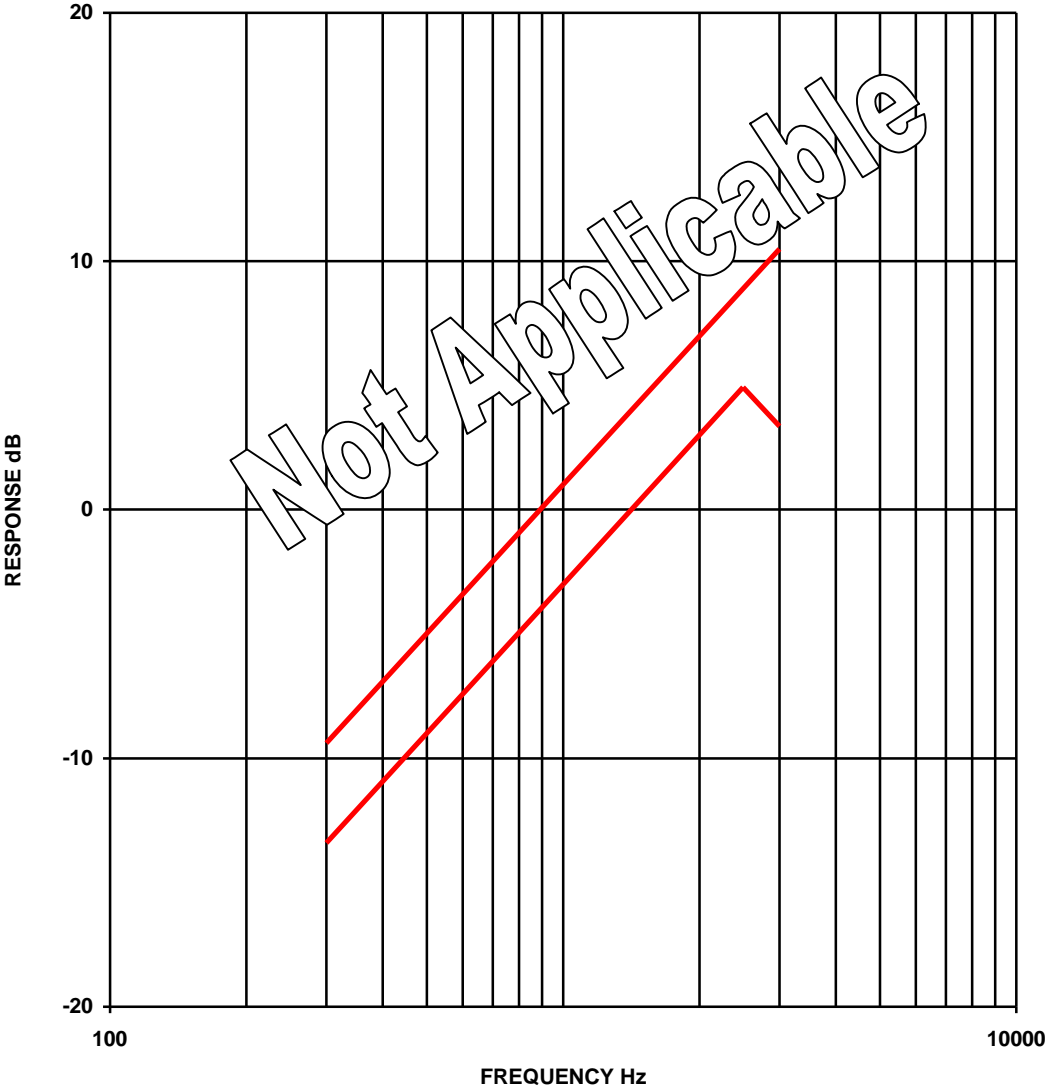
**Temperature:** °C

**Relative Humidity:** %

Not Applicable

EQUIPMENT: Spider 4 CDPD Transceiver  
FCC ID: MIVWG0001A

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Graph 1

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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|  |                   |
|--|-------------------|
| NAME OF TEST: Modulation Characteristics<br>Audio Low-Pass Filter Response | PARA. NO.: 2.1047 |
| TESTED BY:   | DATE:             |

**Test Results:** Complies.

**Measurement Data:** See attached graphs

**Equipment Used:**

**Measurement Uncertainty:** dB

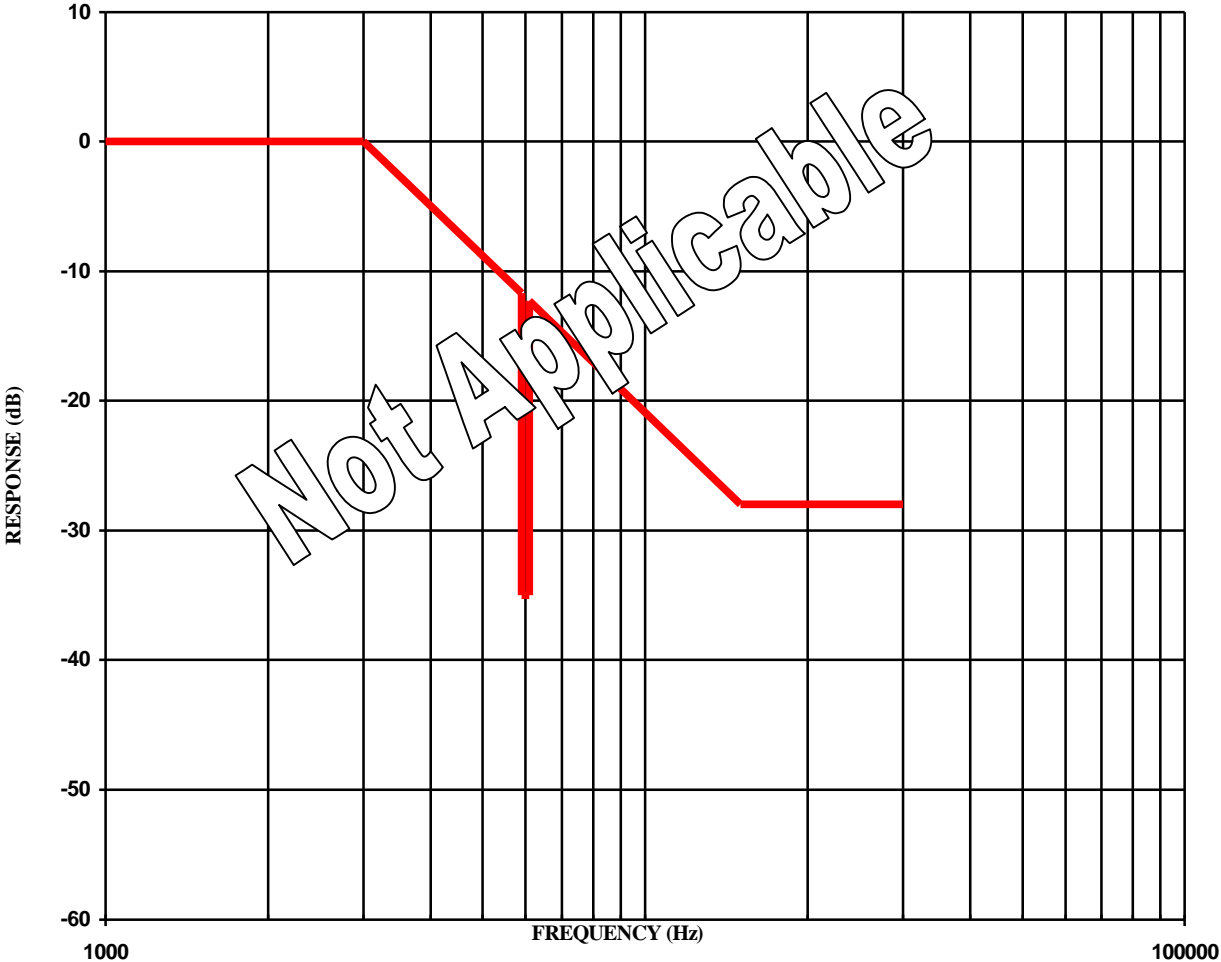
**Temperature:** °C

**Relative Humidity:** %

Not Applicable

EQUIPMENT: Spider 4 CDPD Transceiver  
FCC ID: MIVWG0001A

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Graph 2

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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|   |                   |
|---|-------------------|
| NAME OF TEST: Modulation Characteristics<br>Modulation Limiting | PARA. NO.: 2.1047 |
| TESTED BY:  | DATE:             |

**Test Results:** Complies.

**Measurement Data:** See attached graph

**Equipment Used:**

**Measurement Uncertainty:** kHz

**Temperature:** °C

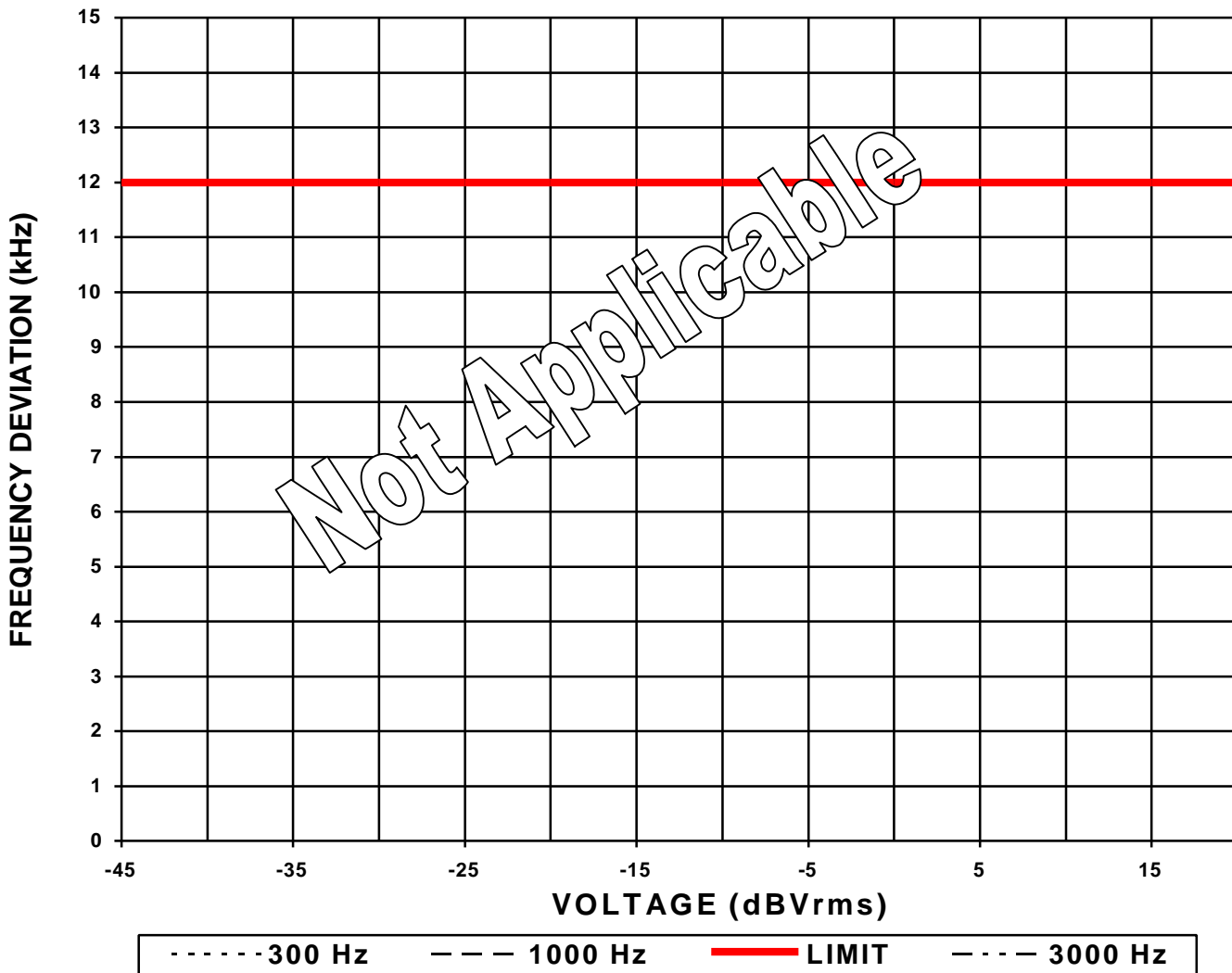
**Relative Humidity:** %

Not Applicable

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

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Graph 3

SAT Deviation: kHz  
WB Data Deviation: kHz  
ST Deviation: kHz

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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|  |                   |
|--|-------------------|
| NAME OF TEST: Modulation Characteristics<br>Digital Modulation | PARA. NO.: 2.1047 |
| TESTED BY:   | DATE:             |

**Test Results:** Complies.

**Measurement Data:** See attached table.

**Equipment Used:**

**Measurement Uncertainty:** dB

**Temperature:** °C

**Relative Humidity:** %

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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**Section 5. Occupied Bandwidth**

|   |                   |
|---|-------------------|
| NAME OF TEST: Occupied Bandwidth<br>(Voice + SAT) | PARA. NO.: 2.1047 |
| TESTED BY:  | DATE:             |

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:**

**Measurement Uncertainty:** dB

**Temperature:** °C

**Relative Humidity:** %

Not Applicable



*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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|                                       |                   |
|---------------------------------------|-------------------|
| NAME OF TEST: Occupied Bandwidth (ST) | PARA. NO.: 2.1047 |
| TESTED BY:                            | DATE:             |

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:**

**Measurement Uncertainty:**

**Temperature:** °C

**Relative Humidity:** %

Not Applicable

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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|   |                   |
|---|-------------------|
| NAME OF TEST: Occupied Bandwidth<br>(Wideband Data) | PARA. NO.: 2.1047 |
| TESTED BY:  | DATE:             |

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:**

**Measurement Uncertainty:** dB

**Temperature:** °C

**Relative Humidity:** %

Not Applicable

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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|   |                   |
|---|-------------------|
| NAME OF TEST: Occupied Bandwidth<br>(CDPD Modulation) | PARA. NO.: 2.1047 |
| TESTED BY: David Light                                | DATE: 3/23/00     |

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:** G2632, G1017, G1018, CF38, G1712

**Measurement Uncertainty:** +/- 1.05 dB

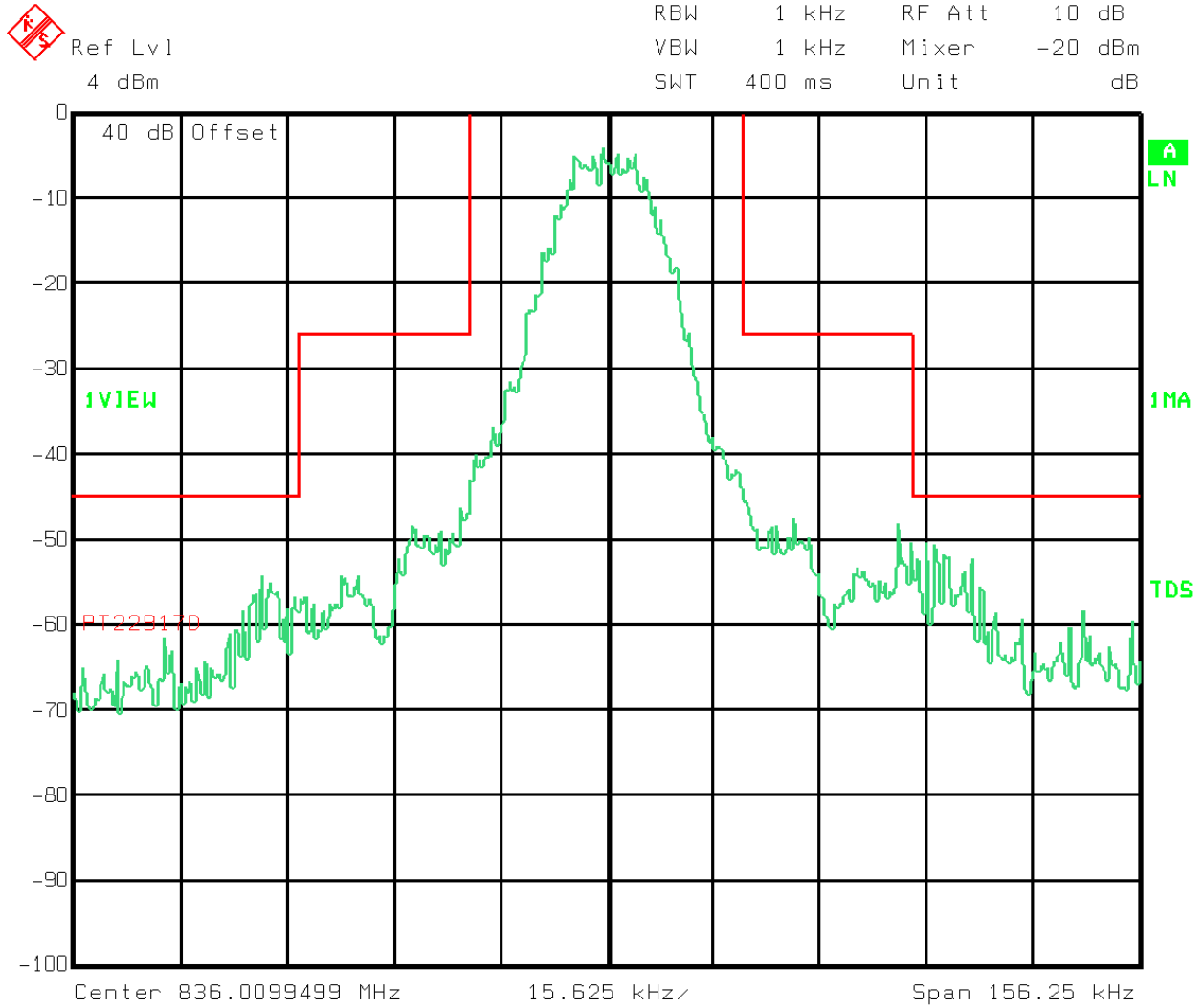
**Temperature:** 20 °C

**Relative Humidity:** 40 %

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

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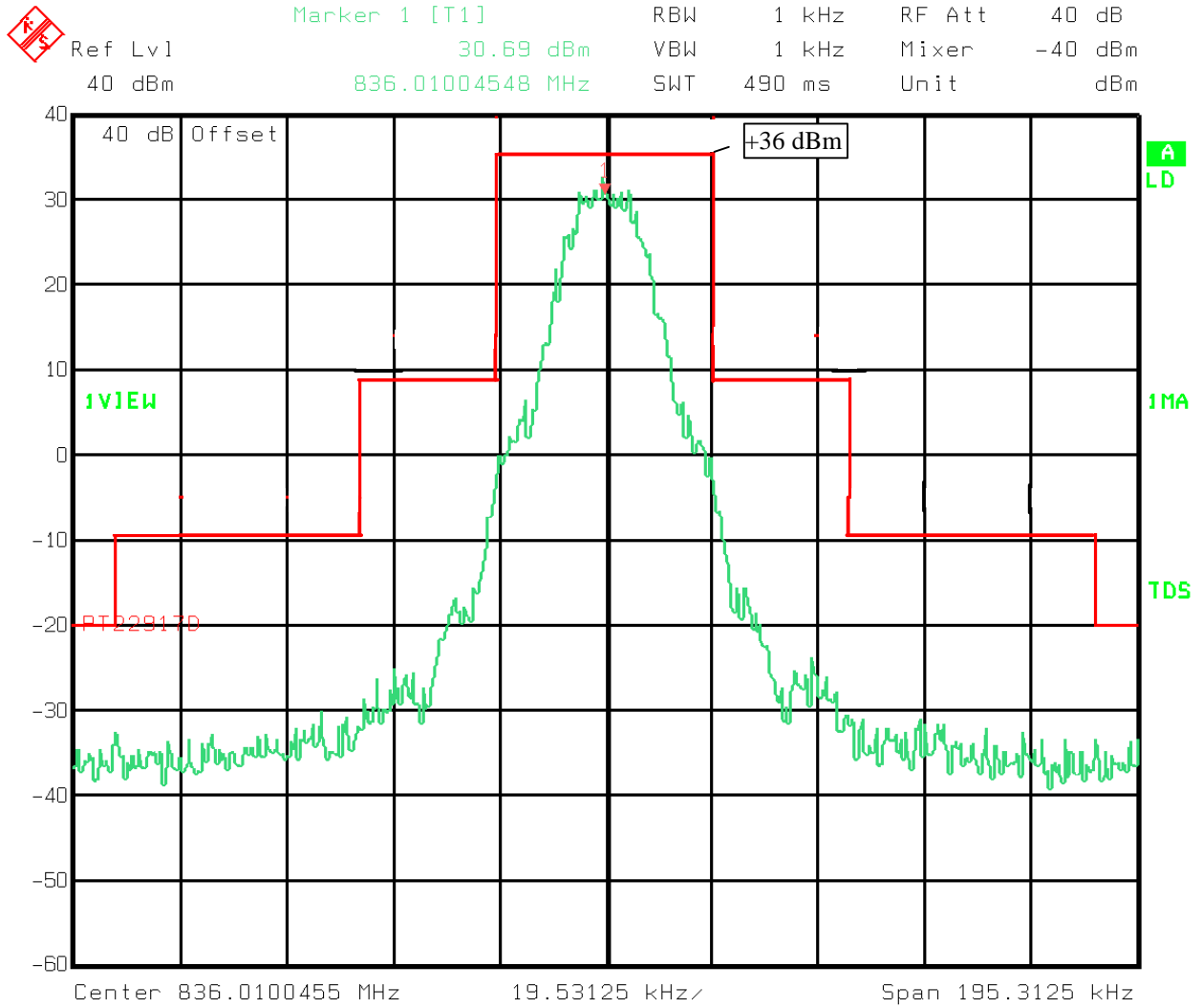


Title: Occupied Bandwidth  
Comment A: Low Power  
Date: 23.MAR.2000 13:43:10

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

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Title: occupied bandwidth  
Comment A: high power  
Date: 23.MAR.2000 14:04:18

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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**Section 6. Spurious Emissions at Antenna Terminals**

|   |                   |
|---|-------------------|
| NAME OF TEST: Spurious Emissions At Antenna Terminals | PARA. NO.: 2.1051 |
| TESTED BY: David Light                                | DATE: 3/23/00     |

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:** G2632, G1017, G1018, CF38, G1712

**Measurement Uncertainty:** +/- 1.05 dB

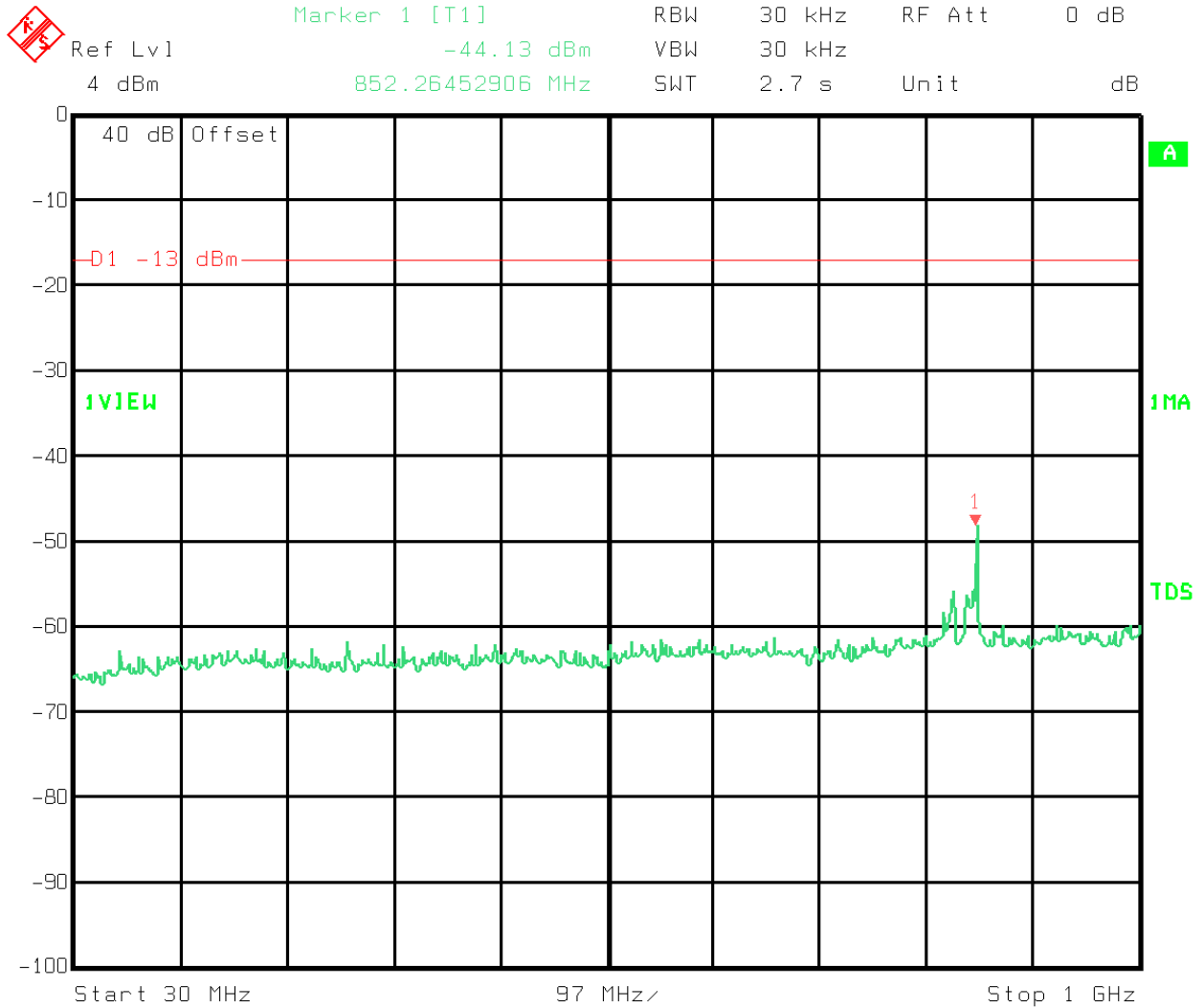
**Temperature:** 20 °C

**Relative Humidity:** 40 %

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

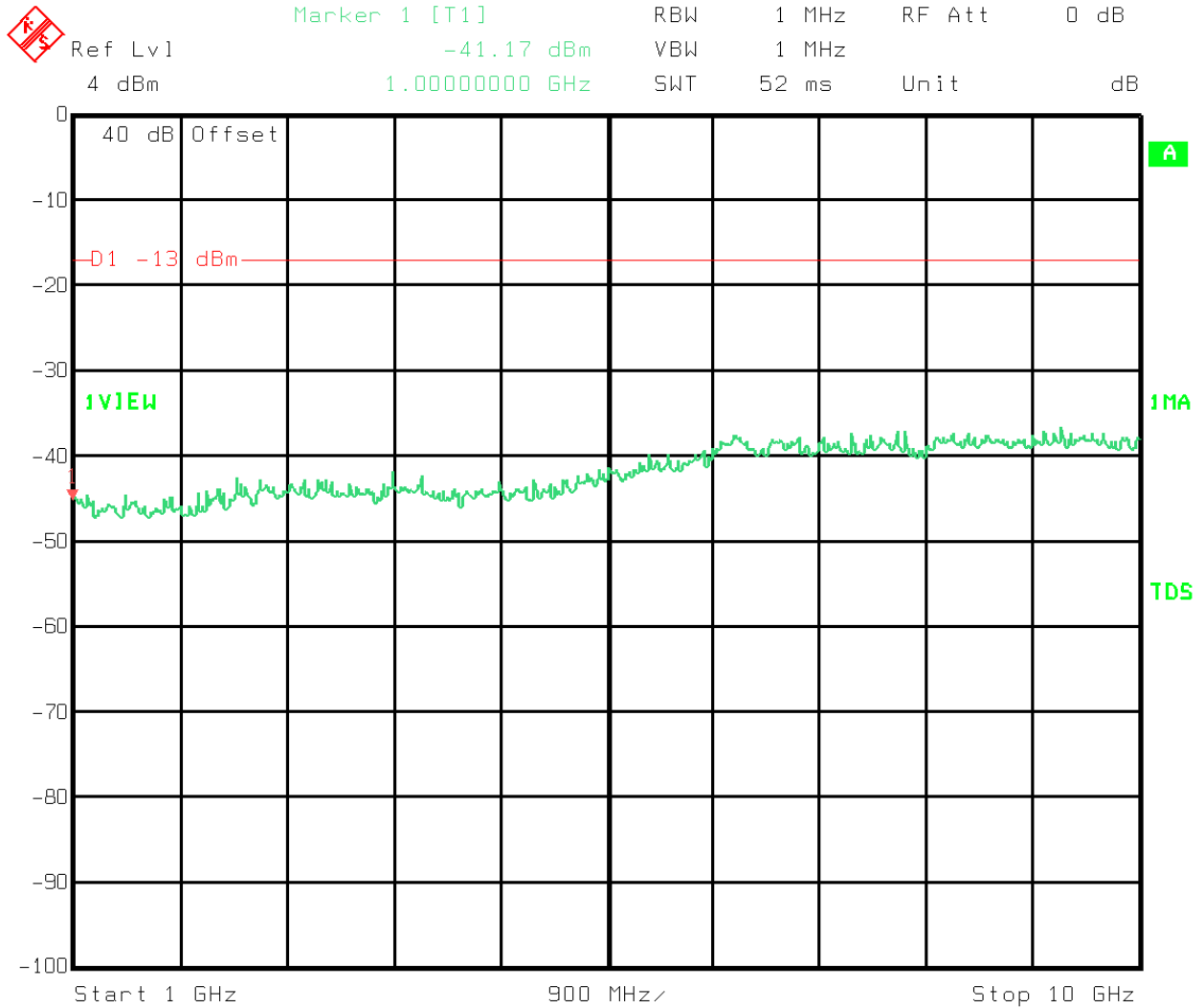


Title: Spurious Emissions  
Comment A: Low Power  
Date: 23.MAR.2000 13:50:23

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1



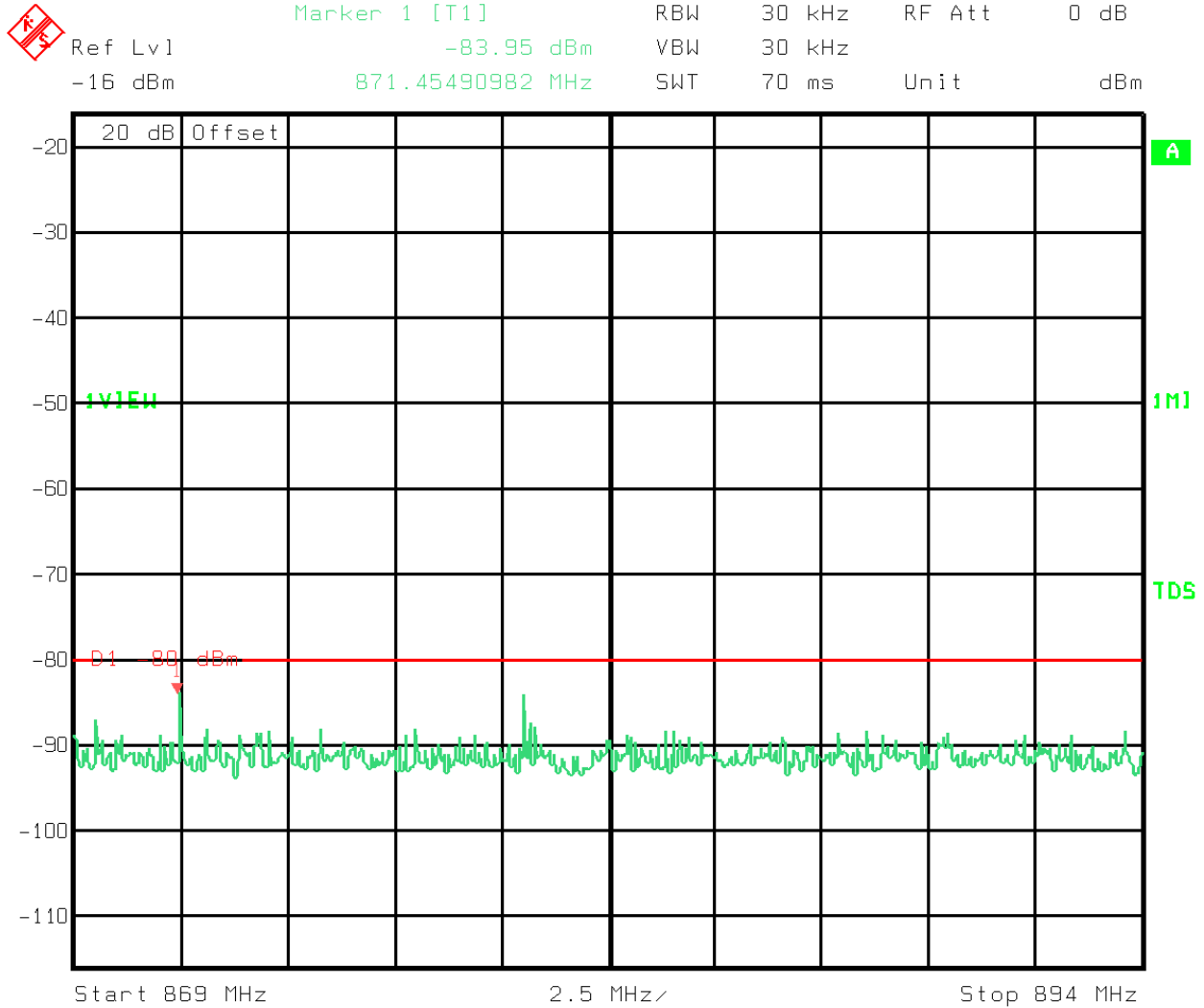
Title: Spurious Emissions  
Comment A: Low Power  
Date: 23.MAR.2000 13:51:06



EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

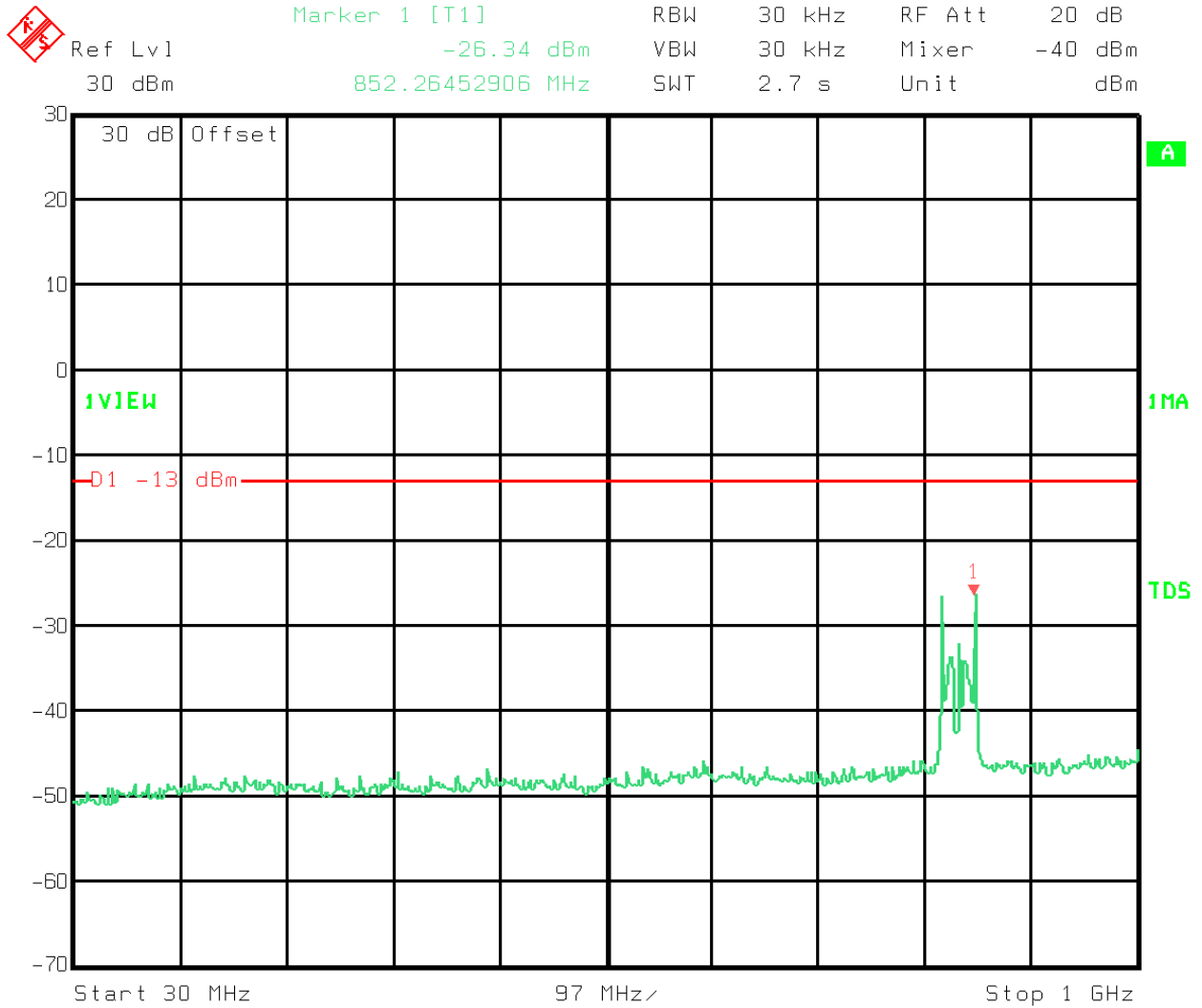


Title: Spurious Emissions  
Comment A: Low Power  
Date: 23.MAR.2000 13:54:58

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

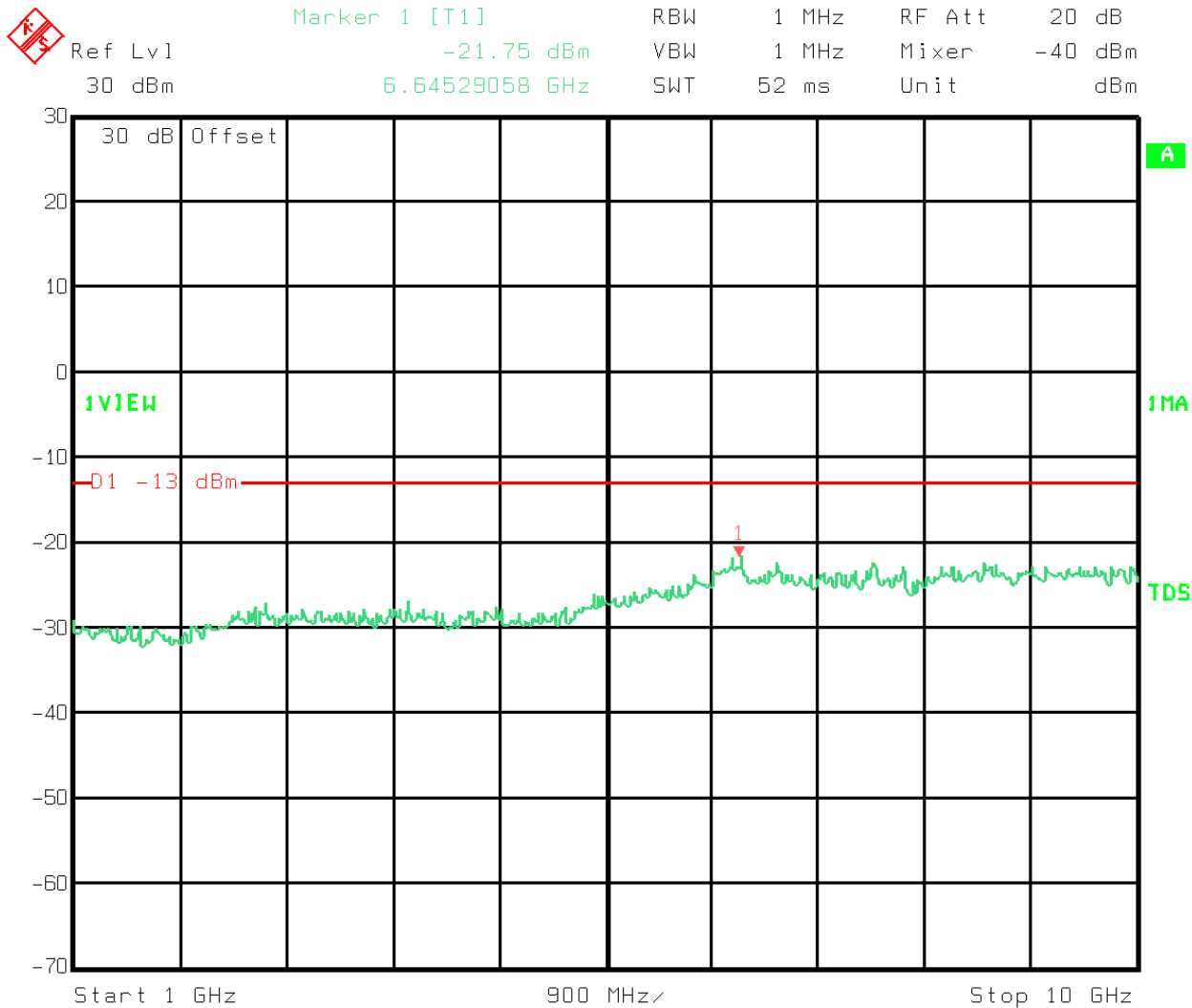


Title:        spurious emmissions  
Comment A:   high power  
              fundemental is notched  
Date:        23.MAR.2000 14:13:42

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

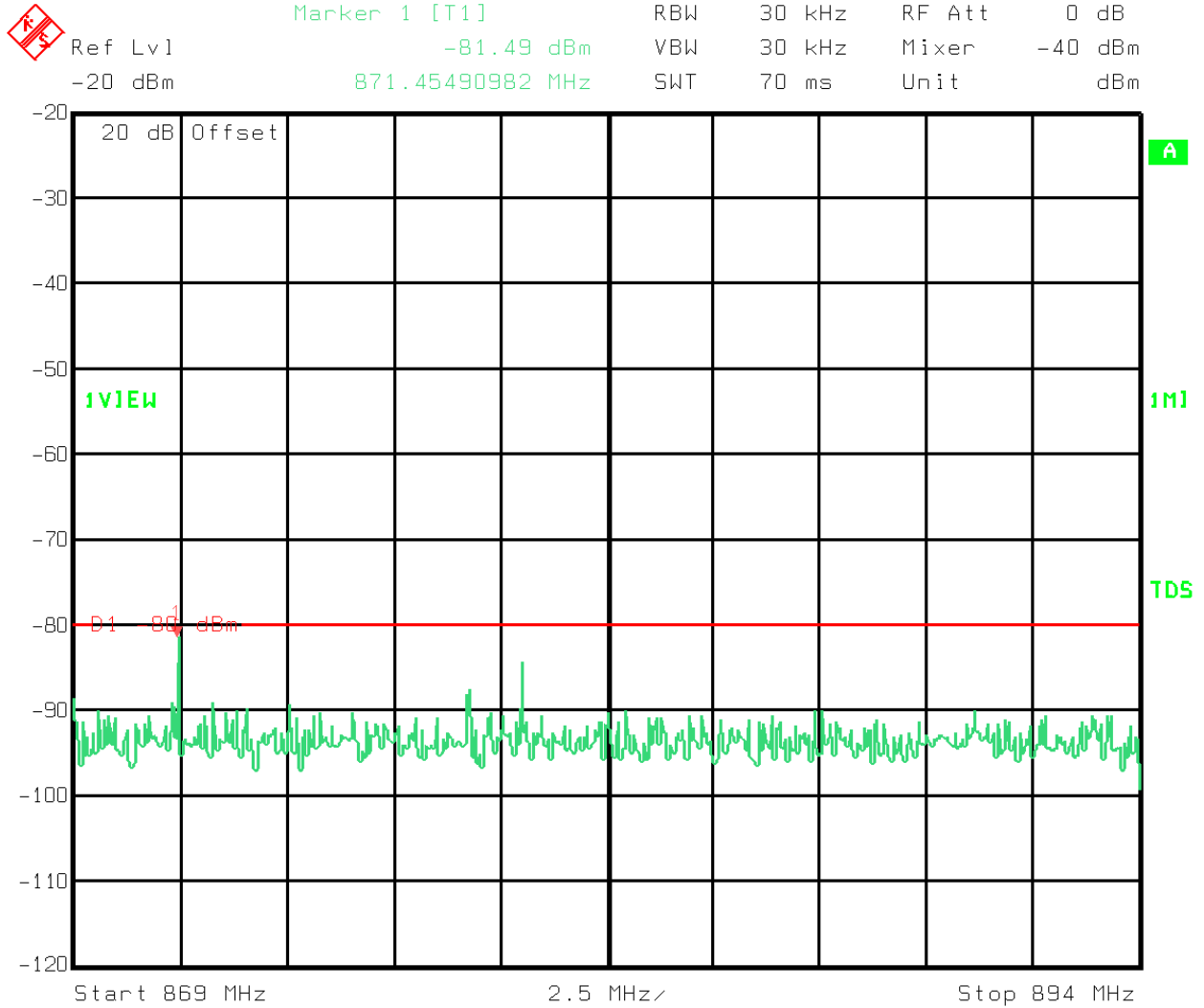


Title: spurious emmissions  
Comment A: high power  
fundamental is notched  
Date: 23.MAR.2000 14:14:51

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1



Title: spurious emmissions  
Comment A: high power  
fundamental is notched  
Date: 23.MAR.2000 14:20:52

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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**Section 7. Field Strength of Spurious**

|  |                   |
|--|-------------------|
| NAME OF TEST: Field Strength of Spurious | PARA. NO.: 2.1053 |
| TESTED BY: David Light                   | DATE: 3/23/00     |

**Test Results:** Complies.

**Measurement Data:** See attached table.

**Equipment Used:** G2044, G2016, G2207, G2200, CF40, CF42, CF43, CF44, CF47

**Measurement Uncertainty:** +/- 3.64 dB

**Temperature:** 20 °C

**Relative Humidity:** 40 %

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

**Test Data - Radiated Emissions**

| Radiated Emissions<br>FCC |   |                 |                                   |  |  |                  |                                    |                    |
|---------------------------|---|-----------------|-----------------------------------|--|--|------------------|------------------------------------|--------------------|
| Complete                  | <u>  X  </u>  |                 |                                   |  |  |                  |                                    |                    |
| Preliminary               | <u>      </u>   |                 | Page <u>  1  </u> of <u>  1  </u> |  |  |                  |                                    |                    |
| Client:                   | <u>  Nextcell  </u>   |                 | W.O.#: <u>  9L0635R  </u>         |  | Date: <u>  3/23/00  </u>                     |                  |                                    |                    |
| EUT:                      | <u>  Spider 4  </u>   |                 | S/N: <u>  Demo Unit No. 2  </u>   |  | Specification: <u>  FCC Pt 15, Class B  </u> |                  |                                    |                    |
| Tech:                     | <u>  D. Light  </u>   |                 | Test #: <u>  REMW-1  </u>         |  | Lab: <u>  AC3  </u>                          |                  | Photo ID: <u>  9L0635 REMW-1  </u> |                    |
| Equipment Used:           | <u>  G2044-G2016-CF44-CF47-CF40-CF43-CF42-G2207-G2200  </u>         |                 |                                   |  | Antenna Distance: <u>  3m  </u>              |                  |                                    |                    |
| Configuration:            | <u>  Transmitting modulated signal into 50 ohm load @ 836 MHz  </u> |                 |                                   |  |  |                  |                                    |                    |
| IF Bandwidth:             | <u>  1 MHz  </u>  | Video Bandwidth | <u>  1 MHz  </u>                  | Detector: <u>  X  </u> Peak <u>      </u> Quasi Peak |  |                  |                                    |                    |
| Ambient Temperature:      | <u>  20  </u>   | C               | EUT Power:                        | <u>      </u>  | <u>  115 V.A.C.  </u>                        | <u>  60 Hz  </u> | <u>      </u>                      | <u>  1 Phase  </u> |
| Relative Humidity:        | <u>  40  </u>   | %               |                                   | <u>      </u>  | <u>  230 V.A.C.  </u>                        | <u>  50 Hz  </u> | <u>      </u>                      | <u>  3 Phase  </u> |
| Atmospheric Pressure:     | <u>  999  </u>  | mbar            |                                   | <u>  X  </u>   | Other <u>  12 VDC  </u>                      |                  |                                    |                    |

| Freq. (GHz)   | Meter Reading (dBuV) | Antenna Factor (dB) | Cable Loss (dB) | RF Gain (dB) | Corrected Reading (dBuV) | Spec.limit (dBuV) FCC | Pol. | Comments:    |
|---|----------------------|---------------------|-----------------|--------------|--------------------------|-----------------------|------|--------------|
| 1.672   | 62.8                 | 24.3                | 4.13            | 31.3         | 59.93                    | 82.3                  | V    | 2nd Harmonic |
| 2.508   | 63.7                 | 29                  | 6.28            | 32.5         | 66.48                    | 82.3                  | V    | 3rd Harmonic |
| 3.344   | 56.2                 | 29.9                | 6.28            | 32.4         | 59.98                    | 82.3                  | V    | 4th Harmonic |
| 4.18  | 50.2                 | 31.6                | 7.65            | 31.6         | 57.85                    | 82.3                  | V    | 5th Harmonic |
| 5   | 32                   | 33.8                | 7.65            | 29.5         | 43.95                    | 82.3                  | V    | Noise floor  |
| 1.672   | 70.3                 | 24.3                | 4.13            | 31.3         | 67.43                    | 82.3                  | H    | 2nd Harmonic |
| 2.508   | 66.7                 | 29                  | 6.28            | 32.5         | 69.48                    | 82.3                  | H    | 3rd Harmonic |
| 3.344   | 54.67                | 29.9                | 6.28            | 32.4         | 58.45                    | 82.3                  | H    | 4th Harmonic |
| 4.18  | 46.3                 | 31.6                | 7.65            | 31.6         | 53.95                    | 82.3                  | H    | 5th Harmonic |
| 5   | 32                   | 33.8                | 7.65            | 29.5         | 43.95                    | 82.3                  | H    | Noise floor  |
| Scanned 1-5 GHz   |                      |                     |                 |              |                          |                       |      |              |
| <b>No emissions were detected EXCEPT harmonics of the transmit signal</b> |                      |                     |                 |              |                          |                       |      |              |
|   |                      |                     |                 |              |                          |                       |      |              |
|   |                      |                     |                 |              |                          |                       |      |              |
|   |                      |                     |                 |              |                          |                       |      |              |
|   |                      |                     |                 |              |                          |                       |      |              |
|   |                      |                     |                 |              |                          |                       |      |              |
|   |                      |                     |                 |              |                          |                       |      |              |
|   |                      |                     |                 |              |                          |                       |      |              |

*Note: Verify that the IF Bandwidth is in the proper setting.*

REV 960827

*EQUIPMENT:* Spider 4 CDPD Transceiver  
*FCC ID:* MIVWG0001A

PROJECT NO.: [9L0635RUS1](#)

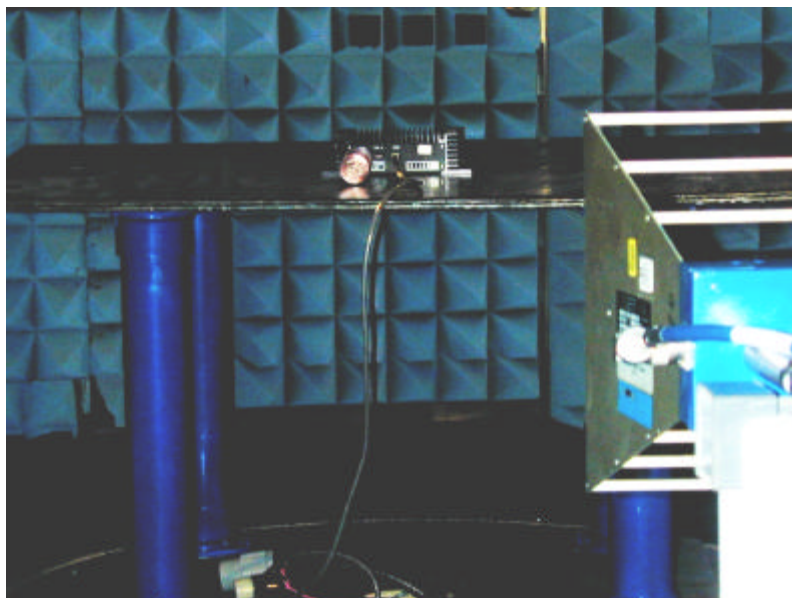
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**Photographs of Test Setup**

FRONT VIEW



REAR VIEW



*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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## **Section 8. Frequency Stability**

|                                   |                   |
|-----------------------------------|-------------------|
| NAME OF TEST: Frequency Stability | PARA. NO.: 2.1055 |
| TESTED BY: Kevin Rose             | DATE: 3/24/00     |

**Test Results:** Complies.

**Measurement Data:** See attached table.

Standard Test Frequency: 836.01 MHz

Standard Test Voltage: 12 Vdc

**Equipment Used:** G4052, G5006, G1017, G1018

**Measurement Uncertainty:**  $1 \times 10^{-7}$  ppm

**Temperature:** -30 to +50 °C

**Relative Humidity:** Uncontrolled



*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

**Frequency Stability**

Client: Nextcell

W.O.# 9L0635R

EUT: Spider 4 CDPD Modem

S/N: Demo Unit #2

Date: 3/24/00

Tech: K. Rose

Notes

| Temperature | Voltage  | Set Freq. (MHz) | Measured Freq. (MHz) | Freq. Error (Hz) | Freq. Error (ppm) |
|-------------|----------|-----------------|----------------------|------------------|-------------------|
| -30 °C      | 12 VDC   | 836.009998      | 836.010747           | 749              | 0.90              |
| -20 °C      | 12 VDC   | 836.009998      | 836.010761           | 763              | 0.91              |
| -10 °C      | 12 VDC   | 836.009998      | 836.010673           | 675              | 0.81              |
| 0 °C        | 12 VDC   | 836.009998      | 836.010462           | 464              | 0.56              |
| 10 °C       | 12 VDC   | 836.009998      | 836.010246           | 248              | 0.30              |
| 20 °C       | 10.2 VDC | 836.009998      | 836.009998           | 0                | 0.00              |
| 20 °C       | 12.0 VDC | 836.009998      | 836.009998           | 0                | 0.00              |
| 20 °C       | 13.8 VDC | 836.009998      | 836.009998           | 0                | 0.00              |
| 30 °C       | 12 VDC   | 836.009998      | 836.009832           | -166             | -0.20             |
| 40 °C       | 12 VDC   | 836.009998      | 836.009830           | -168             | -0.20             |
| 50 °C       | 12 VDC   | 836.009998      | 836.010780           | 782              | 0.94              |

*EQUIPMENT:* Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

**Section 9. Test Equipment List**

| KTL ID | Description          | Manufacturer<br>Model Number   | Serial Number | Calibration<br>Date |
|--------|----------------------|--------------------------------|---------------|---------------------|
| G2044  | BILOG ANTENNA        | Shaffner-Chase<br>CBL6111C     | 2572          | 01/14/00            |
| G2016  | ANTENNA, HORN        | A.H. SYSTEMS<br>SAS-200/571    | 162           | 07/16/99            |
| G2207  | PREAMP, 25dB         | ICC<br>LNA25                   | 398           | 08/27/99            |
| G2200  | AMPLIFIER            | HEWLETT PACKARD<br>8449A       | 2749A00159    | 06/11/99            |
| CF40   | CABLE 2m             | Astrolab<br>32027-2-29094-72TC | N/A           | 08/31/99            |
| CF44   | CABLE, 4M            | STORM<br>PR90-010-144          | N/A           | 10/15/99            |
| CF47   | CABLE, 4M            | STORM<br>PR90-010-144          | N/A           | 10/15/99            |
| G3893  | POWER METER          | WAVETEK<br>8531                | 1911          | 06/17/99            |
| G3894  | SENSOR,RF POWER      | WAVETEK<br>85310               | 2310          | 06/17/99            |
| G1017  | ATTENUATOR           | NARDA<br>776B-20               | N/A           | 09/30/99            |
| G1018  | ATTENUATOR           | NARDA<br>776B-10               | N/A           | 09/30/99            |
| CF38   | CABLE 2m             | Astrolab<br>32027-2-29094-72TC | N/A           | 08/31/99            |
| G4052  | FREQUENCY COUNTER    | HEWLETT PACKARD<br>5350B       | 8232A01493    | 04/20/99            |
| G5006  | ENVIROMENTAL CHAMBER | ENVIROTRONICS<br>SH27          | 129010083     | 06/14/99            |
| G2632  | SPECTRUM ANALYZER    | ROHDE & SCHWARZ<br>FSEK30      | 830844/006    | 06/14/99            |
| CF38   | CABLE 2m             | Astrolab<br>32027-2-29094-72TC | N/A           | 08/31/99            |
| G1712  | TUNABLE NOTCH FILTER | K&L<br>3TNF-500/1000-N/N       | 162           | CBU                 |

**KTL Dallas**

FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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## **ANNEX A - TEST DETAILS**

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

|                                      |                          |
|--------------------------------------|--------------------------|
| <b>NAME OF TEST: RF Power Output</b> | <b>PARA. NO.: 1.1046</b> |
|--------------------------------------|--------------------------|

**Minimum Standard:** Para. No. 22.913(a). The E.R.P. of mobile transmitter and auxiliary test transmitter must not exceed 7 watts.

EIA is 19B Para. No. 3.2.1.3. The transmitter shall be compiled of 8 distinct power levels.

The output power shown above shall be maintained within the range of +2 dB, -4 dB of nominal dBW value

| PL | I   | II  | III |
|----|-----|-----|-----|
| 0  | +6  | +2  | -2  |
| 1  | +2  | +2  | -2  |
| 2  | -2  | -2  | -2  |
| 3  | -6  | -6  | -6  |
| 4  | -10 | -10 | -10 |
| 5  | -14 | -14 | -14 |
| 6  | -18 | -18 | -18 |
| 7  | -22 | -22 | -22 |

**Method Of Measurement:**

Detachable Antenna:

The power at antenna terminals is measured using an in-line power meter.

Integral Antenna:

If the antenna is not detachable from the circuit then the Power Output is derived from the radiated field strength of the fundamental emission by using the plane wave relation  $GP/4\pi R^2 = E^2/120\pi$  and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to a halfwave dipole antenna

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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|   |                          |
|---|--------------------------|
| <b>NAME OF TEST: Audio Frequency Response</b> | <b>PARA. NO.: 2.1047</b> |
|---|--------------------------|

**Minimum Standard:**

Para. No. 15-19-B. From 300 to 3000 Hz the audio frequency response shall not vary more than +1 to -3 dB from a true 6dB octave pre-emphasis characteristic as referred to 1000 Hz level (with the exception of a permissible 6dB per octave roll-off from 2500 to 3000 Hz).

**Method Of Measurement:**

Operate the transmitter with the compressor disabled, and monitor the output with a frequency deviation meter or standard test receiver without standard 750-microsecond de-emphasis, with expander disabled, and without C-message weighted filter (see 6.6.2). Apply a sine wave audio input to the transmitter external audio input port, vary the modulating frequency from 300 to 3000 Hz and observe the input levels necessary to maintain a constant  $\pm 2.9$  kHz system deviation.

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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|   |                          |
|---|--------------------------|
| <b>NAME OF TEST: Audio Low Pass Filter Response</b> | <b>PARA. NO.: 2.1047</b> |
|---|--------------------------|

**Minimum Standard:** Para. No. 22.915 (d). For mobile stations, signals must be attenuated as a function of frequency as follows:

- i. In the frequency ranges 3.0 to 5.9 Hz and 6.1 to 15 kHz, 40 log (f/3) dB.
- ii. In the frequency range 5.9 to 6.1 kHz, 35 dB
- iii. In the frequency range above 15 kHz, 28 dB.

**Method Of Measurement:**

Adjust the audio input frequency to 1000 Hz and adjust the input level to 20 dB greater than that required to produce  $\pm 8$  kHz deviation. Note the output level on the frequency deviation meter or standard test receiver. Using the output level as reference (0dB), vary the modulating frequency from 3000 Hz to 30,000 Hz and observe the change in output while maintaining a constant audio input level.

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

**NAME OF TEST: Modulation Limiting**

**PARA. NO.: 2.1047**

**Minimum Standard:** Para. No. 22.915(b)

The levels of the modulating signals must be set to the values specified below and must be maintained within  $\pm 10\%$  of these values.

Voice:  $\pm 12$  kHz

SAT:  $\pm 2$  kHz

Wideband Data:  $\pm 8$  kHz

ST:  $\pm 8$  kHz

**Method Of Measurement:**

Voice: A 1 kHz audio tone is injected at levels between -45 and +20 dBVrms. The peak deviation is noted. This is repeated with a 300 Hz tone and a 3 kHz tone.

SAT: A SAT tone is generated by the mobile station and the peak deviation is measured.

Wideband Data: Wideband data is generated by the mobile station and the peak deviation is measured.

ST: ST data is generated by the mobile station and the peak deviation is measured.

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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|   |                          |
|---|--------------------------|
| <b>NAME OF TEST: Occupied Bandwidth (Voice &amp; SAT)</b> | <b>PARA. NO.: 2.1049</b> |
|---|--------------------------|

**Minimum Standard:** 22.917(b) The mean power of any emission removed from the carrier frequency by a displacement frequency ( $f_d$  in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

- (i) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB
- (ii) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or  $43 + 10 \log (P)$  dB, whichever is the lesser attenuation.

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 300 Hz  
VBW:  $\geq$  RBW  
Span: 100 kHz  
Sweep: Auto  
Mask: CELLF3E

Input Signal Characteristics (F3E/F3D):

AF1 frequency: 2.5 kHz  
AF1 level: 16 dB above the level sufficient to produce  $\pm 6$  kHz deviation with a 1 kHz tone.  
SAT: 6000 Hz SAT  
SAT level: sufficient to produce  $\pm 2$  kHz deviation.



*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

|   |                          |
|---|--------------------------|
| <b>NAME OF TEST: Occupied Bandwidth (WBD &amp; SAT)</b> | <b>PARA. NO.: 2.1049</b> |
|---|--------------------------|

**Minimum Standard:** 22.917(d) The mean power of any emission removed from the carrier frequency by a displacement frequency ( $f_d$  in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or  $43 + 10 \log (P)$  dB, whichever is the lesser attenuation.

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW:  $\geq$  RBW

Span: 200 kHz

Sweep: Auto

Mask: CELLF1D

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

10 kbps WBD + DAT

ST

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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|   |                          |
|---|--------------------------|
| <b>NAME OF TEST: Spurious Emission at Antenna Terminals</b> | <b>PARA. NO.: 2.1051</b> |
|---|--------------------------|

**Minimum Standard:** Para. No. 22.917(b). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least  $43 + 10 \log P$ . This is equivalent to -13 dBm absolute power.

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 30 kHz (AMPS). As required for digital modulations.

VBW:  $\geq$  RBW

Start Frequency: 0 MHz

Stop Frequency: 10 GHz

Sweep: Auto

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

**NAME OF TEST: Field Strength of Spurious Radiation****PARA. NO.: 2.1053****Minimum Standard:**

Para. No. 22.917(b). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least  $43 + 10 \log P$ . This is equivalent to -13 dBm absolute power.

**Calculation Of Field Strength Limit:**

An example of attenuation requirement of  $43 + 10 \log P$  is equivalent to -13 dBm ( $5 \times 10^{-5}$  Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions  $\leq 1$  GHz:

$G = 1.64$  (Dipole Gain)

$P = 10^{-5}$  Watts (Maximum spurious output power)

$R = 3\text{m}$  (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V / m} = 84.4 \text{ dBmV / m}$$

For emissions  $> 1$  GHz:

$G = 1$  (Isotropic Gain)

$P = 1 \times 10^{-5}$  Watts (Maximum spurious output power)

$R = 3\text{m}$  (Measurement Distance)

$$E = 84.4 - 20 \log \sqrt{1.64} = 82.3 \text{ dBmV / m @ } 3\text{m}$$

*The spectrum is searched to 10 GHz.*

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

|  |                          |
|--|--------------------------|
| <b>NAME OF TEST: Frequency Stability</b> | <b>PARA. NO.: 2.1055</b> |
|--|--------------------------|

**Minimum Standard:** Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

| <b>Freq. Range (MHz)</b> | <b>Mobile &gt; 3 W</b> | <b>Mobile ≤ 3 W</b> |
|--------------------------|------------------------|---------------------|
| 821 to 896               | 2.5                    | 2.5                 |

Table C-1

**Method Of Measurement:**

Frequency Stability With Voltage Variation:

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

**KTL Dallas**

FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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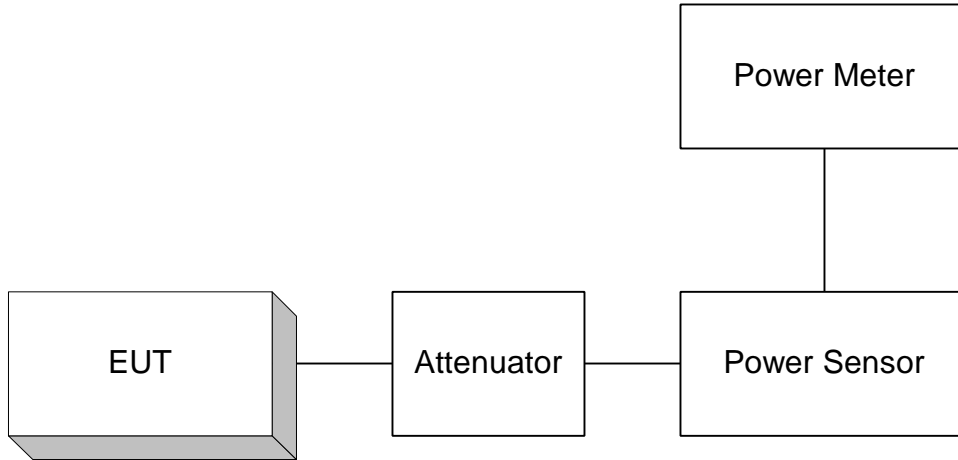
## ANNEX B - TEST DIAGRAMS

*EQUIPMENT:* Spider 4 CDPD Transceiver  
*FCC ID:* MIVWG0001A

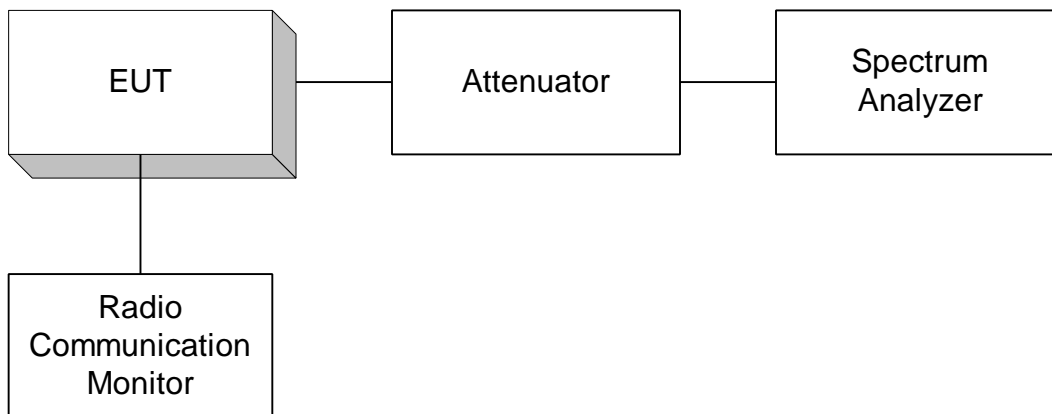
PROJECT NO.: 9L0635RUS1

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**Para. No. 2.1046 - R.F. Power Output**



**Para. No. 2.1049 - Occupied Bandwidth**



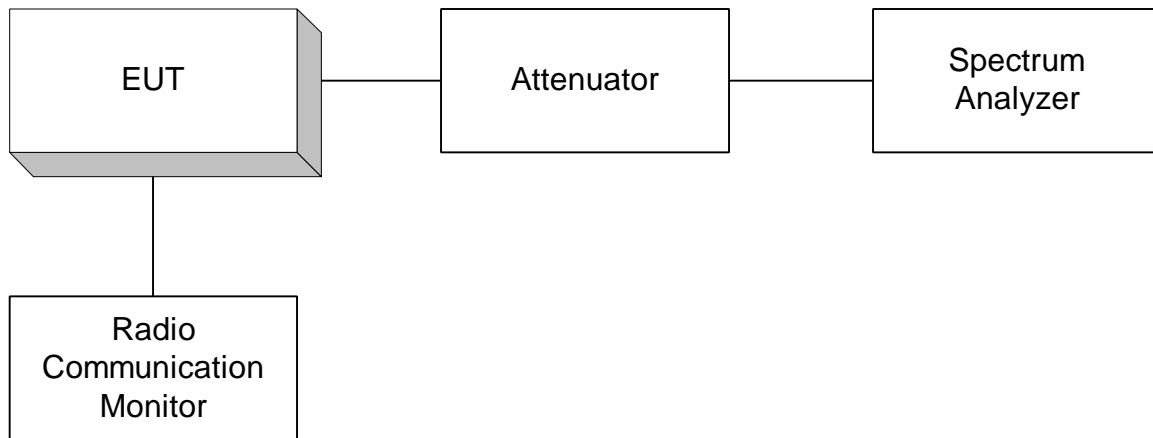
*The Radio Communication Monitor is used only to provide modulation input for external modulation.*

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

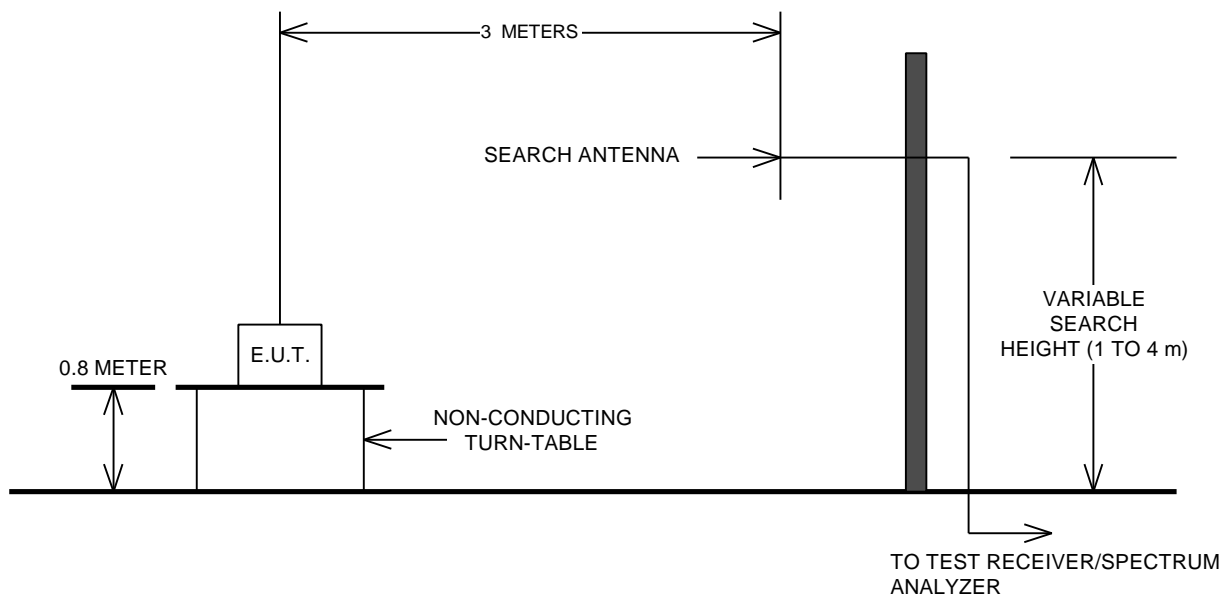
PROJECT NO.: 9L0635RUS1

**Para. No. 2.1051 Spurious Emissions at Antenna Terminals**



*The Radio Communication Monitor is used only to provide modulation input for external modulation.*

**Para. No. 2.1053 - Field Strength of Spurious Radiation**



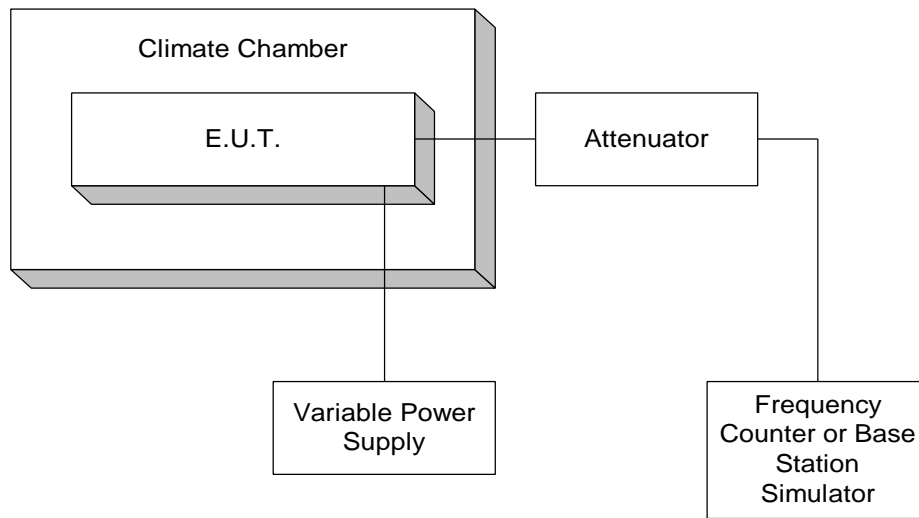
*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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**Para. No. 2.1055 - Frequency Stability**



**Para. No. 2.1045 – Audio Frequency Response, Audio Low Pass Filter Response And Modulation Limiting**

