

**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

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**EQUIPMENT:** Spider 4 CDPD Transceiver**FCC ID:** MIVWG0001A**PROJECT NO.:** 9L0635RUS1**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 TechnicianTESTED BY: Kevin Rose DATE: 3/24/00  
Test Technician

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**EQUIPMENT:** Spider 4 CDPD Transceiver**FCC ID:** MIVWG0001A**PROJECT NO.:** 9L0635RUS1**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 dB $\mu$ V/m	69.5 dB $\mu$ V/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.

**Section 2. General Equipment Specification**

<b>Frequency Range:</b>	824 – 849 MHz 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

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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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### **Modifications Made During Testing**

There were no modifications made to the equipment during testing.

*EQUIPMENT: Spider 4 CDPD Transceiver**FCC ID: MIVWG0001A**PROJECT NO.: 9L0635RUS1*

## **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**

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*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

### **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 %

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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
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*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

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## **Section 4. Modulation Characteristics**

NAME OF TEST: Modulation Characteristics Audio Frequency Response	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph

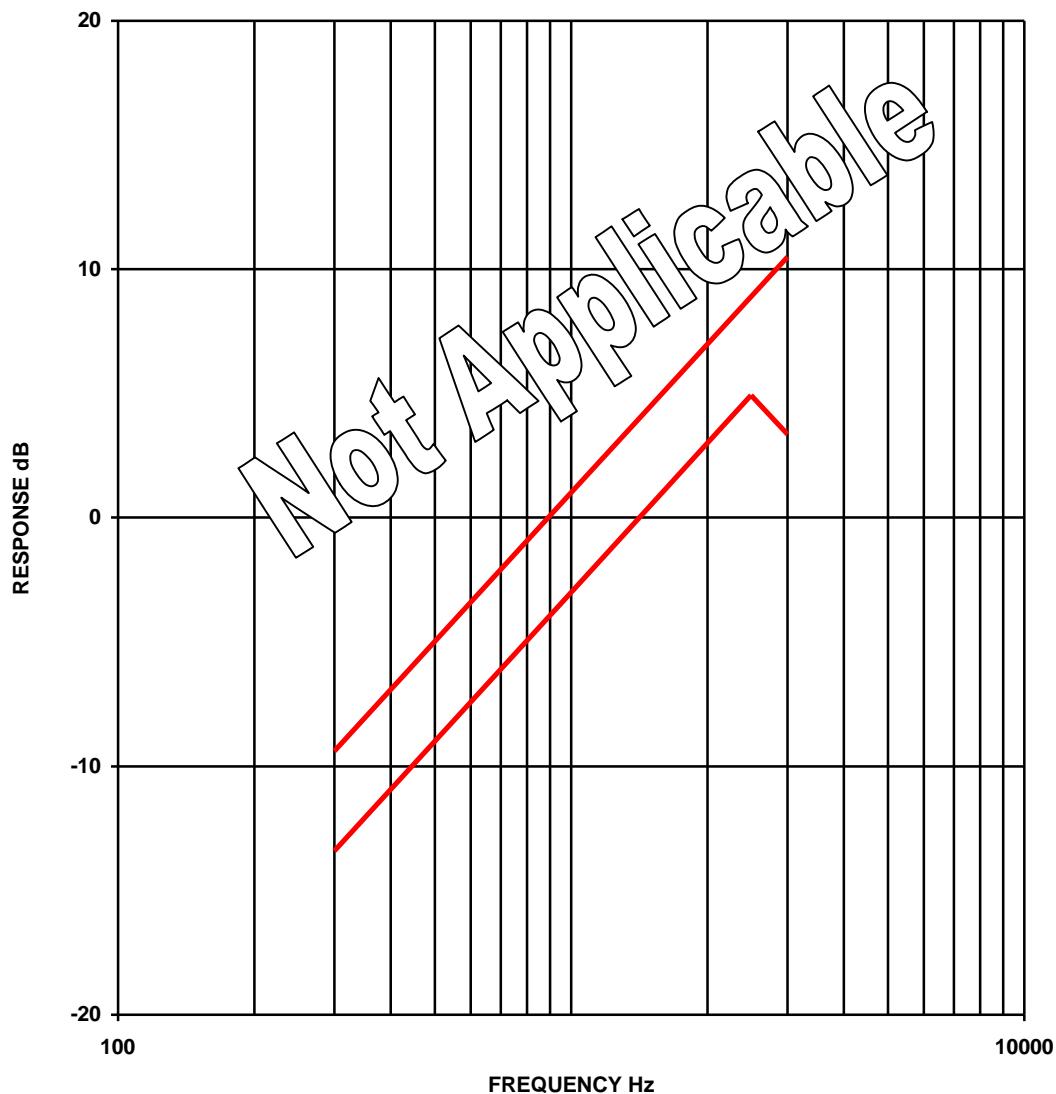
**Equipment Used:**

**Measurement Uncertainty:**

**Temperature:** °C

**Relative  
Humidity:** %

Not Applicable

**EQUIPMENT:** Spider 4 CDPD Transceiver**FCC ID:** MIVWG0001A**PROJECT NO.:** 9L0635RUS1**Graph 1**

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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
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*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

NAME OF TEST: Modulation Characteristics Audio Low-Pass Filter Response	PARA. NO.: 2.1047
TESTED BY:	TEST:

**Test Results:** Complies.

**Measurement Data:** See attached sheet

**Equipment Used**

**Measurement Uncertainty:** dB

**Temperature:** °C

**Relative  
Humidity:** %

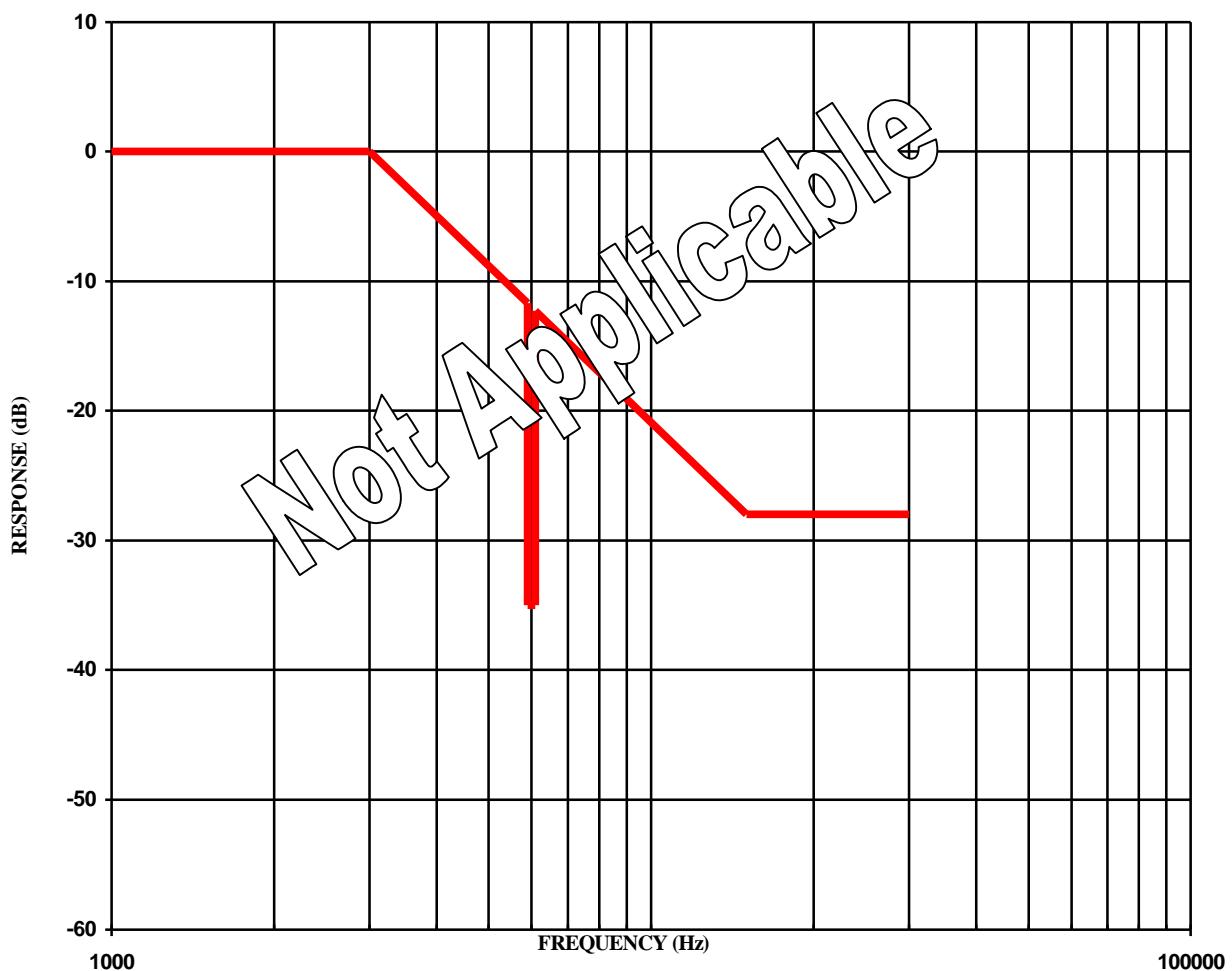
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800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT: Spider 4 CDPD Transceiver*

*FCC ID: MIVWG0001A*

*PROJECT NO.: 9L0635RUS1*



**Graph 2**

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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

NAME OF TEST: Modulation Characteristics  
Modulation Limiting

PARA. NO.: 2.1047

TESTED BY:

DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph

**Equipment Used:**

**Measurement Uncertainty:** kHz

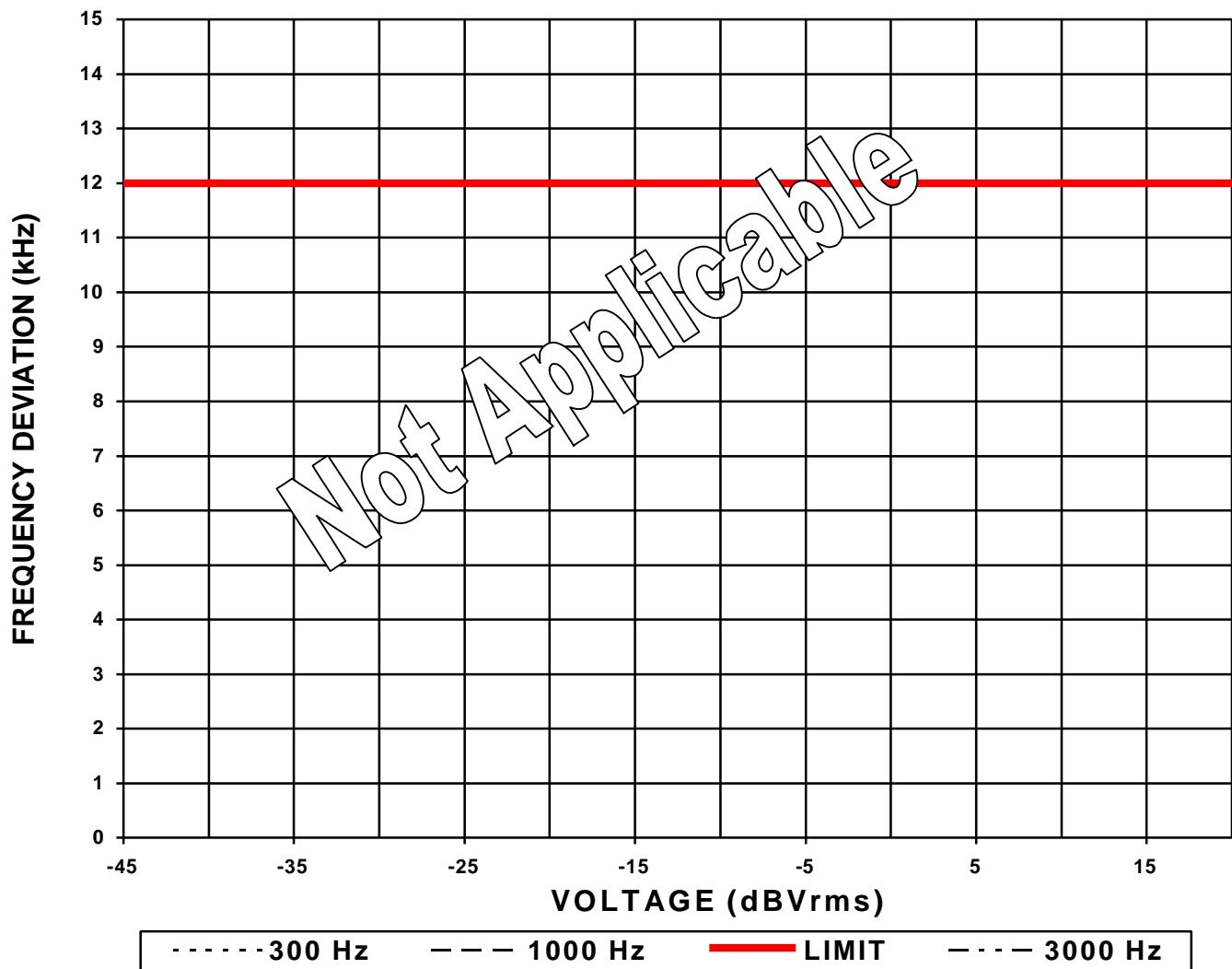
**Temperature:** °C

**Relative  
Humidity:** %

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1



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

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UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

NAME OF TEST: Modulation Characteristics 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**PROJECT NO.:** 9L0635RUS1**Section 5.      Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth (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:** %

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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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:** %

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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

NAME OF TEST: Occupied Bandwidth  
(Wideband Data)

PARA. NO.: 2.1047

TESTED BY:

DATE:

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:**

**Measurement Uncertainty:**

**Temperature:** °C

**Relative  
Humidity:** %

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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

NAME OF TEST: Occupied Bandwidth  
(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

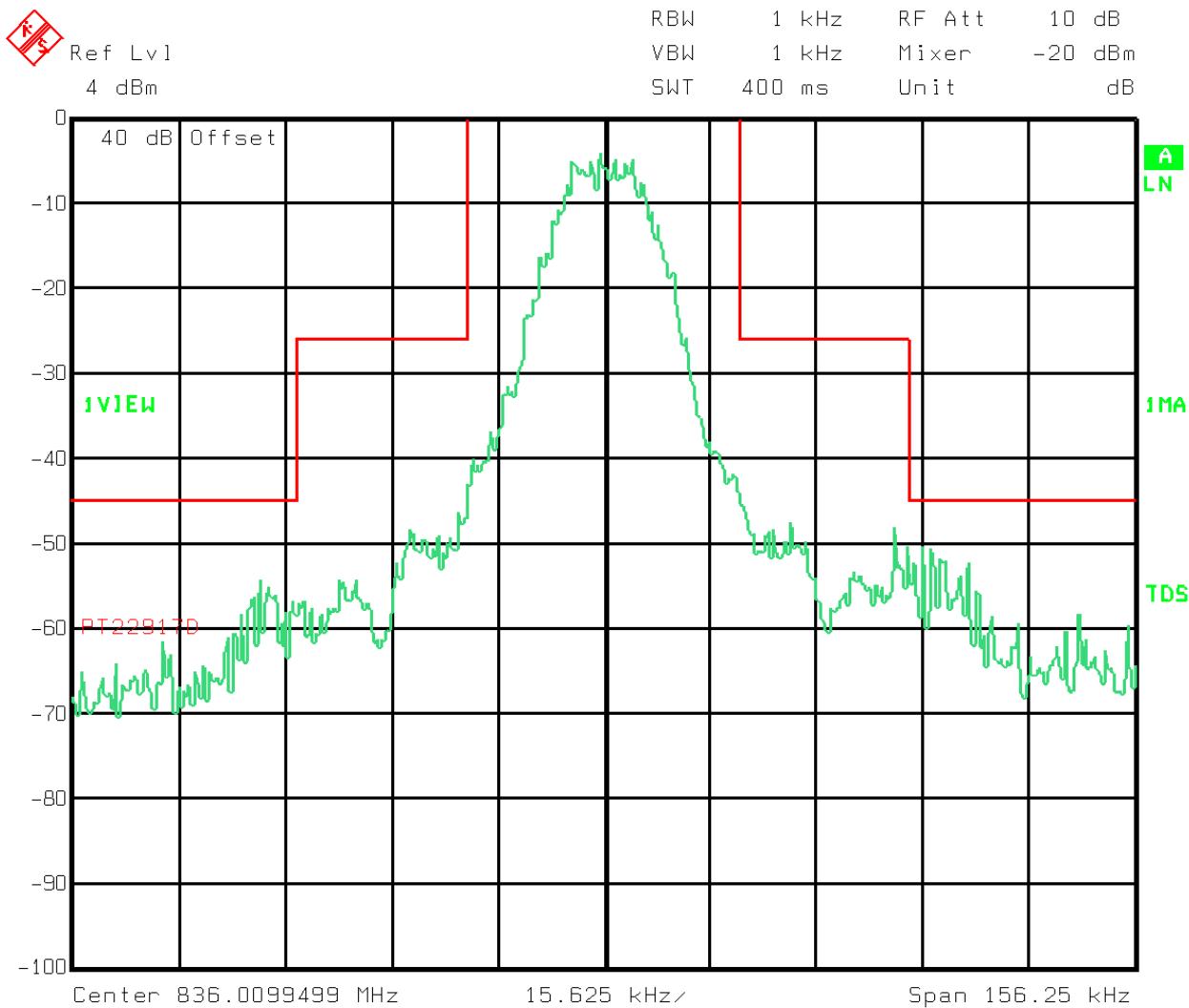
**Temperature:** 20 °C

**Relative  
Humidity:** 40 %

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1



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

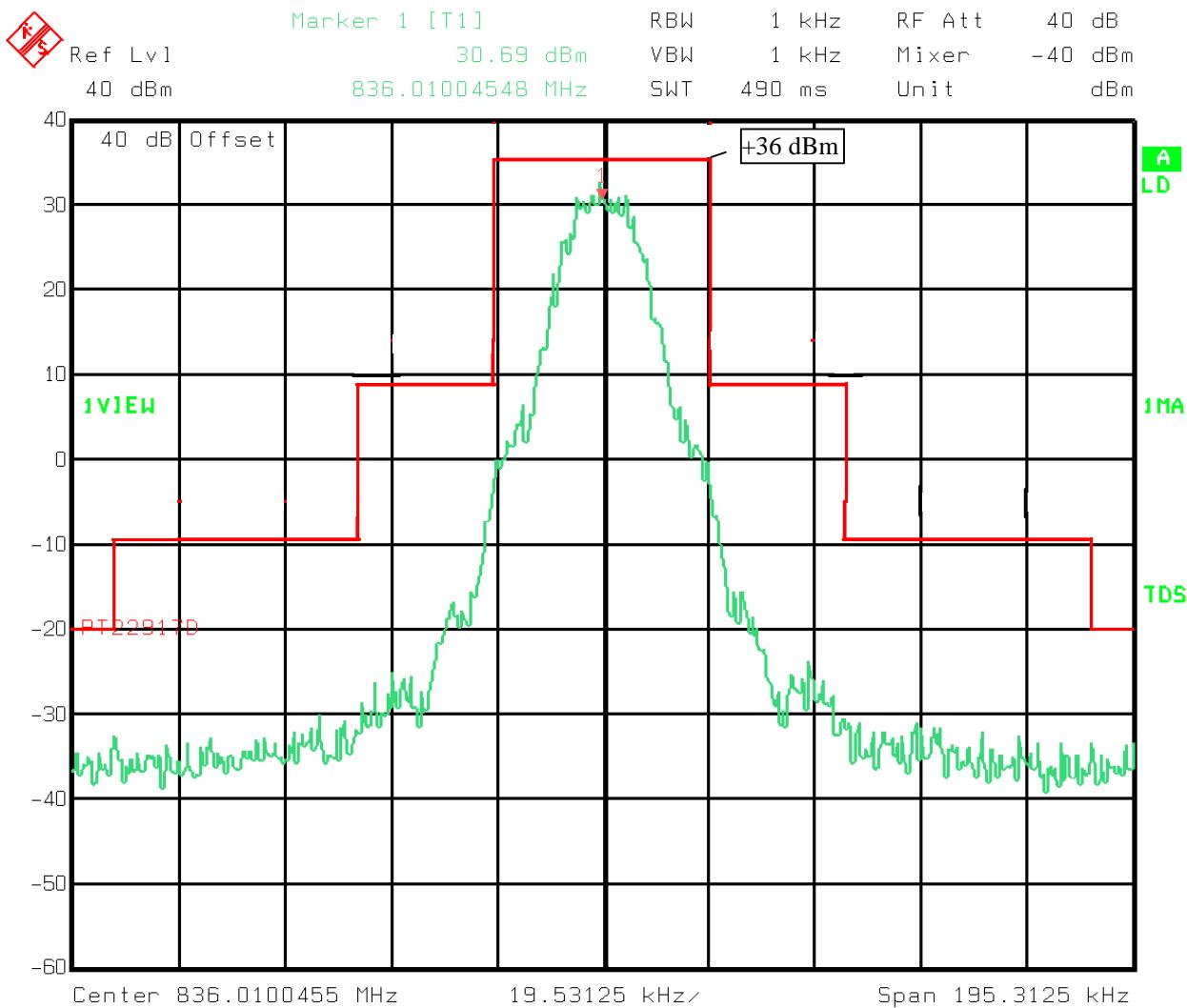
**KTL Dallas**

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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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
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*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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

NAME OF TEST: Spurious Emissions At Antenna Terminals	PARA. NO.: 2.1051
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TESTED BY: David Light	DATE: 3/23/00
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**Test Results:** Complies.

**Measurement Data:** See attached graph.

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

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

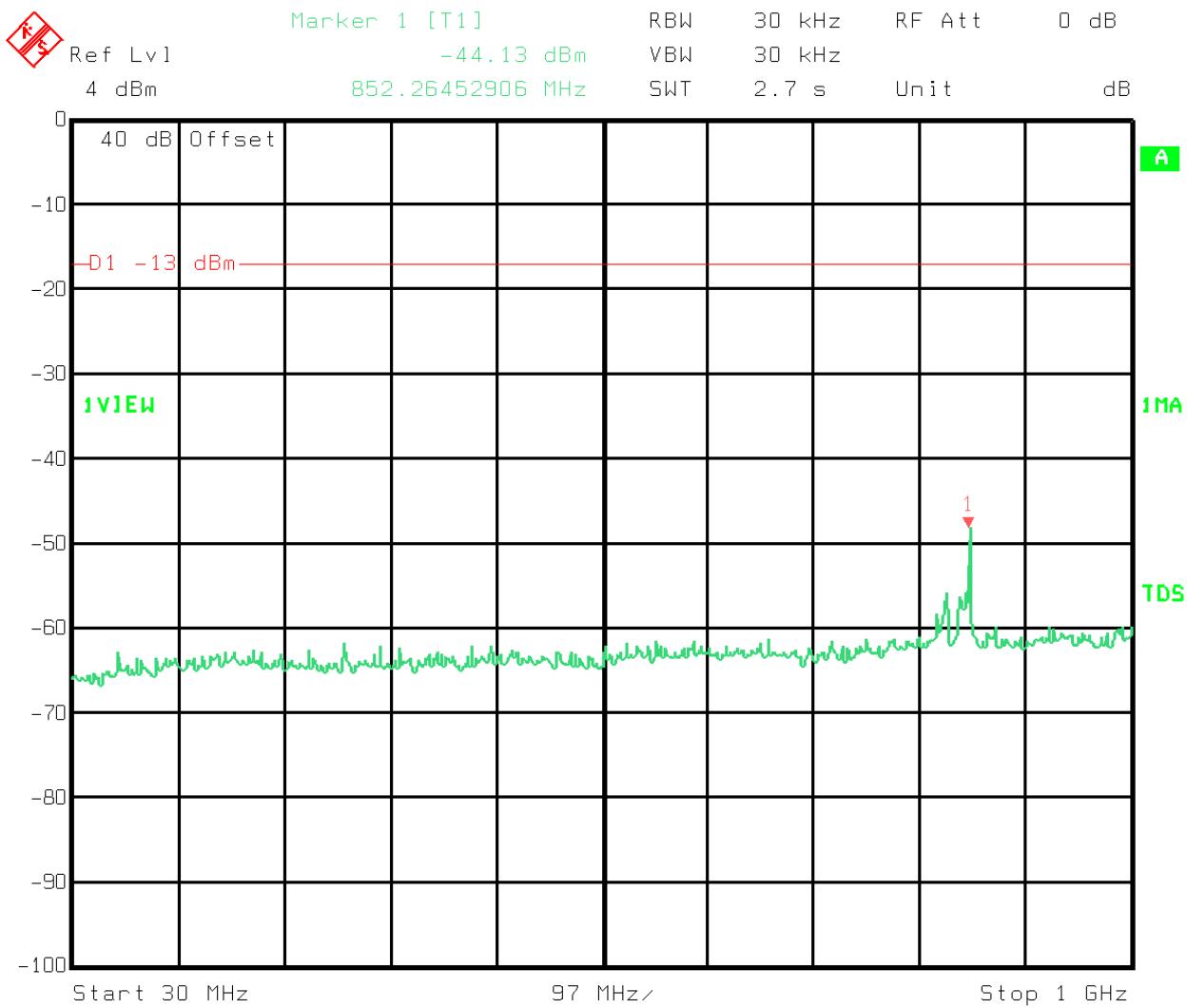
**Temperature:** 20 °C

**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

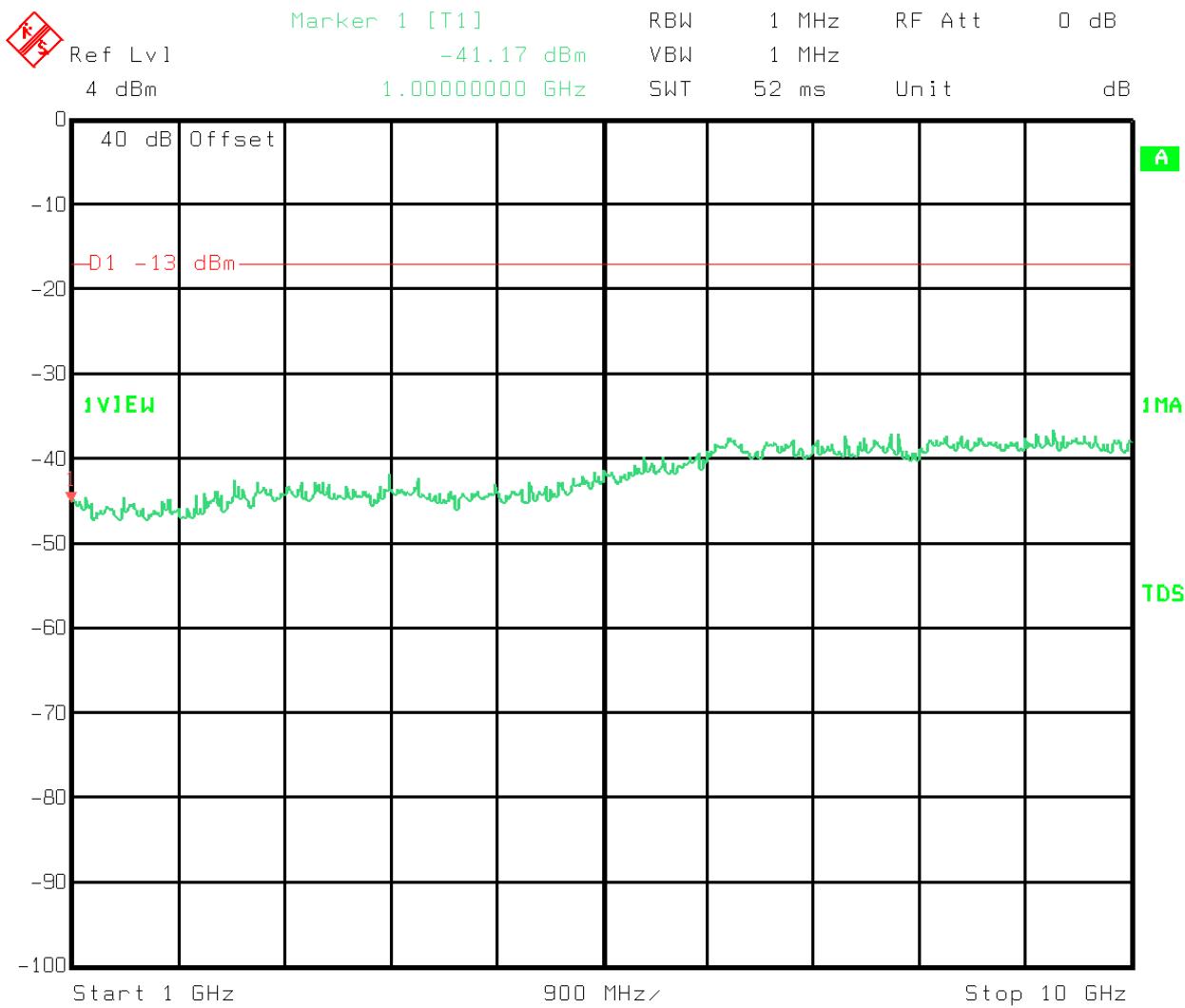
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FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

**EQUIPMENT:** Spider 4 CDPD Transceiver

**FCC ID:** MIVWG0001A

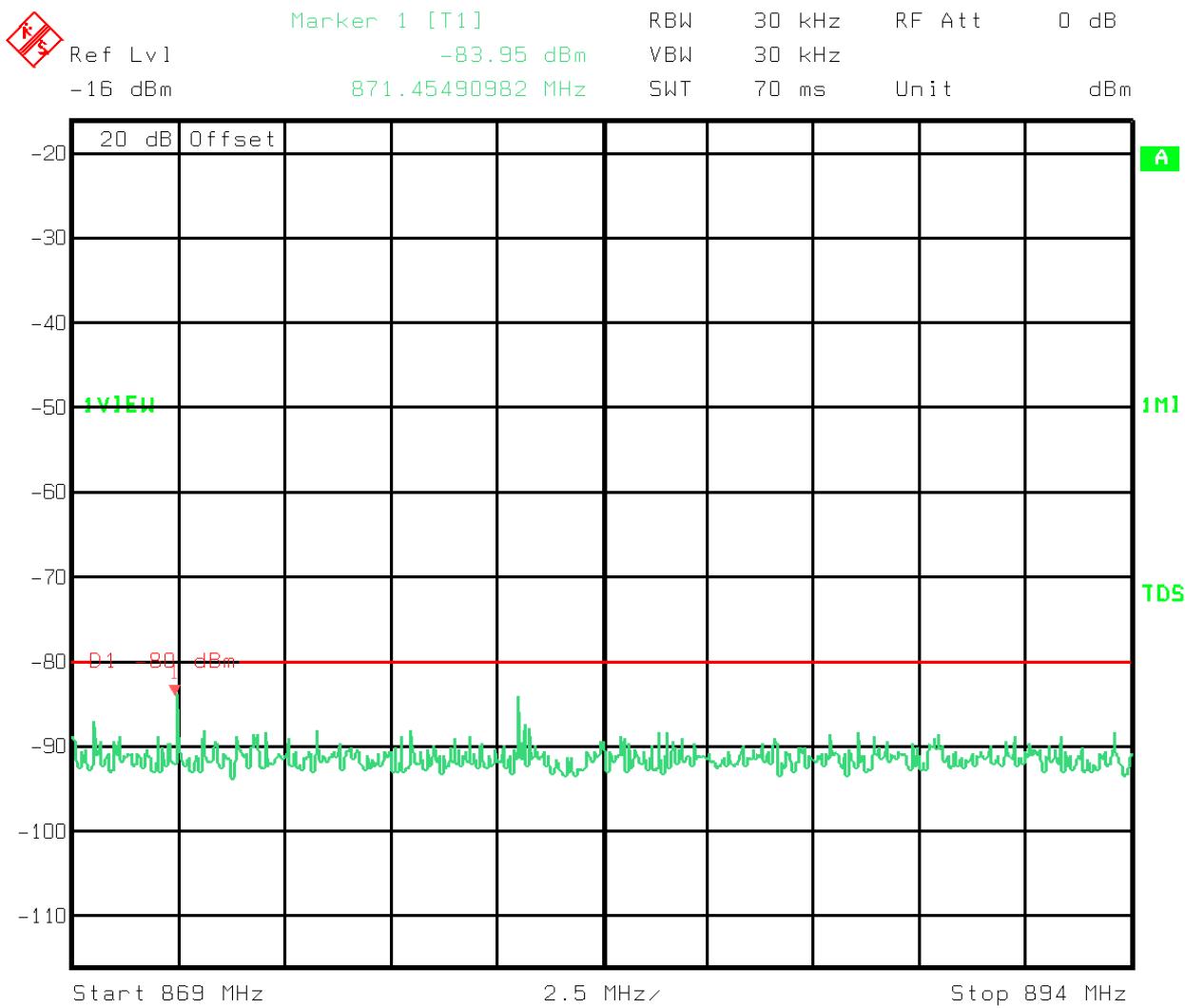
**PROJECT NO.:** 9L0635RUS1



EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

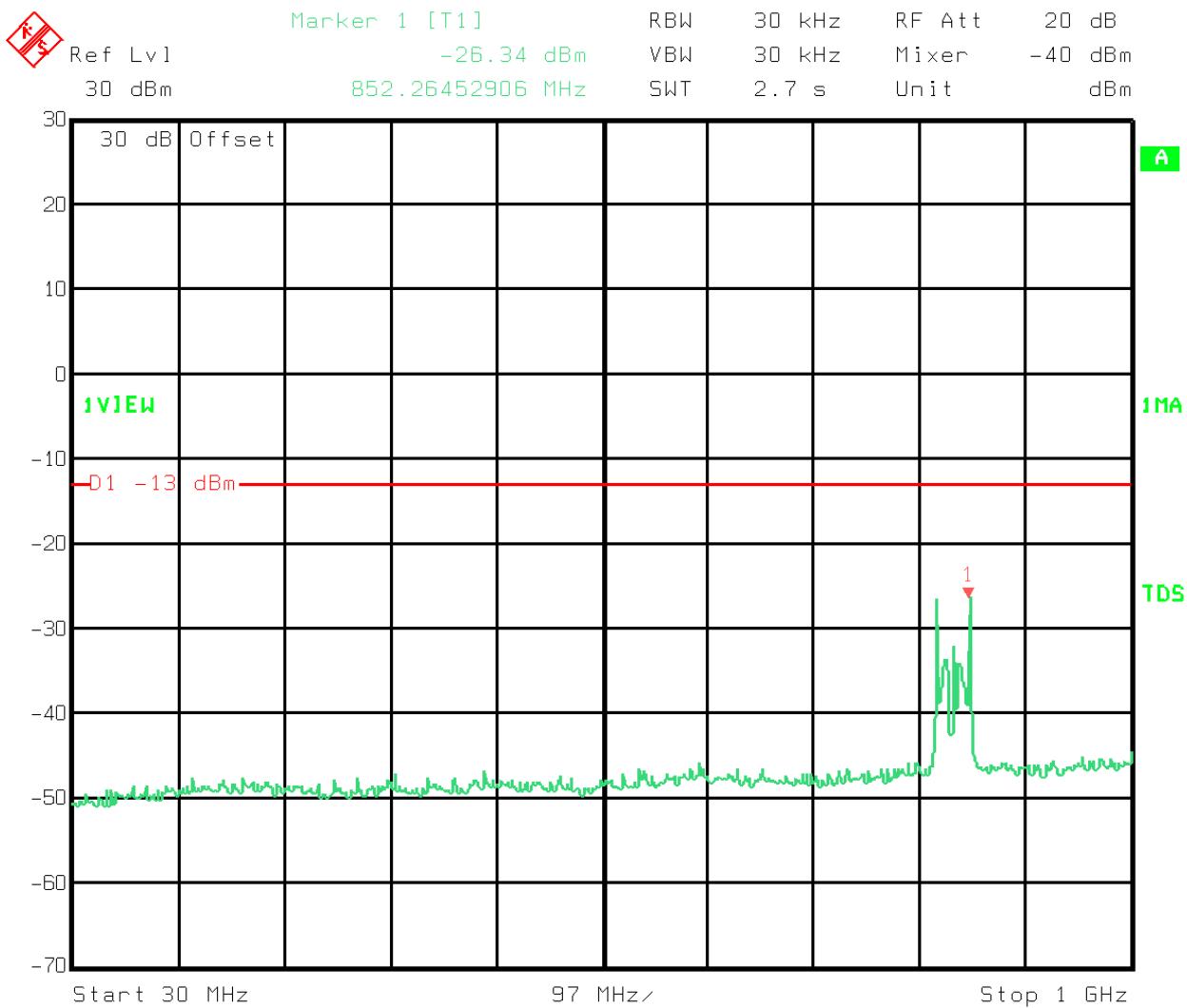


Title: Spurious Emissions  
Comment A: Low Power  
Date: 23.MAR.2000 13:54:58

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1

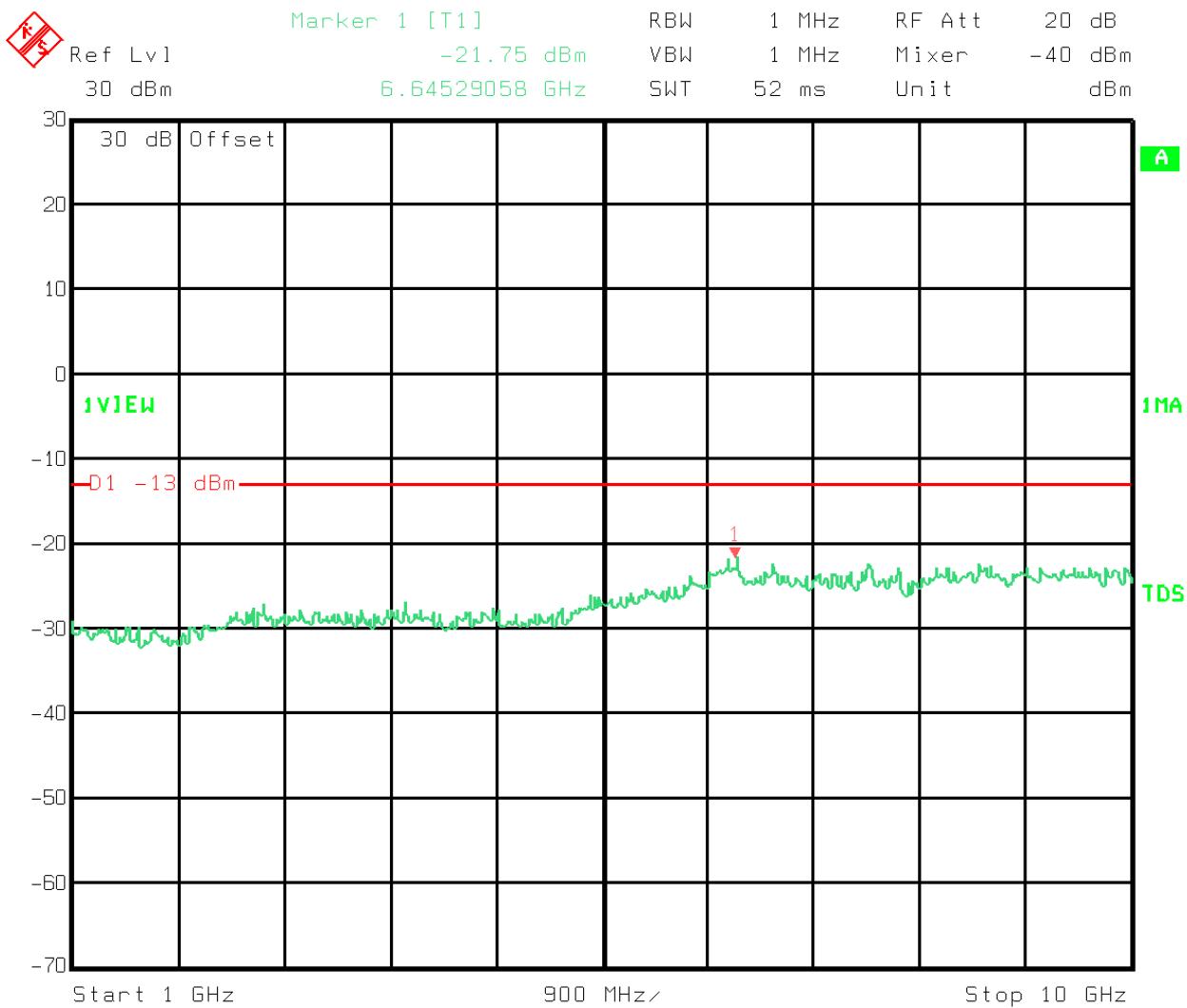


Title: spurious emmisions  
Comment A: high power  
fundemental is notched  
Date: 23.MAR.2000 14:13:42

EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

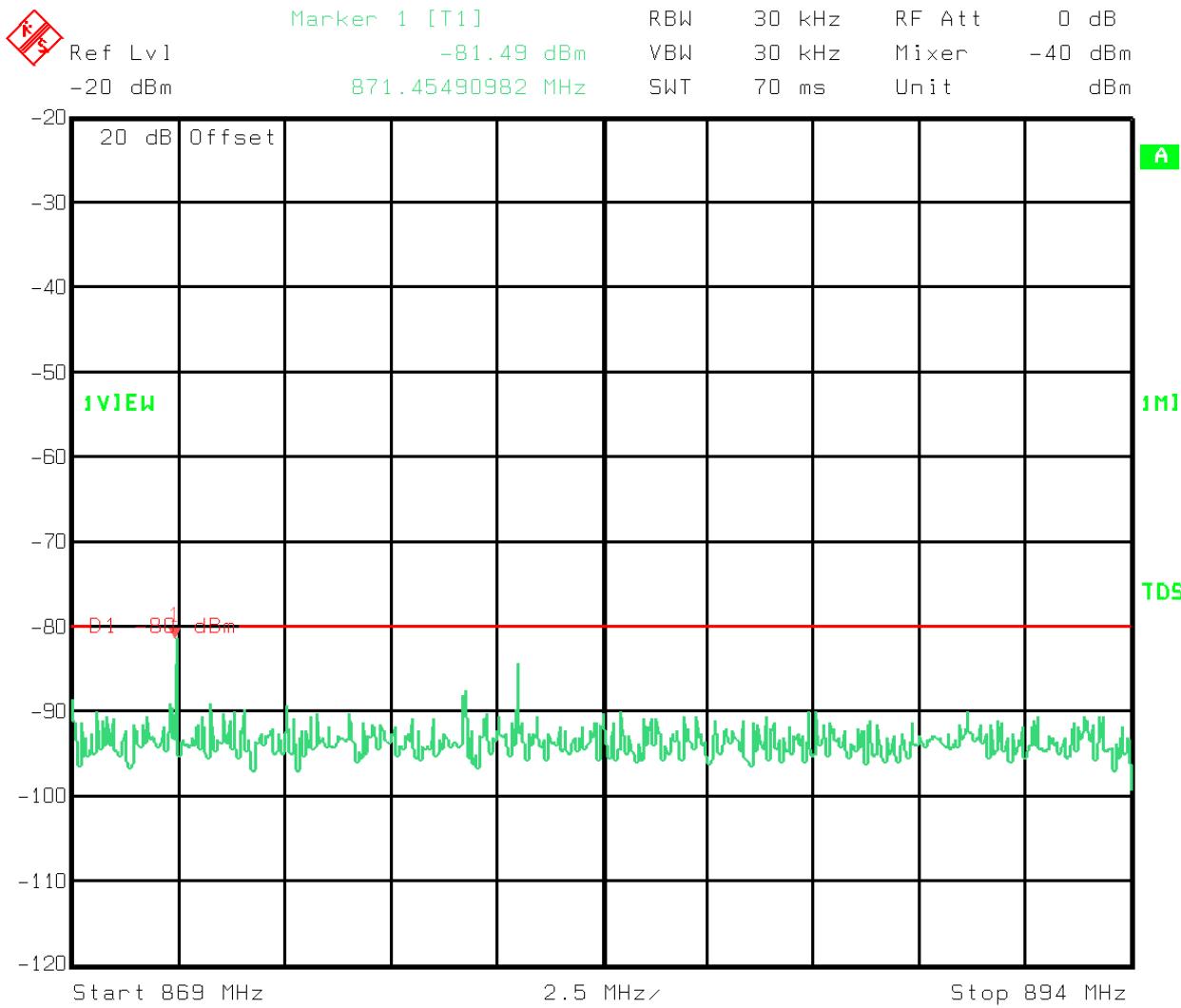
PROJECT NO.: 9L0635RUS1



EQUIPMENT: Spider 4 CDPD Transceiver

FCC ID: MIVWG0001A

PROJECT NO.: 9L0635RUS1



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

**KTL Dallas**

FCC PART 22, SUBPART H  
800 MHz CELLULAR SUBSCRIBER  
UNITS

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

## **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 FCC										
Complete	<input checked="" type="checkbox"/>		Page <u>1</u> of <u>1</u>							
Preliminary	<input type="checkbox"/>									
Client:	Nextcell			W.O.#: 9L0635R			Date: 3/23/00			
EUT:	Spider 4			S/N: Demo Unit No. 2			Specification: FCC Pt 15, Class B			
Tech:	D. Light			Test #: REMW-1			Lab: AC3	Photo ID: 9L0635 REMW-1		
Equipment Used:	G2044-G2016-CF44-CF47-CF40-CF43-CF42-G2207-G2200						Antenna Distance: 3m			
Configuration:	Transmitting modulated signal into 50 ohm load @ 836 MHz									
IF Bandwidth:	1 MHz			Video Bandwidth	1 MHz		Detector:	<input checked="" type="checkbox"/>	Peak	Quasi Peak
Ambient Temperature:	20		C	EUT Power:	115 V.A.C.		60 Hz	1 Phase		
Relative Humidity:	40		%	230 V.A.C.		50 Hz	3 Phase			
Atmospheric Pressure:	999 mbar			<input checked="" type="checkbox"/>		Other 12 VDC				
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		
No emissions were detected EXCEPT harmonics of the transmit signal										
<p>Note: Verify that the IF Bandwidth is in the proper setting.</p> <p>REV 960827</p>										

*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

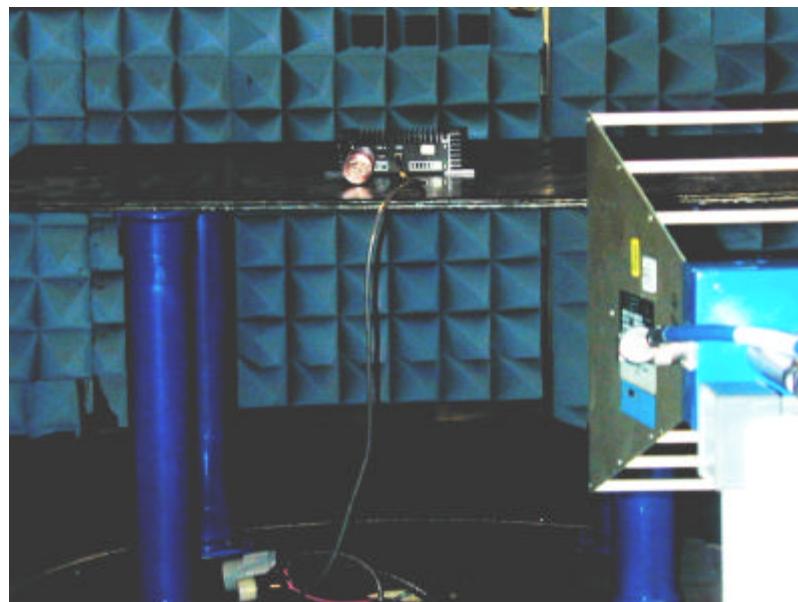
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**Photographs of Test Setup**

FRONT VIEW



REAR VIEW



**EQUIPMENT:** Spider 4 CDPD Transceiver**FCC ID:** MIVWG0001A**PROJECT NO.:** 9L0635RUS1**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: NextcellW.O.# 9L0635REUT: Spider 4 CDPD ModemS/N: Demo Unit #2Date: 3/24/00Tech: 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 Model Number	Serial Number	Calibration Date
G2044	BILOG ANTENNA	Shaffner-Chase CBL6111C	2572	01/14/00
G2016	ANTENNA, HORN	A.H. SYSTEMS SAS-200/571	162	07/16/99
G2207	PREAMP, 25dB	ICC LNA25	398	08/27/99
G2200	AMPLIFIER	HEWLETT PACKARD 8449A	2749A00159	06/11/99
CF40	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
CF44	CABLE, 4M	STORM PR90-010-144	N/A	10/15/99
CF47	CABLE, 4M	STORM PR90-010-144	N/A	10/15/99
G3893	POWER METER	WAVETEK 8531	1911	06/17/99
G3894	SENSOR,RF POWER	WAVETEK 85310	2310	06/17/99
G1017	ATTENUATOR	NARDA 776B-20	N/A	09/30/99
G1018	ATTENUATOR	NARDA 776B-10	N/A	09/30/99
CF38	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
G4052	FREQUENCY COUNTER	HEWLETT PACKARD 5350B	8232A01493	04/20/99
G5006	ENVIRONMENTAL CHAMBER	ENVIROTRONICS SH27	129010083	06/14/99
G2632	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99
CF38	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
G1712	TUNABLE NOTCH FILTER	K&L 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**NAME OF TEST: RF Power Output****PARA. NO.: 1.1046**

**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

<b>PL</b>	<b>I</b>	<b>II</b>	<b>III</b>
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***NAME OF TEST: Audio Frequency Response****PARA. NO.: 2.1047**

**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***NAME OF TEST: Audio Low Pass Filter Response****PARA. NO.: 2.1047**

**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:  $\pm 12$  kHzSAT:  $\pm 2$  kHzWideband Data:  $\pm 8$  kHzST:  $\pm 8$  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**NAME OF TEST: Occupied Bandwidth (Voice & SAT)      PARA. NO.: 2.1049**

**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**NAME OF TEST: Occupied Bandwidth (WBD & SAT)      PARA. NO.: 2.1049**

**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: CELF1D

**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*

<b>NAME OF TEST: Spurious Emission at Antenna Terminals</b>	<b>PARA. NO.: 2.1051</b>
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**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
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**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 = 3m (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 = 3m (Measurement Distance)

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

***The spectrum is searched to 10 GHz.***

**EQUIPMENT:** Spider 4 CDPD Transceiver**FCC ID:** MIVWG0001A**PROJECT NO.:** 9L0635RUS1**NAME OF TEST: Frequency Stability****PARA. NO.: 2.1055**

**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

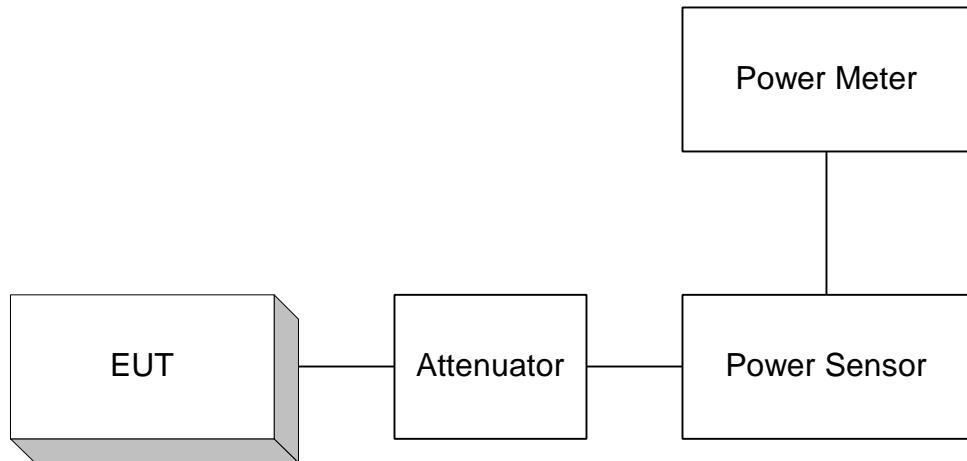
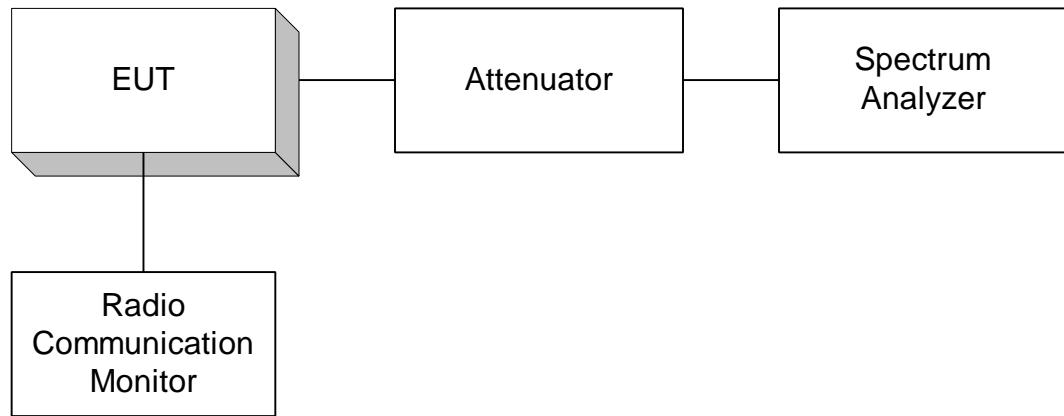
*EQUIPMENT:* Spider 4 CDPD Transceiver

*FCC ID:* MIVWG0001A

PROJECT NO.: 9L0635RUS1

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**ANNEX B - TEST DIAGRAMS**

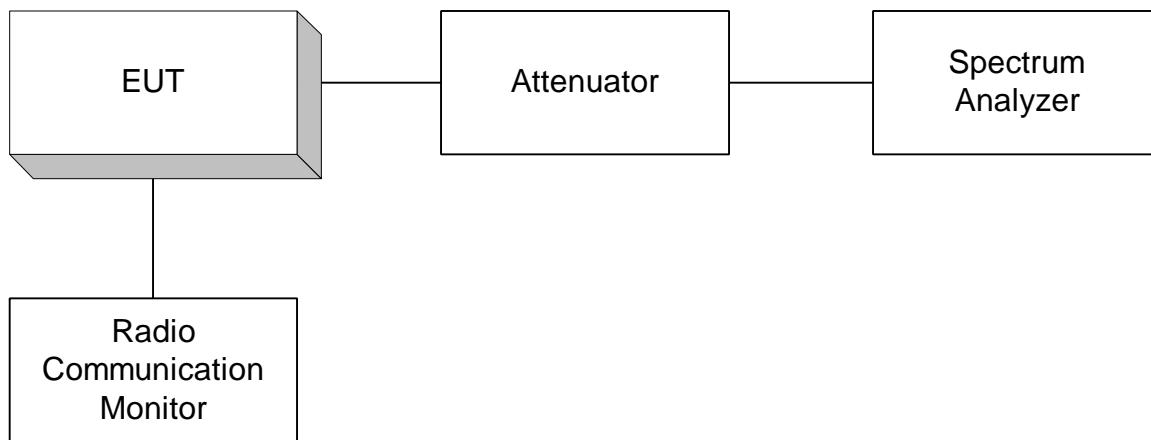
**EQUIPMENT:** Spider 4 CDPD Transceiver**FCC ID:** MIVWG0001A**PROJECT NO.:** 9L0635RUS1**Para. No. 2.1046 - R.F. Power Output****Para. No. 2.1049 - Occupied Bandwidth**

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

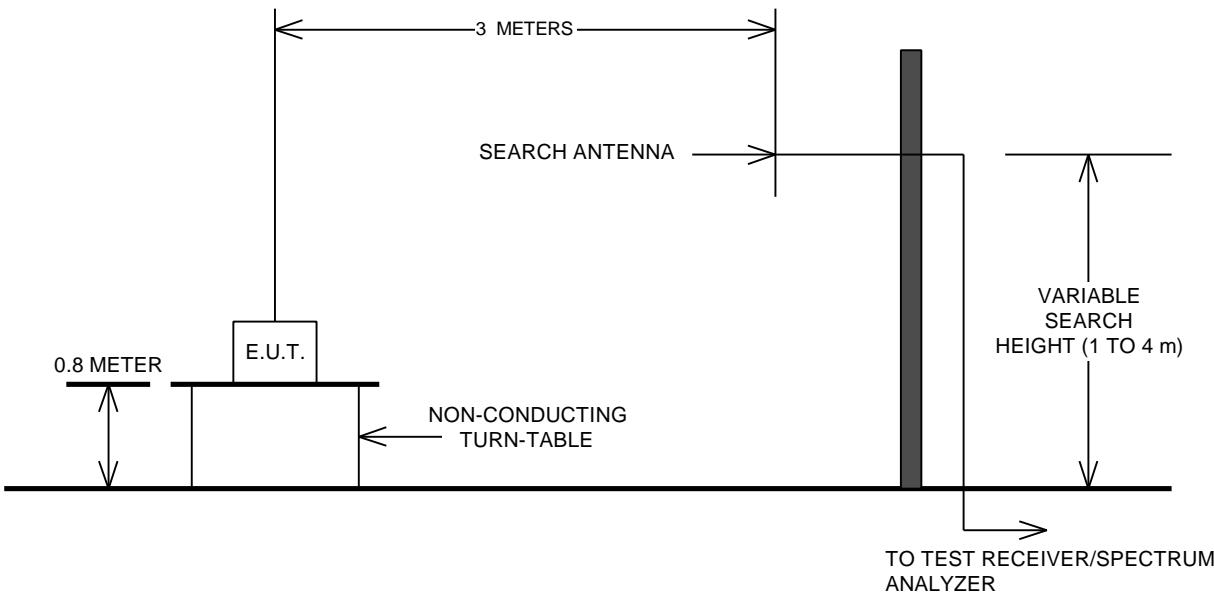
EQUIPMENT: Spider 4 CDPD Transceiver

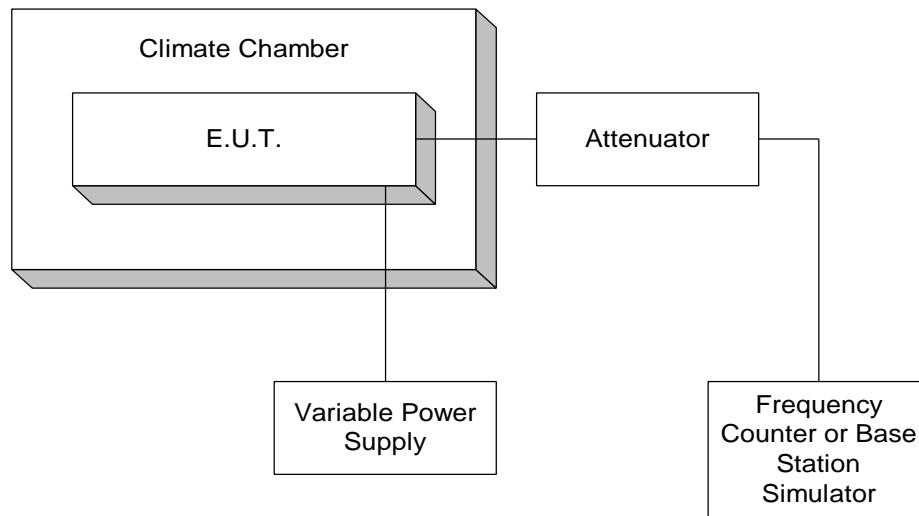
FCC ID: MIVWG0001A

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**Para. No. 2.1055 - Frequency Stability****Para. No. 2.1045 – Audio Frequency Response, Audio Low Pass Filter Response And Modulation Limiting**