

December 7, 2001

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Attention: Applications Examiner

Applicant: Celletra Ltd.
P.O. Box 106, Tavor building 1,
Yoqne'am Ilit 20692, ISRAEL

Equipment: CELLULAR Beamer® 1x4x4 Rev.2. Column Array

FCC ID: PNQC-BCL

Specification: 47 CFR 22 Licensed Certification


Dear Examiner:

The following application for Grant of Equipment Authorization is presented on behalf of Cellular Transmission Solutions for the Licensed Certification of their Cellular Enhancer, Model: CELLULAR Beamer® 1x4x4 Rev.2. Column Array.

Enclosed, please find a complete data and documentation package demonstrating that this device complies with the technical requirements of 47 CFR, Part 22, for a Cellular Enhancer.

If you have any questions, please contact the undersigned, who is authorized to act as Agent.

Sincerely,


Chris Harvey
Director, EMC Laboratory

MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

914 WEST PATAPSCO AVENUE ! BALTIMORE, MARYLAND 21230-3432 ! PHONE (410) 354-3300 ! FAX (410) 354-3313

ENGINEERING TEST REPORT

in support of the
Application for Grant of Equipment Authorization

EQUIPMENT: CELLULAR Beamer® 1x4x4 Rev.2. Column Array

FCC ID:: PNQC-BCL

Specification: 47 CFR 22

On Behalf of the Applicant: Celletra Ltd.
P.O. Box 106, Tavor building 1,
Yoqne'am Ilit 20692, ISRAEL


Manufacturer: Celletra Ltd.
P.O. Box 106, Tavor building 1,
Yoqne'am Ilit 20692, ISRAEL

**Manufacturer's
Representative** Mr. Paul Lemson

Test Date(s): 9-16 Nov. 2001

ENGINEERING STATEMENT

I ATTEST: the measurements shown in this report were made in accordance with the procedures indicated, and that the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements. On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 22 of the FCC Rules under normal use and maintenance.



Liming Xu
Project Engineer, MET Laboratories

Summary of Test Results

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 22 (H) of 47CFR. All tests were conducted using measurement procedure ANSI C63.4-1992.

Type of Submission/Rule Part:	Original Filing for Part 22(H)
EUT:	CELLULAR Beamer® 1x4x4 Rev.2. Column Array
FCC ID:	PNQC-BCL
Type of Emissions:	F9W (CDMA) Downlink power 40.5 dBm +/- 0.5dB (12.5 Watts max)
Frequency Range (MHz):	824-849 (conducted to BaseStation) and 869-894 (Transmit by antenna)
Frequency Stability:	N/A

This is a multi-carrier CDMA amplifier/repeater. The Power Output listed on this Grant is the combined conducted power of the four amplifiers. For multi-channel operation, the power per channel decreases proportionally as the number of channels is increased.

The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed.

Summary of Test Data

Name of Test	FCC Rule Part/Section	Results
Radiated Emissions	2.1053; 22.901(d); 22.917(e)	Complies
Occupied Bandwidth/Input vs. Output	2.1049	Complies
RF Power Output	2.1046; 22.913(a)	Complies
Spurious Emissions at Antenna Terminals (uplink&downlink)	2.1051; 22.917(e)	Complies
IMDSpur emissions 2-tone at high and low side of band (uplink & downlink)	2.1051	Complies

1.0 INTRODUCTION

The following data is presented on behalf of the Applicant, Celletra Ltd. as verification of the compliance of the Cellular Enhancer Unit, to the requirements of 47CFR 22.

2.0 TEST SITE

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3493. Radiated emissions measurements were performed on a Semi-Anechoic Chamber. A complete site description is on file with the FCC Laboratory Division as 31040/SIT/MET.

3.0 TEST EQUIPMENT USED

Manufacturer	Equipment	Calibration Due	Cal. Interval
Hewlett Packard	8563A Spectrum Analyzer	6/14/02	annual
EMCO	Biconical Antenna 3104	3/21/02	annual
EMCO	EMCO Log Periodic Antenna	11/01/02	annual
EMCO	Double Ridge Guided Horn	6/3/02	annual
Hewlett Packard	8546A Analyzer	08/11/02	annual
Hewlett Packard	E4331B Digital Signal Gen.	9/29/02	annal

4.0 EQUIPMENT UNDER TEST CONFIGURATION

The CELLULAR Beamer® 1x4x4 Rev.2. Column Array was configured with DC power supply modules, and a digital signal generator was used to simulate a CDMA type RF input signals to the EUT. The EUT with host external computer was configured for maximum signal gain and bandwidth. The EUT was operated in a manner representative of the typical usage of the equipment. During all testing, the EUT was configured for Single/Dual Channel operation which results in maximum possible output power.

5.0 TEST TYPE(S)

- 5.1 Radiated Emissions: 47CFR2.1053, 22.901(d)(2), 22.917(e)
- 5.2 Occupied Bandwidth: 47CFR2.1049, Input vs. Output
- 5.3 RF Power Output: 47CFR 2.1046, 22.913(a)
- 5.4 Spurious Emission at Antenna Terminals:(uplink & downlink) 47CFR 2.1051, 22.917(e)
- 5.5 IMDSpur Emissions 2-tone at high and low side of the band (UL and DL) 2.1051

6.0 TEST RESULTS**6.1 TEST TYPE:** Radiated Emissions**6.1.1 TECHNICAL SPECIFICATION:** 2.1053, 22.901(d)(2), 22.917(e)**6.1.2 TEST DATE(S):** 9 November 2001**6.1.3 MEASUREMENT PROCEDURES:**

As required by 47 CFR 2.1053, measurements of the *relative radiated power of spurious emissions* were performed. Preliminary radiated emission measurements were performed inside a non-reflective area (not an OATS) at 3 meters. The frequency list from the preliminary measurements was used as a guide for making final measurements. The unit was scanned over the frequency range of 9 kHz to 9 GHz.

The Power *Limit* of Radiated Spurious Emissions is calculated as follows:

Based on the measured conducted output power (at the RF output of the EUT) of 12.5 watts,

$$P_o = 12.5W$$

the radiated power level of all spurious emissions must be attenuated by at least $43 + 10\log(P_o)$ below P_o , yielding:

$$P_o - [43 + 10\log(P_o)] \leq -13dBm$$

All of the measurable radiated emissions are related to the digital device portion of the EUT, and thus are compared to the 47CFR 15 Class A field strength limit. Mathematical calculations indicate that these field strengths yield radiated power levels greater than 30 dB below the -13 dBm limit for spurious emissions from the transmitter portion of the EUT calculated above. There were no observable radiated emissions from the transmitter portion of the EUT.

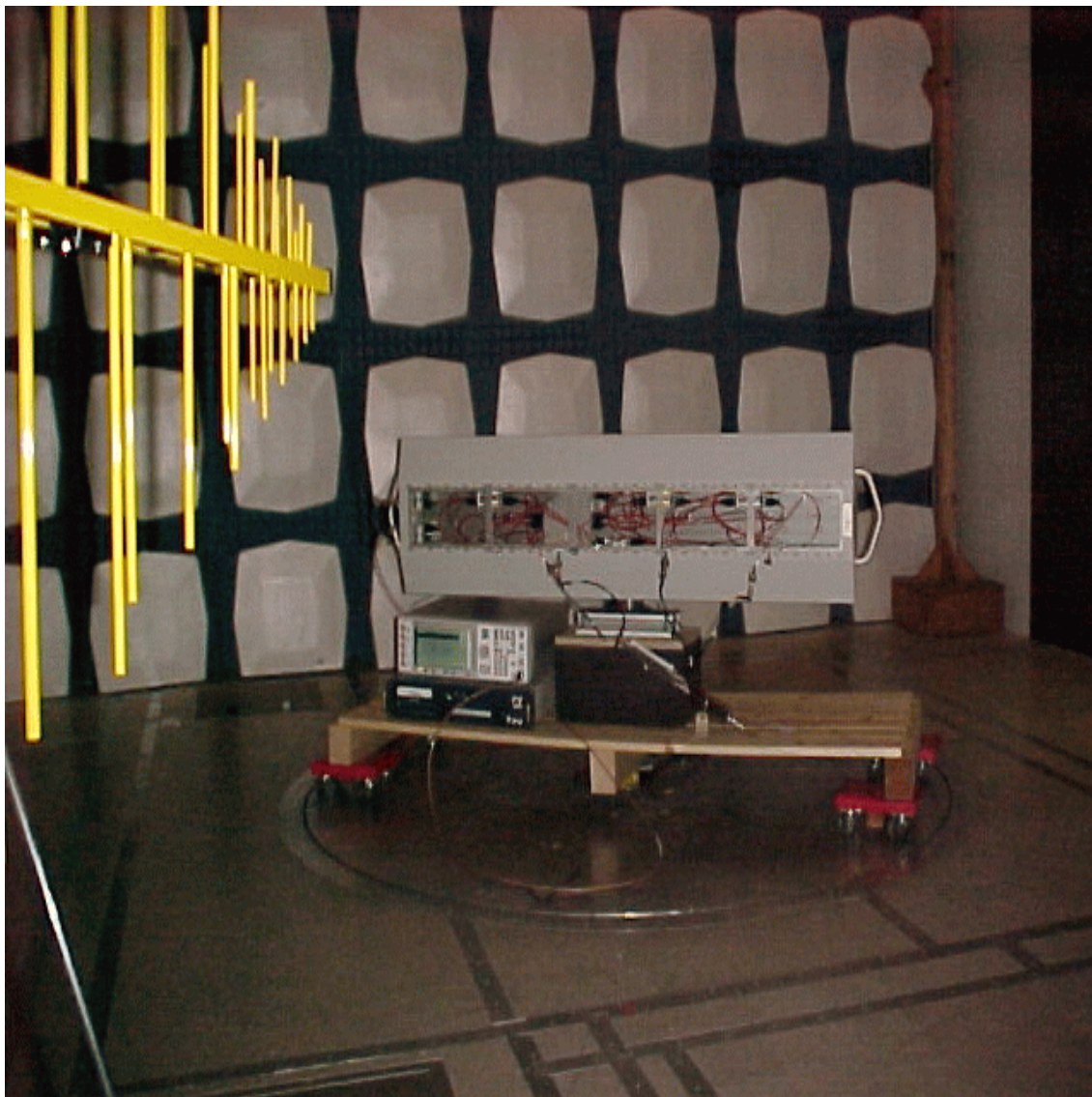


Figure 1. Photograph of test setup of radiated emissions

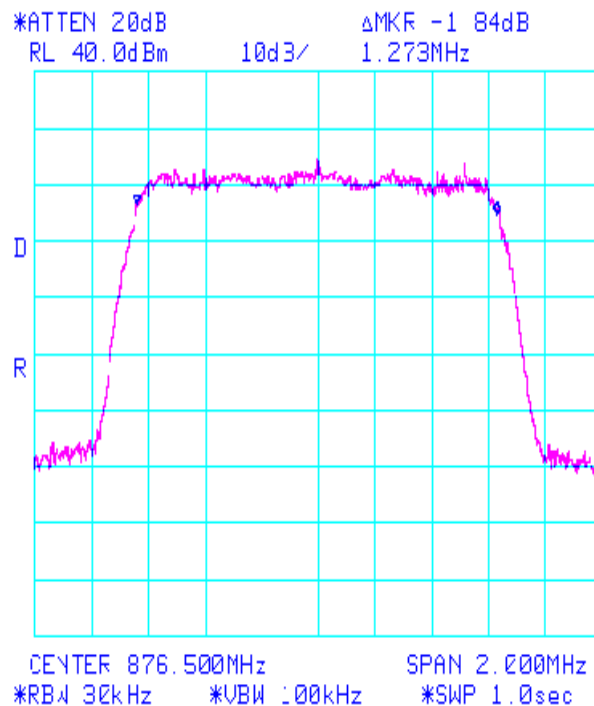
6.2 TEST TYPE: Occupied Bandwidth**6.2.1 TECHNICAL SPECIFICATION:** 47 CFR 2.1049**6.2.2 TEST DATE(S):** 9 November 2001**6.2.3 MEASUREMENT PROCEDURES:**

As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made on the CELLULAR Beamer® 1x4x4 Rev.2. Column Array and post- CELLULAR Beamer® 1x4x4 Rev.2. Column Array A digital signal generator was configured to transmit an CDMA modulated carrier signal. Using an IF bandwidth of 30KHz, we determined the occupied bandwidth of the emission at the Input and Output side.

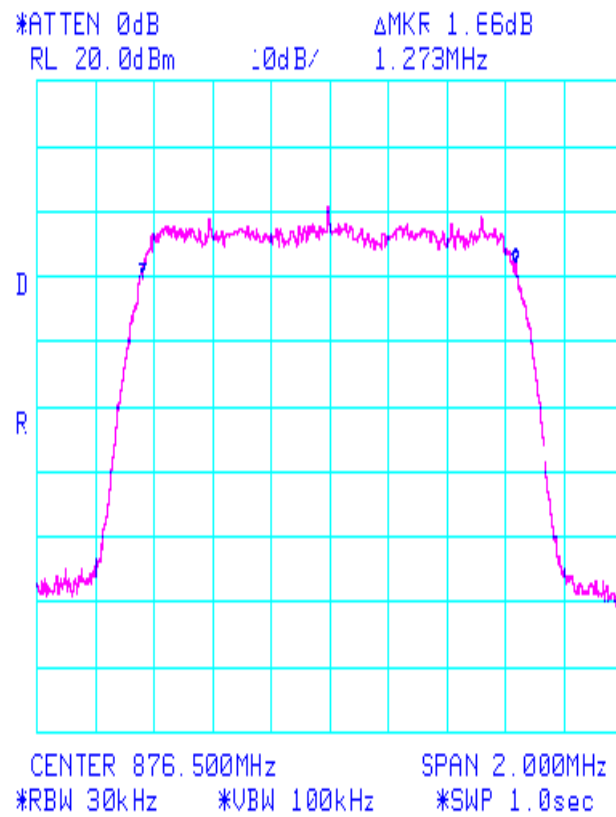
6.2.4 RESULTS:

Equipment complies with Section 2.1049. Plots of the occupied bandwidth, as measured at the EUT RF input port, and at the antenna RF output port (post amplification) follow:

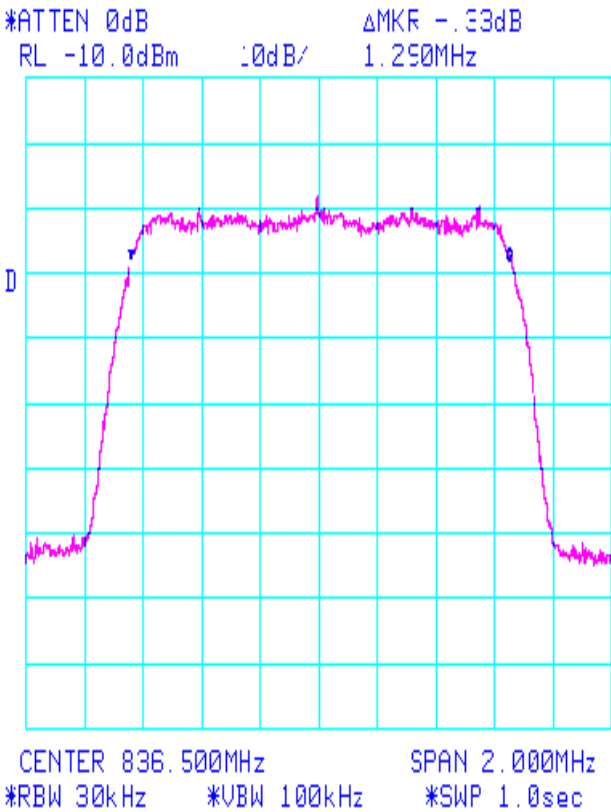
CDMA modulated B/W Downlink output side Met 11425



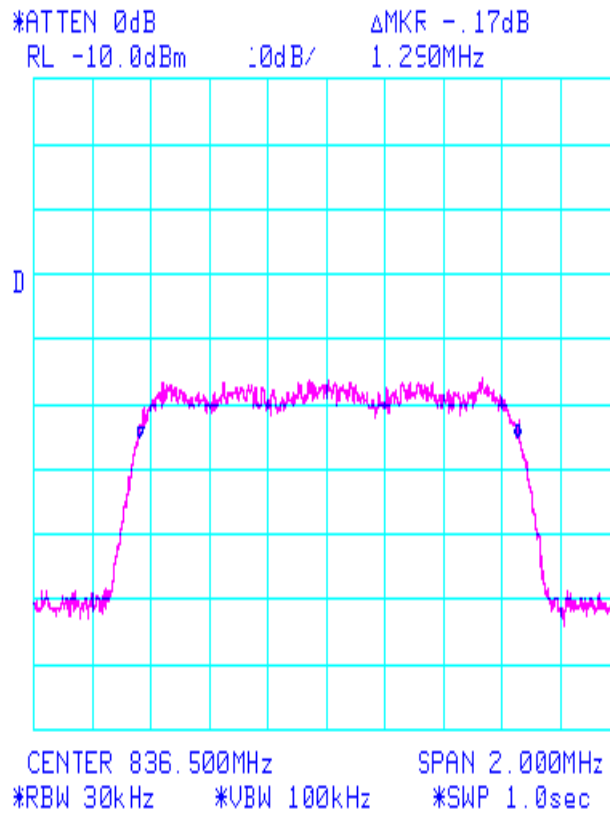
CDMA modulated B/W downlink input side Met11425



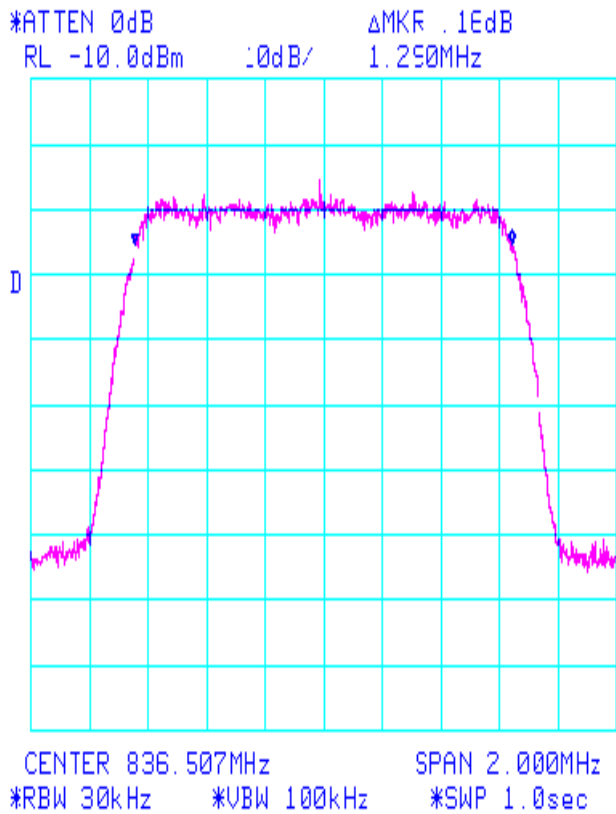
CDMA Occupied B/W Uplink+ Output side Met11425



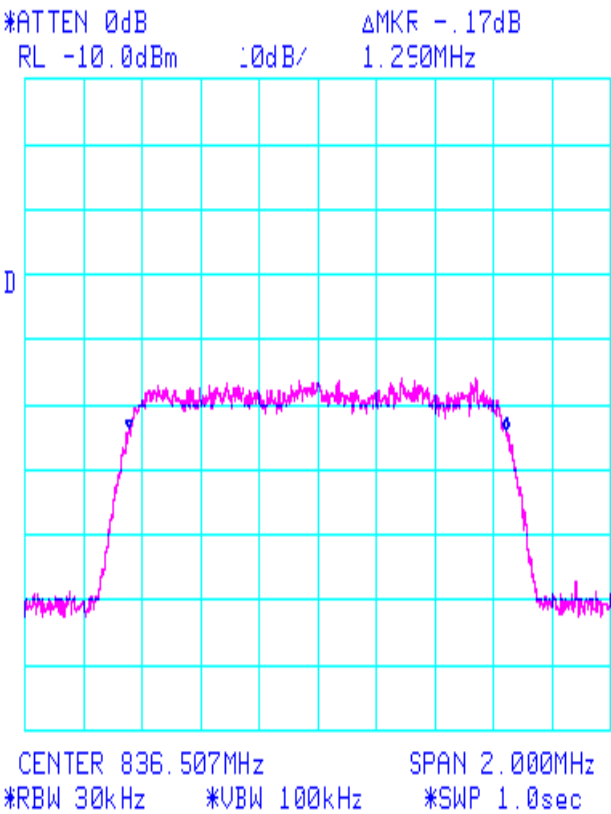
CDMA Occupied B/W Uplink+ Input side Met11425



CDMA Occupied B/W Uplink- Output side Met11425



CDMA Occupied B/W Uplink- Input side Met11425



6.3 TEST TYPE: RF Power Output**6.3.1 TECHNICAL SPECIFICATION:** 47 CFR 2.1046 and 22.913(a)**6.3.2 TEST DATE(S):** 9 November 2001**6.3.3 MEASUREMENT PROCEDURES:**

As required by 47 CFR 2.1046, *RF power output measurements* were made at the RF output terminals using an attenuator and spectrum analyzer. This test was performed with carrier modulated by a CDMA signal.

Plots of the RF output Power level of the Digitally modulated carrier, as measured at the Antenna port of the EUT appear on the following pages.

6.3.4 RESULTS:

Equipment complies with 47CFR 2.1046 and 22.913(a). The CELLULAR Beamer® 1x4x4 Rev.2. Column Array conducted RF power does not exceed 100 W (50 dBm) at the carrier frequency.

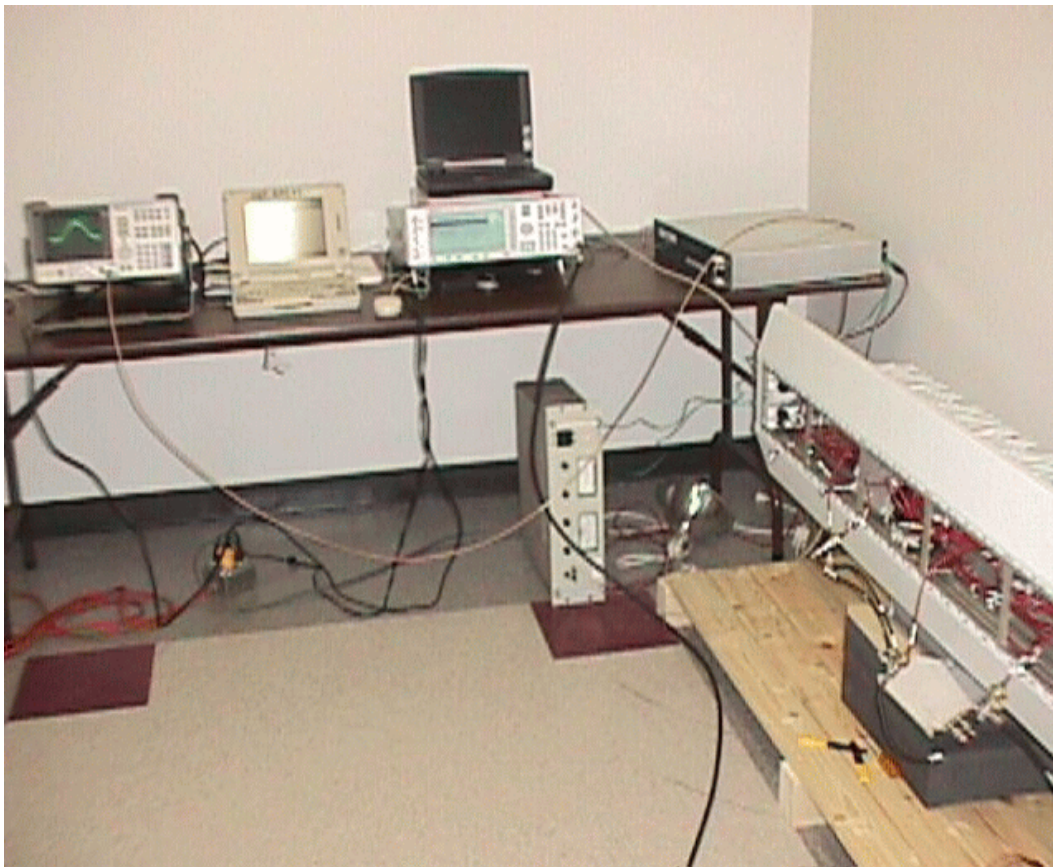
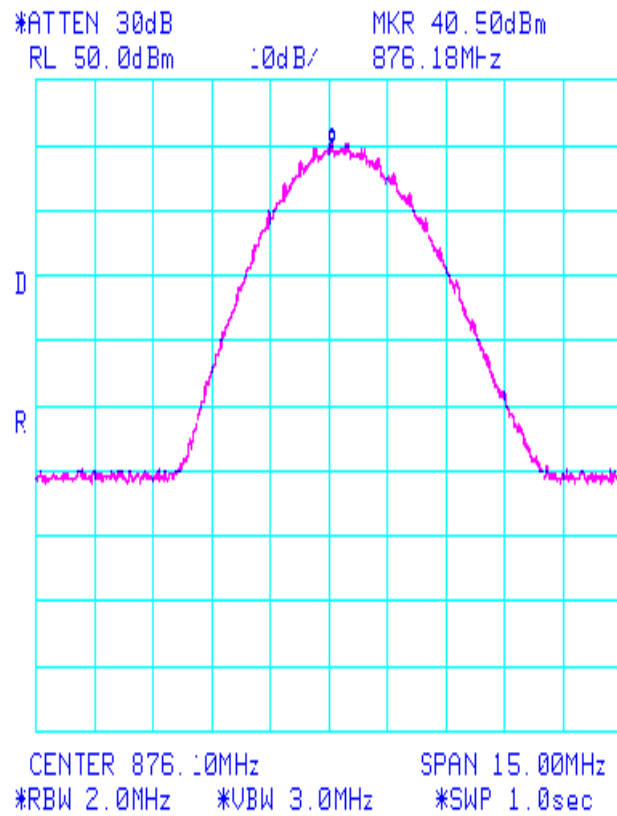
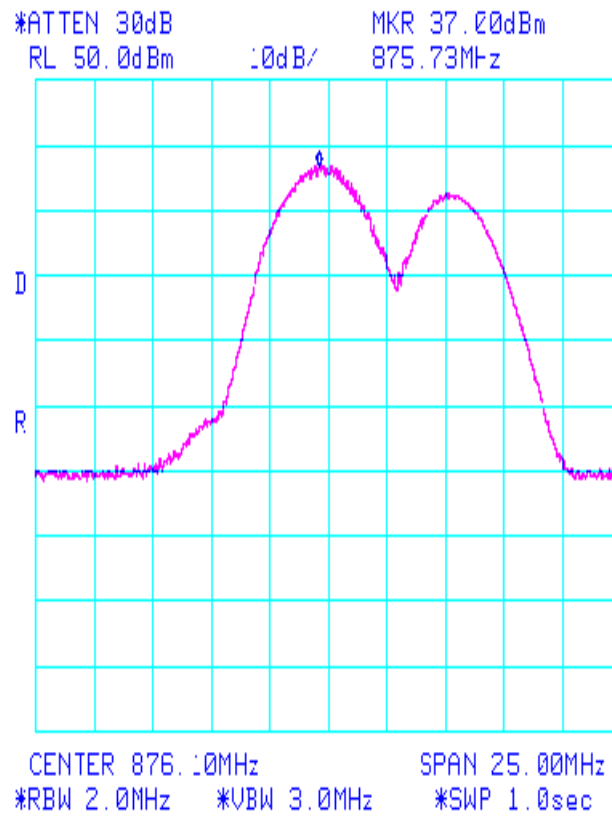


Figure 2. Photograph of Configuration for Part 22 Tests

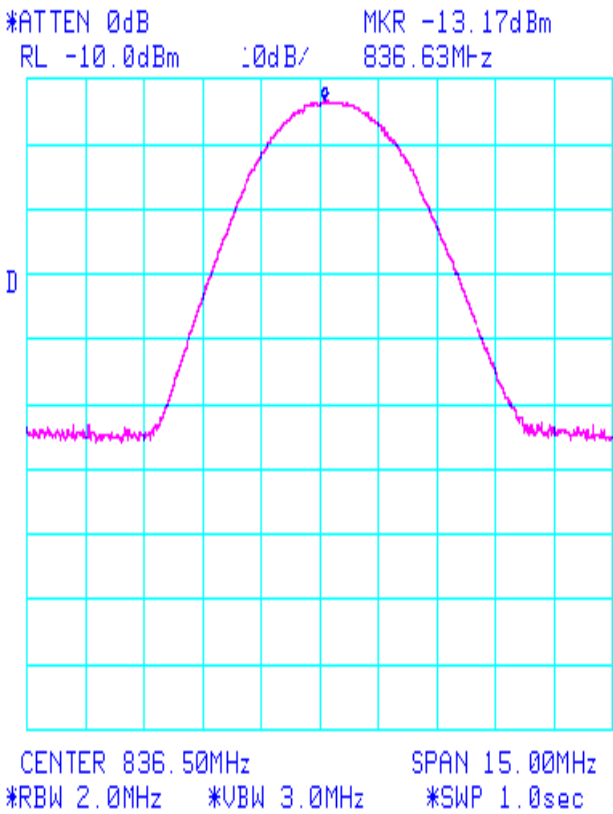
RF output power CDMA single channel downlink Met11425



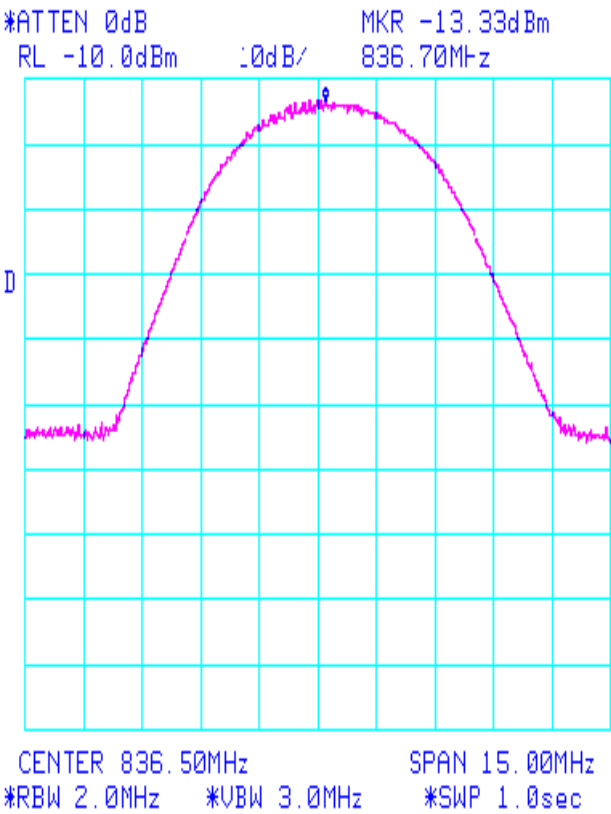
RF output power CDMA 3-channels downlink Mett1425



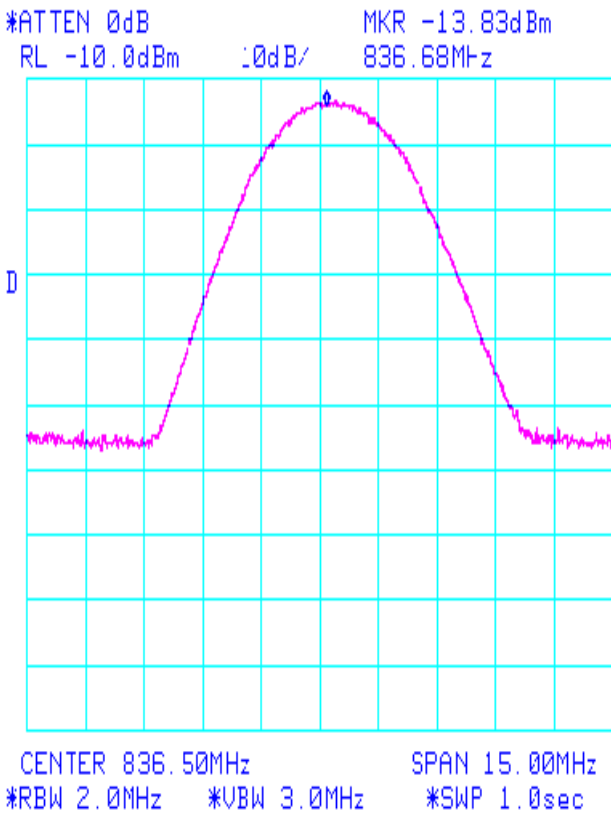
RF output power CDMA Uplink+ single channel Met11425



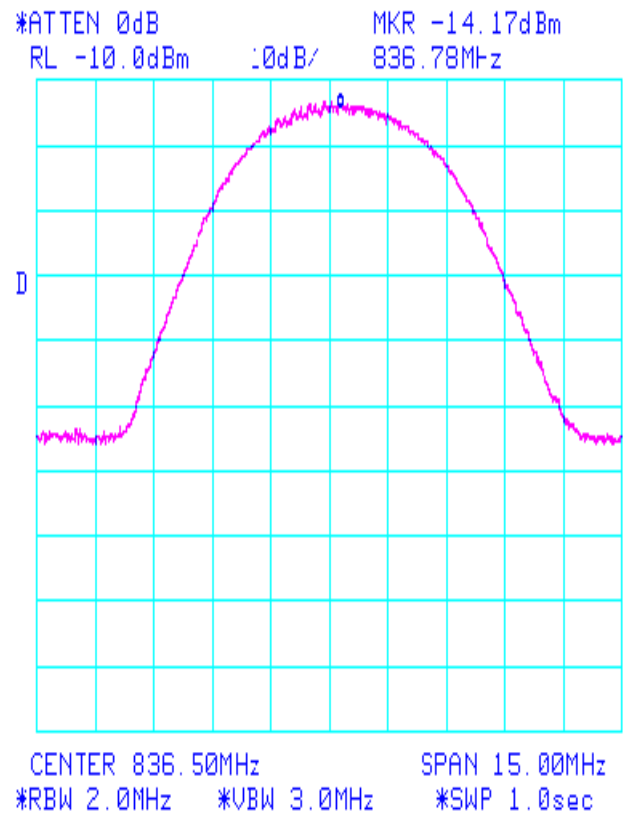
RF output power CDMA Uplink+ 3-channels



RF output power CDMA Uplink- single channel Met11425



RF output power CDMA Uplink- 3-channels Met11425



6.4 TEST TYPE: Spurious Emissions at Antenna Terminals: (uplink & downlink)**6.4.1 TECHNICAL SPECIFICATION:** 2.1051; 22.917(e)**6.4.2 TEST DATE(S):** 15 November 20001**6.4.3 MEASUREMENT PROCEDURES:**

As required by 47 CFR 2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a 50 S attenuator and spectrum analyzer set for a 100 kHz bandwidth. This test was performed with Digitally modulated carrier signals. The Digital signal generator was adjusted for continuous transmit on frequencies in both the uplink and down-link frequency bands. The frequency spectrum was investigated from 9.0 KHz to 9.0 GHz. For measuring emissions above 0.9 GHz, a high-pass filter was used to eliminate the fundamental transmit frequency to prevent possible saturation effects on the front end of the spectrum analyzer.

6.4.4 RESULTS:

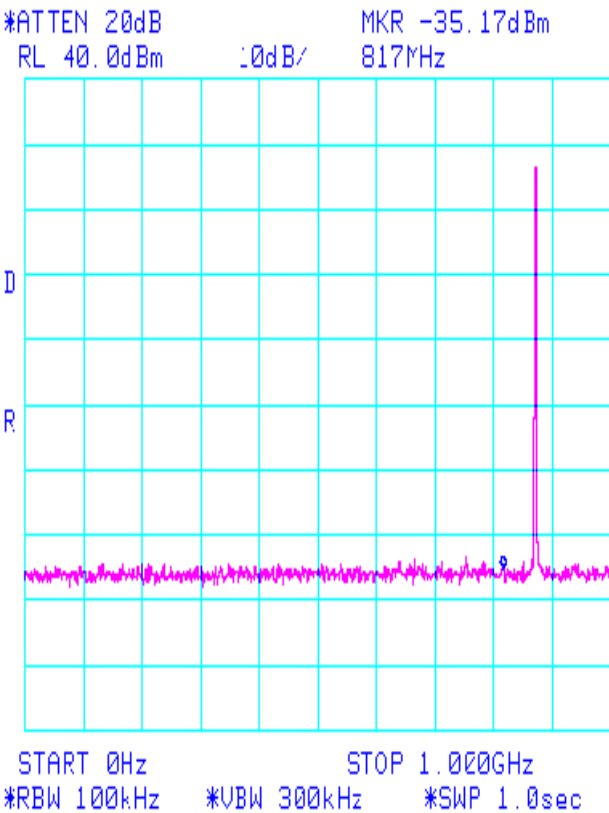
Spur limit = $P_o - (43 + 10\log P) = 94 \text{ dB}\mu\text{V} = -13.1 \text{ dBm}$

Equipment complies with Section 2.1051 and 22.917(e)

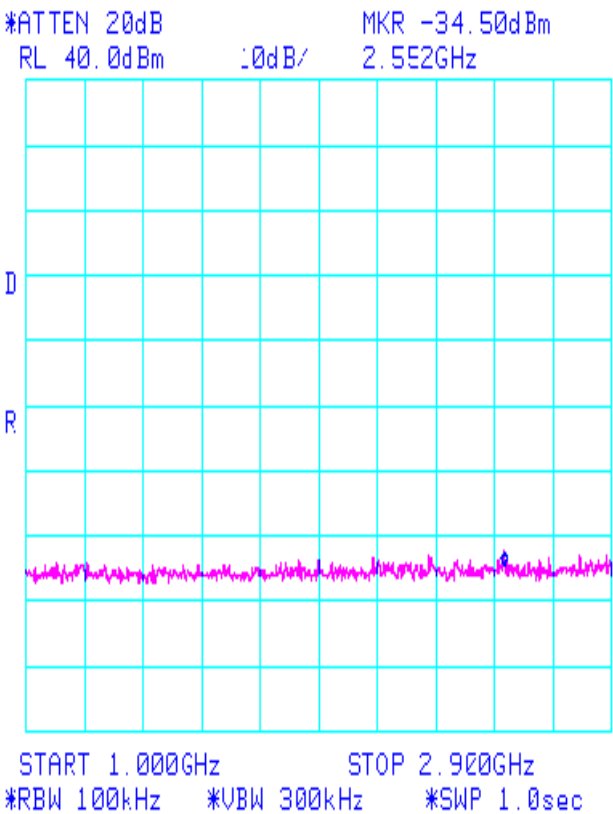
The following plots are included to illustrate compliance with the requirements of 47 CFR Part 22.917(e):

* There is no detectable emissions between frequency range 9KHz to 9GHz.

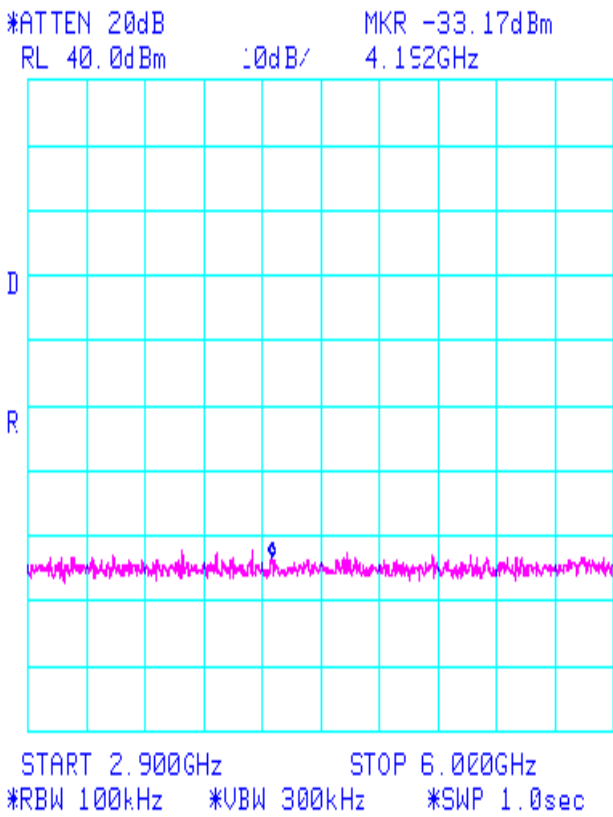
Conducted spur emissions at antenna port Met11425



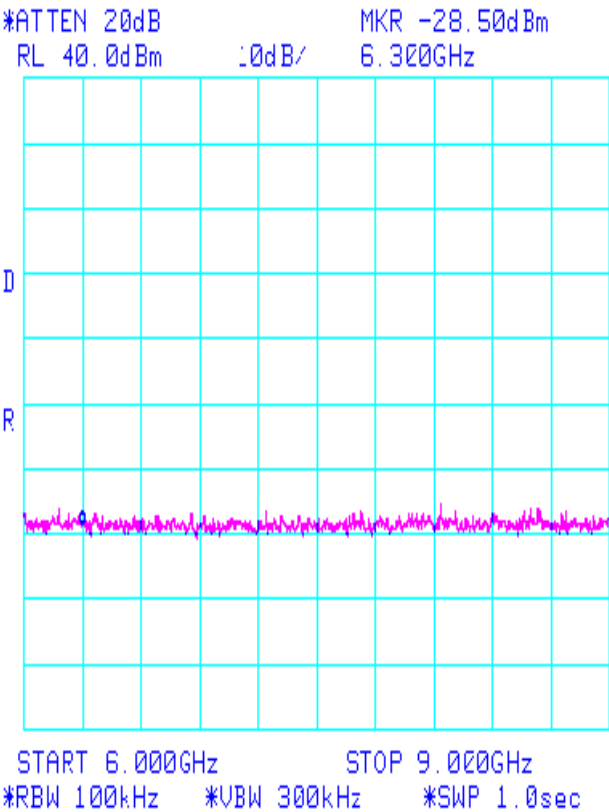
Conducted spur emissions at antenna port downlink Met11425



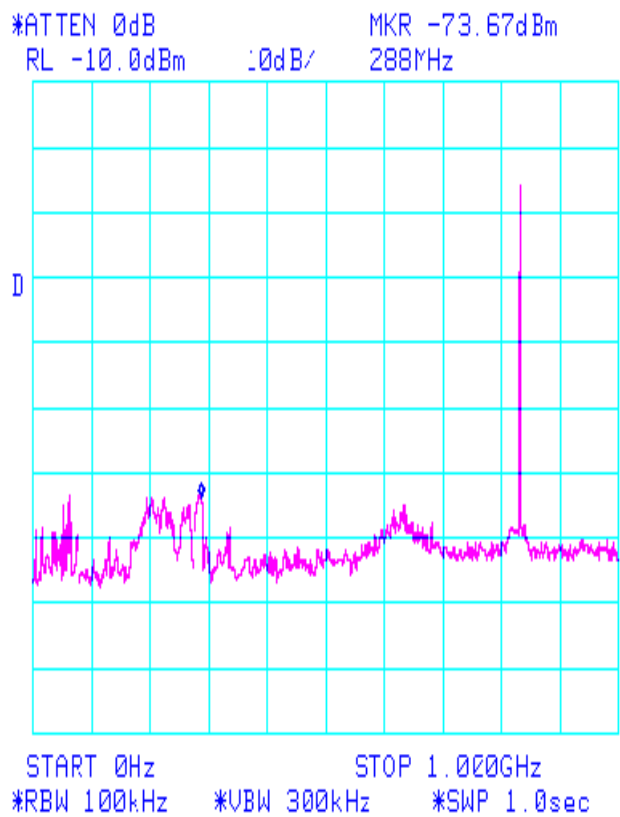
Conducted spur emissions at antenna port downlink Met11425



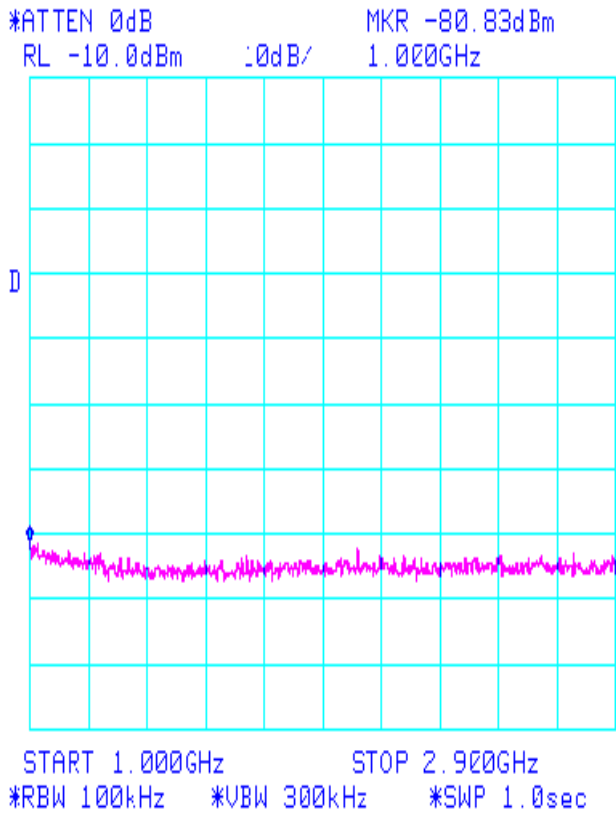
Conducted spur emissions at antenna port downlink Met11425



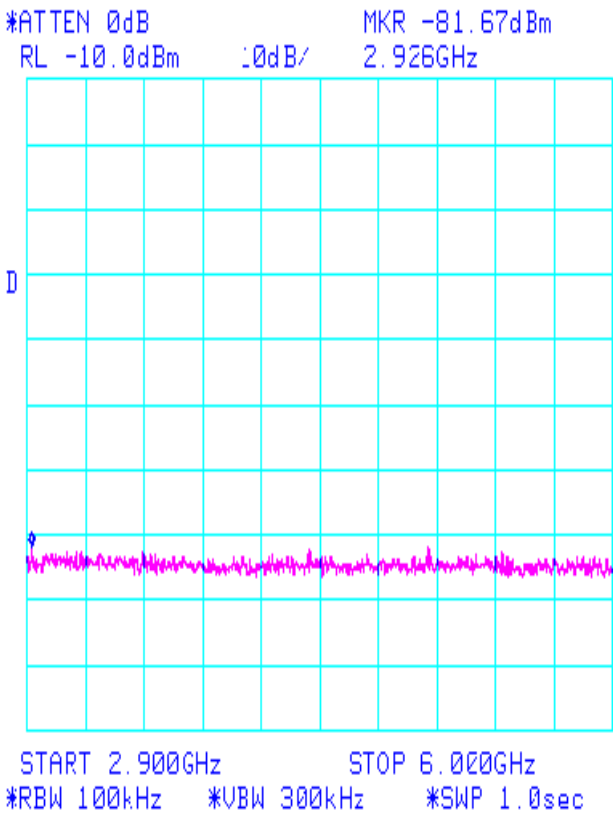
Conducted spur emissions at antenna port Uplink+ Met11425



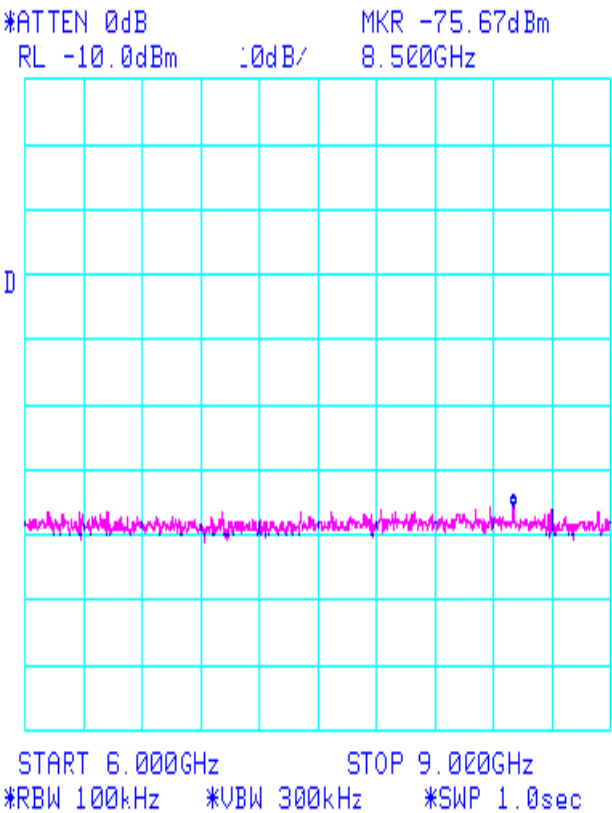
Conducted spur emissions at antenna port Uplink+ Met11425



Conducted spur emissions at antenna port Uplink+ Met11425



Conducted spur emissions at antenna port Uplink+ Met11425



6.5 TEST TYPE: Intermodulation Spurious Emissions at Antenna Terminals**6.5.1 TECHNICAL SPECIFICATION:** 47 CFR 2.1051.**6.5.2 TEST DATE(S):** 15 November 2001**6.5.3 MEASUREMENT PROCEDURES:** UPLINK and DOWNLINK

Spurious emissions were measured at the antenna terminal with the Digital signal generator tuned to transmit on a frequency in the uplink/downlink of its tuneable range.

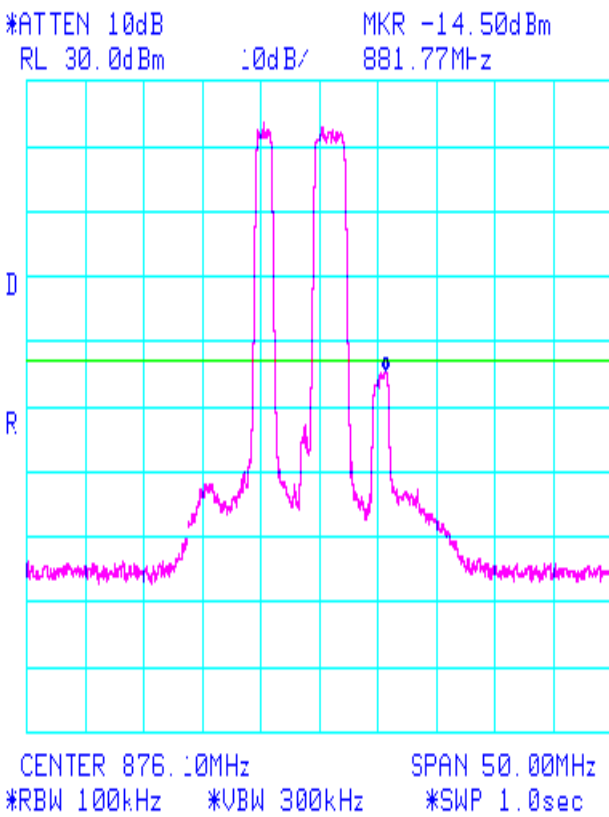
6.5.4 RESULTS:

Intermodulation Spurious Products from 2-tone Simultaneous RF(CDMA) Injection At low side and high side of Cellular band. Uplink and Downlink

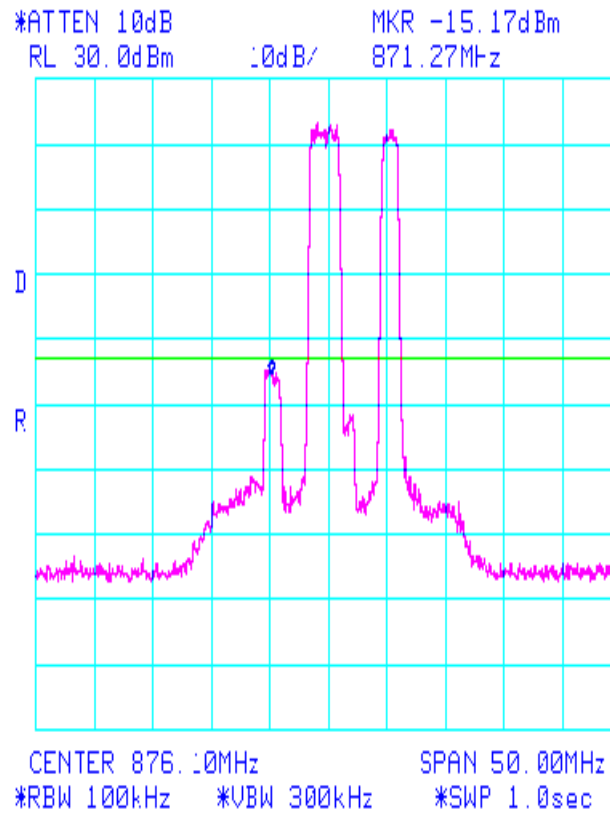
Spur limit = $P_o - (43 + 10\log P) = 94 \text{ dB}\mu\text{V} = -13.1 \text{ dBm}$

Equipment complies with 47CFR 2.1051. Plots of the spurious emissions as measured at the antenna ports follow.

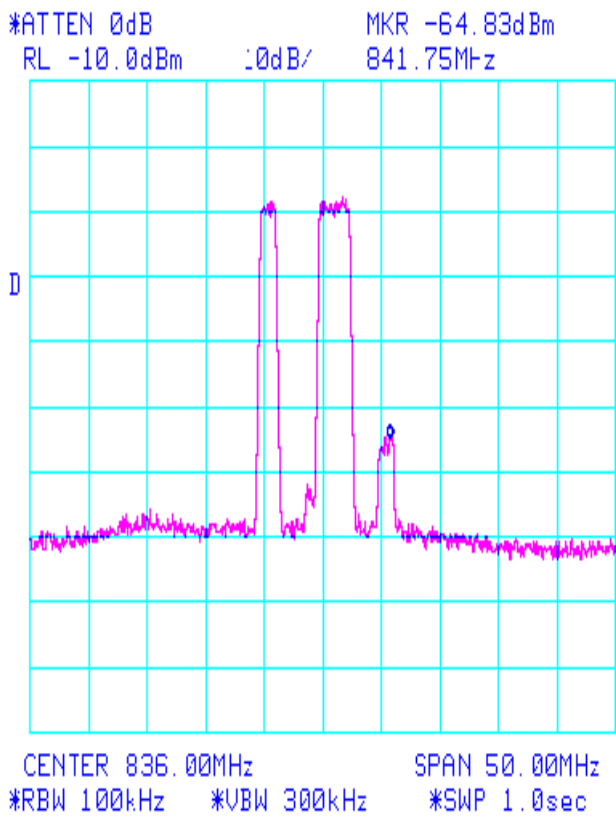
CDMA IMD Products Downlink Met 11425



CDMA IMD Products Downlink Met11425



CDMA IMD Products Uplink- Met11425



CDMA IMD Products Uplink- Met11425

