

October 11, 2001

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

Attention: Applications Examiner

Applicant: Nokia UK Limited
Stanhope Road
Yorktown Industrial Estate
Camberley, Surrey
United Kingdom GU153-BW

Equipment: InLite Remote Unit

FCC ID: L7KINLITERU-01

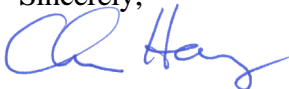
Specification: 47 CFR 22 Licensed Certification

Dear Examiner:

The following application for Grant of Equipment Authorization is presented on behalf of Nokia UK Limited for the Licensed Certification of their Cellular Enhancer, Model: InLite Remote Unit.

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 Repeater.

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 Enhancer, Model: InLite Remote Unit

FCC ID:: L7KINLITERU-01

Specification: 47 CFR 22

On Behalf of the Applicant: Nokia UK Limited
Stanhope Road, Yorktown Industrial Estate
Camberley, Surrey, UK GU153-BW

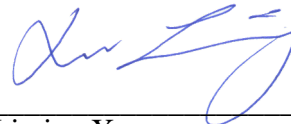
Manufacturer: Nokia UK Limited
Stanhope Road, Yorktown Industrial Estate
Camberley, Surrey, UK GU153-BW

Manufacturer's Representative Mr. Marc Paull

Test Date(s): August 29, 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: | Nokia UK Inlite Remote Unit |
| FCC ID: | L7KINLITERU-01 |
| Type of Emissions: | F9W (CDMA) and DXW (NADC) |
| Frequency Range (MHz): | 824-849 and 869-894 |
| Frequency Stability: | N/A |

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, Nokia UK Ltd., as verification of the compliance of the Cellular Enhancer, InLite Remote 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 | 11/01/01 | annual |
| EMCO | Double Ridge Guided Horn | 6/3/02 | annual |
| Hewlett Packard | 8546A Analyzer | 08/23/02 | annual |
| Hewlett Packard | E4331B Digital Signal Gen. | 9/29/01 | annal |

4.0 EQUIPMENT UNDER TEST CONFIGURATION

The Cellular Repeater was configured with AC power supply modules, and a digital signal generator was used to simulate CDMA/NADC 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 gain.

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):** August 29, 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 0.08 watts,

$$P_o = 0.08W$$

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

$$P_o \&[43 \% 10\text{Log}(6)] ' \&13\text{dBm}$$

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.

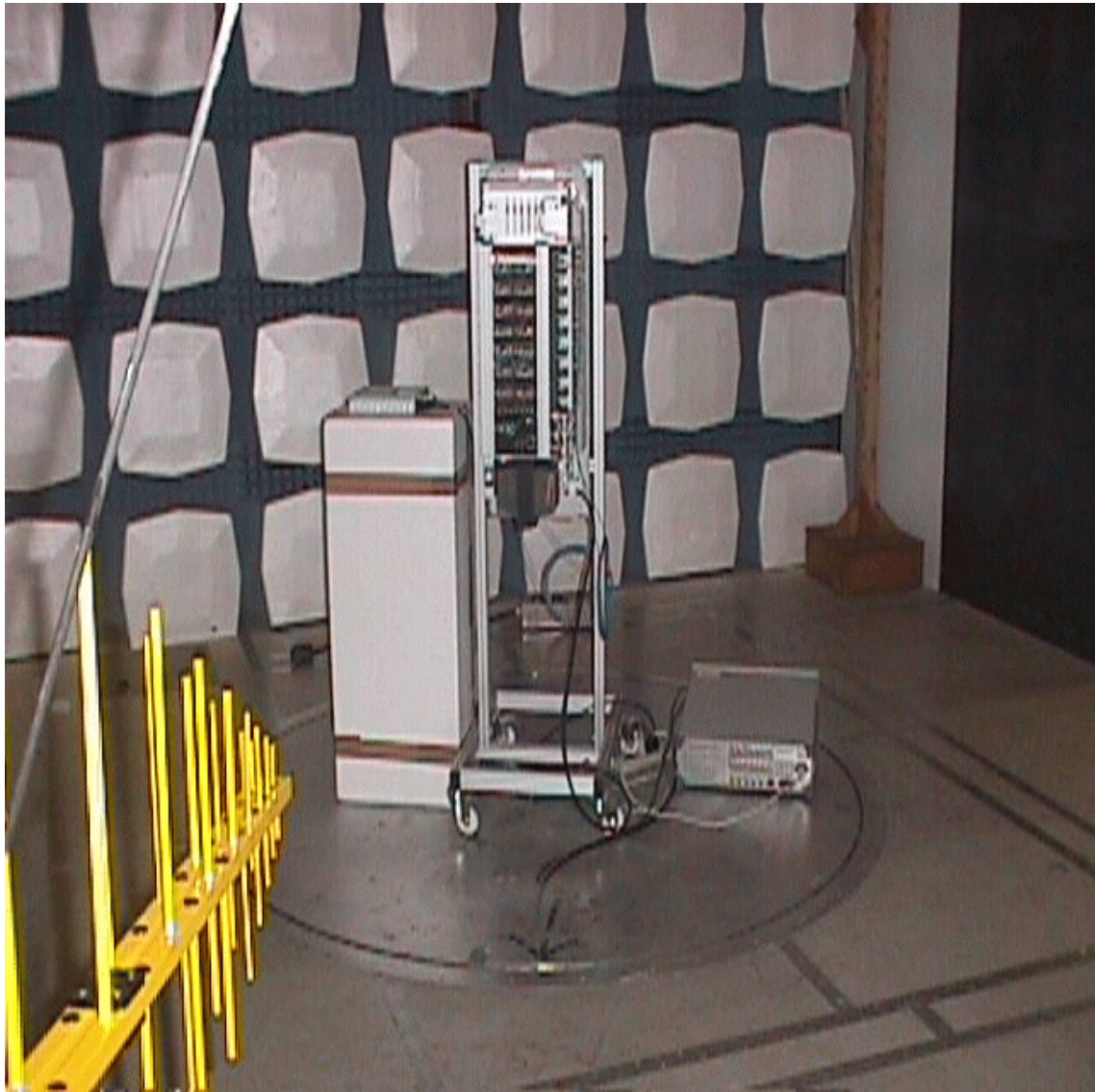


Figure 1. Photo of test setup of radiated emissions

6.2 TEST TYPE: Occupied Bandwidth

6.2.1 TECHNICAL SPECIFICATION: 47 CFR 2.1049

6.2.2 TEST DATE(S): August 29, 2001

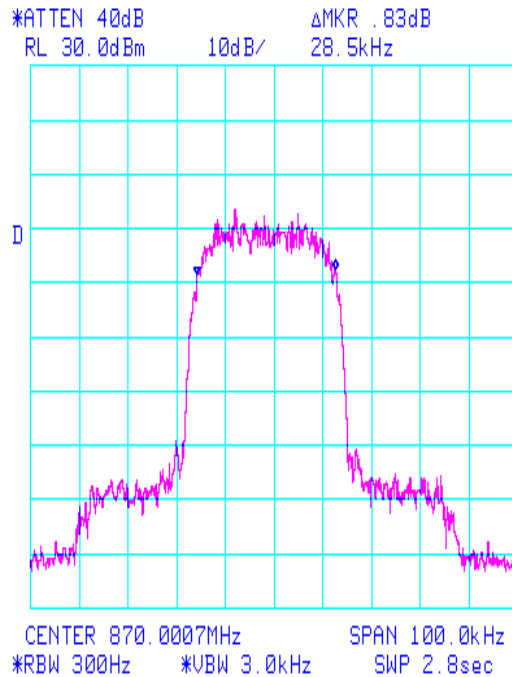
6.2.3 MEASUREMENT PROCEDURES:

As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made on the Repeater pre- and post- repeater. A digital signal generator was configured to transmit an CDMA/NADC modulated carrier signal. Using an IF bandwidth of 30kHz/300Hz, we determined the occupied bandwidth of the emission at the Input and Output side.

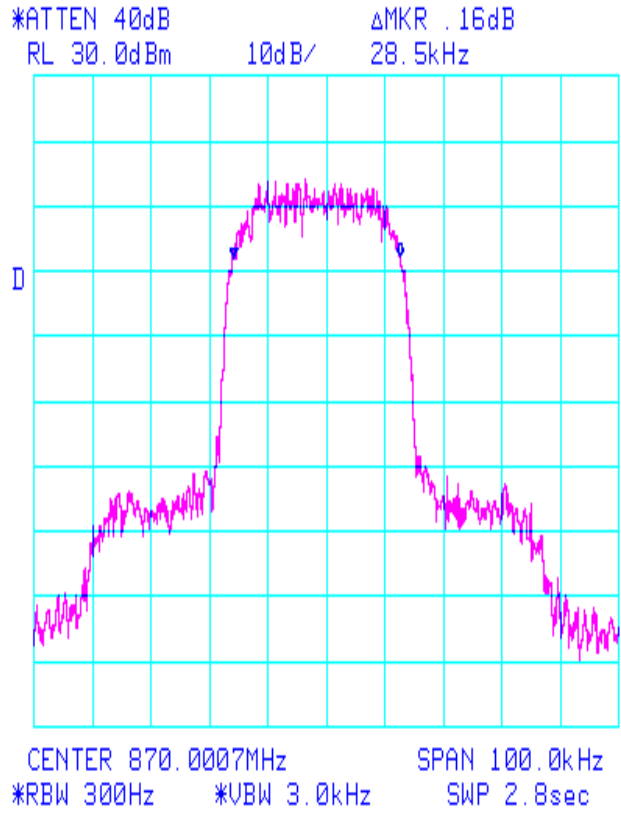
6.2.4 RESULTS:

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

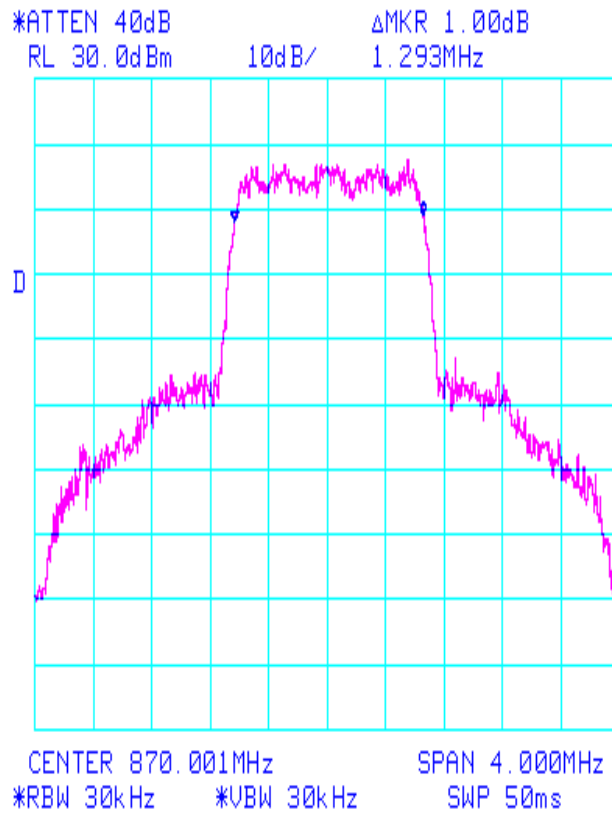
Occupied B/W NADC at Output side Met11001



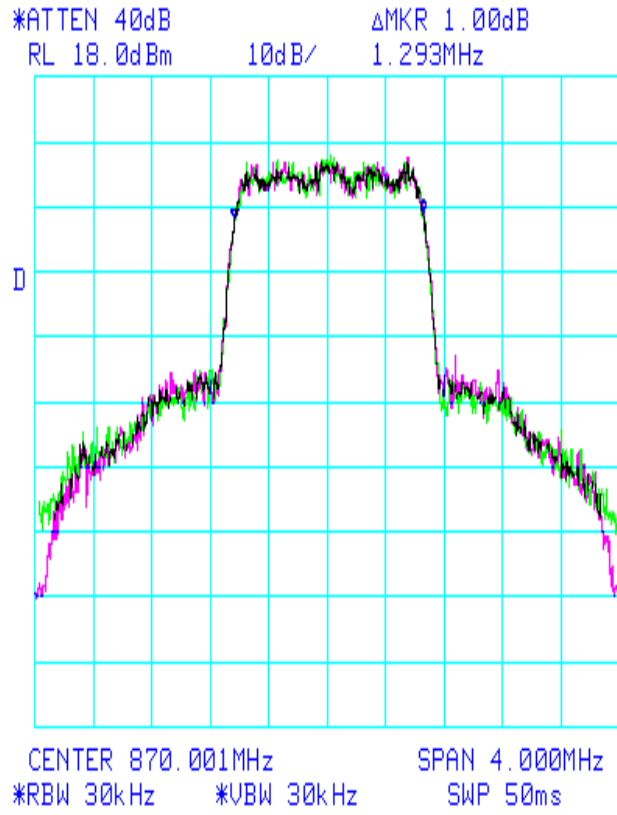
Occupied B/W NADC at Input side Met11001



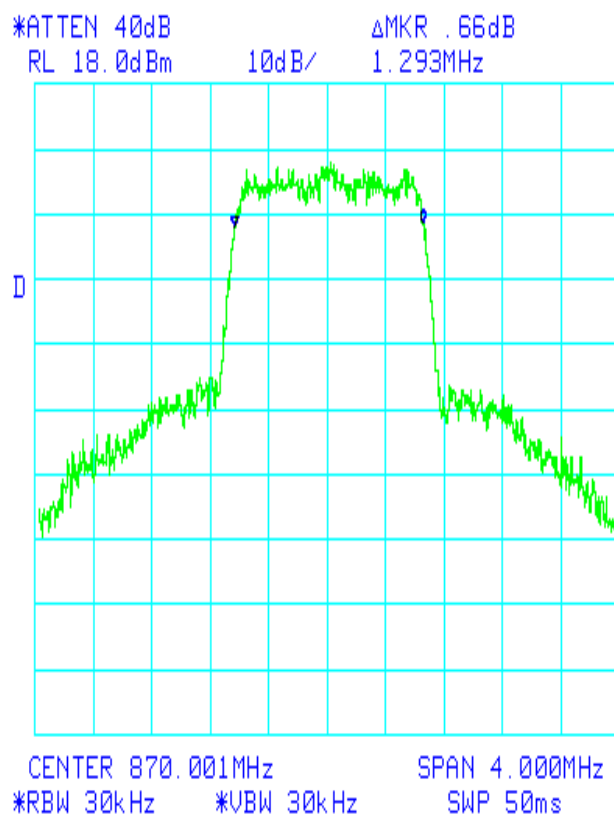
Occupied B/W CDMA at Input side Met11001



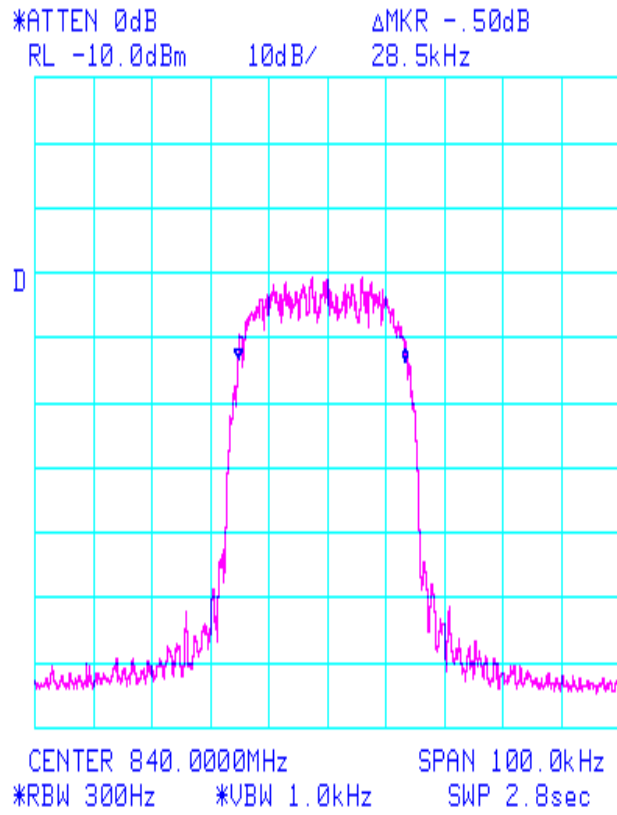
Occupied B/W CDMA Input vs. Output Met11001



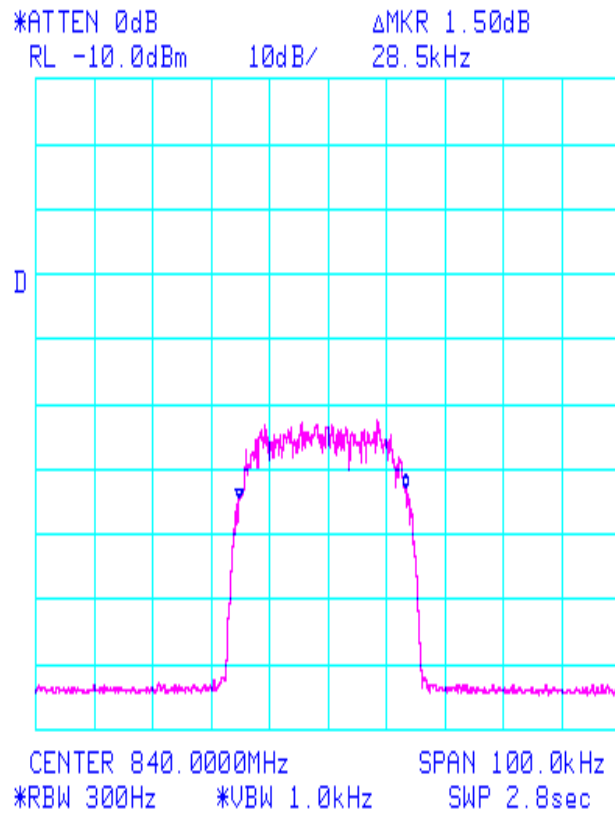
Occupied B/W CDMA at Output side Met11001



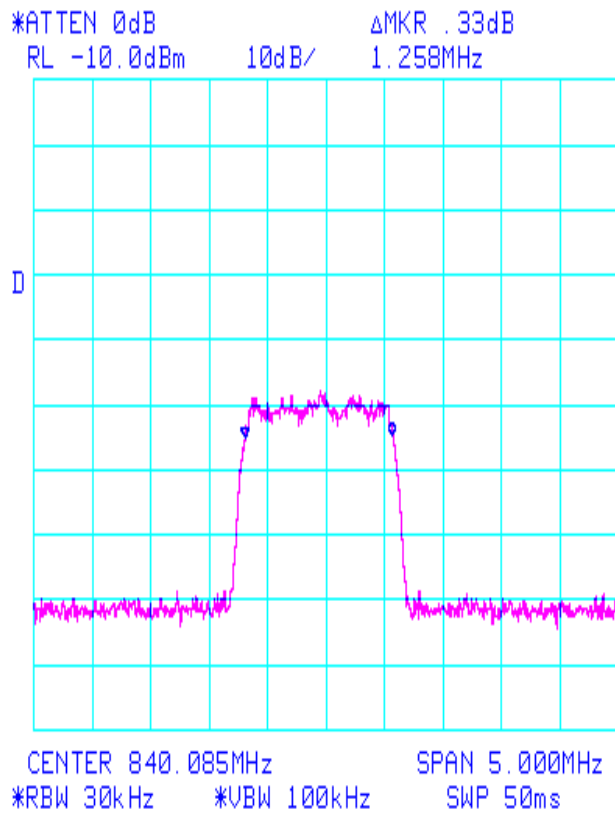
Occupied B/W NADC at Input side Uplink Met11001



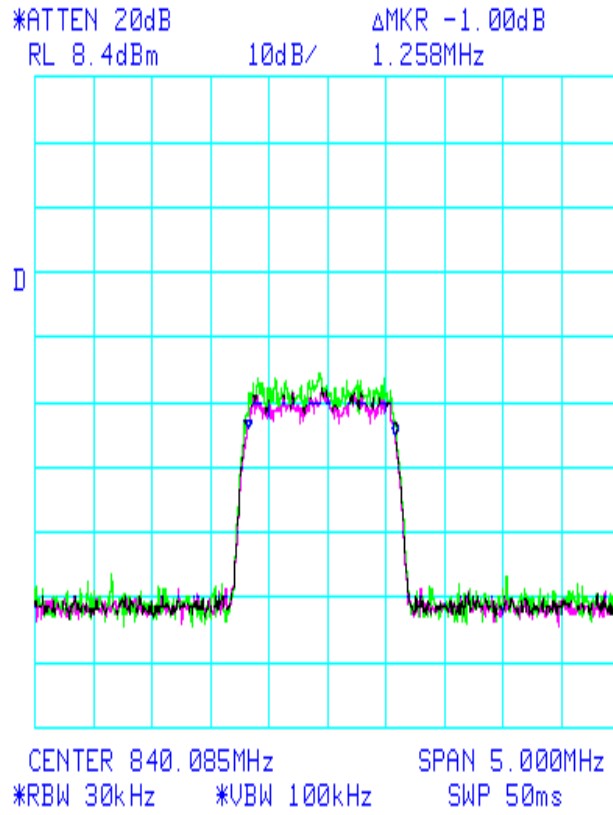
Occupied B/W NADC at Output side Uplink Met11001



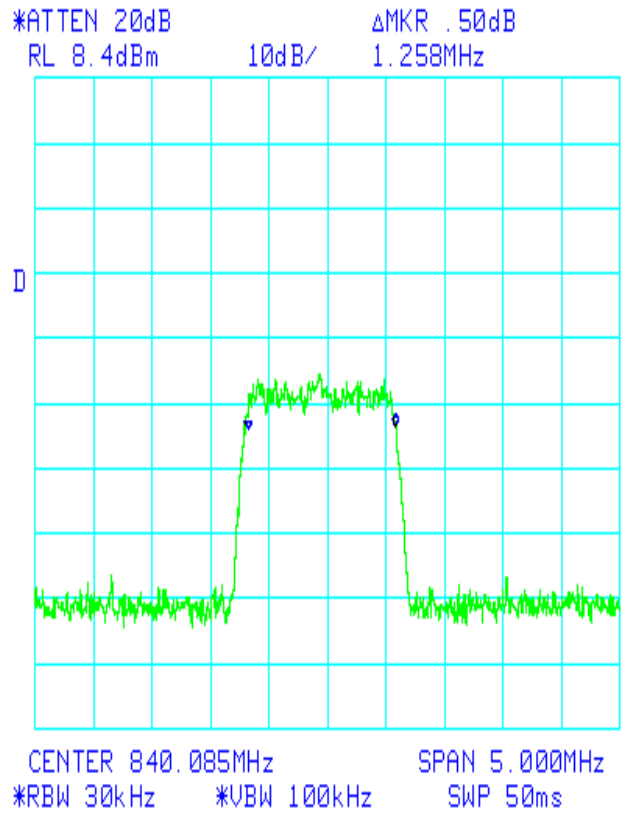
Occupied B/W CDMA at output side Uplink Met11001



Occupied B/W CDMA Input vs. Output Uplink Met11001



Occupied B/W CDMA at Input side Uplink Met11001



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): August 29, 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 PCS CDMA/NADC 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 PCS repeater power does not exceed 100 W (50 dBm) at the carrier frequency.

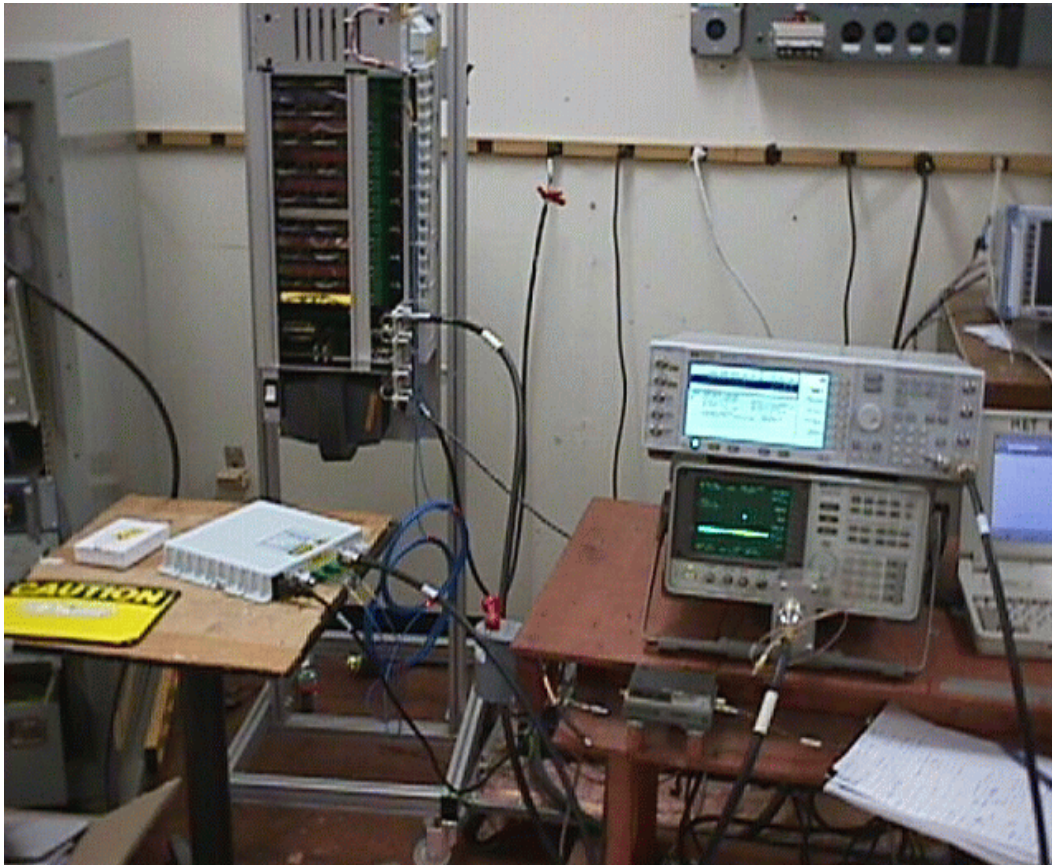
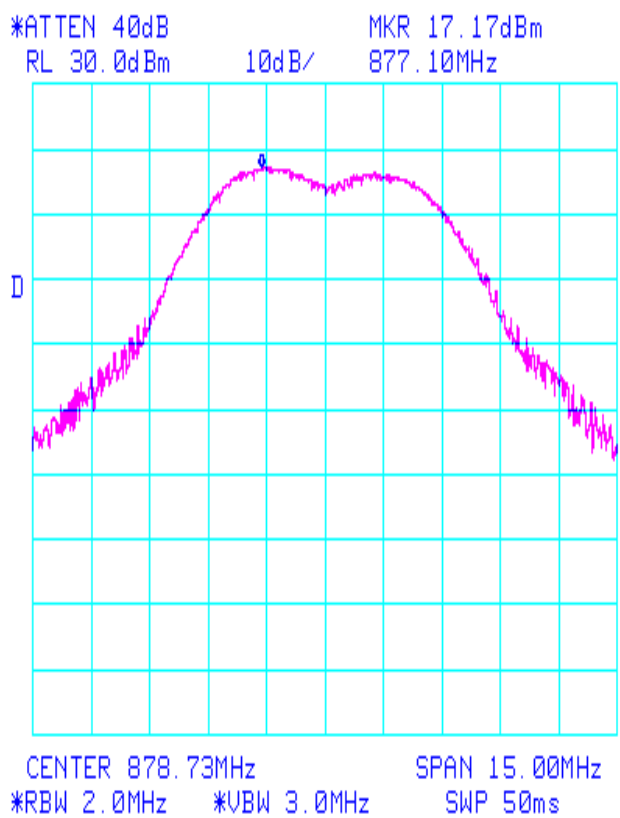
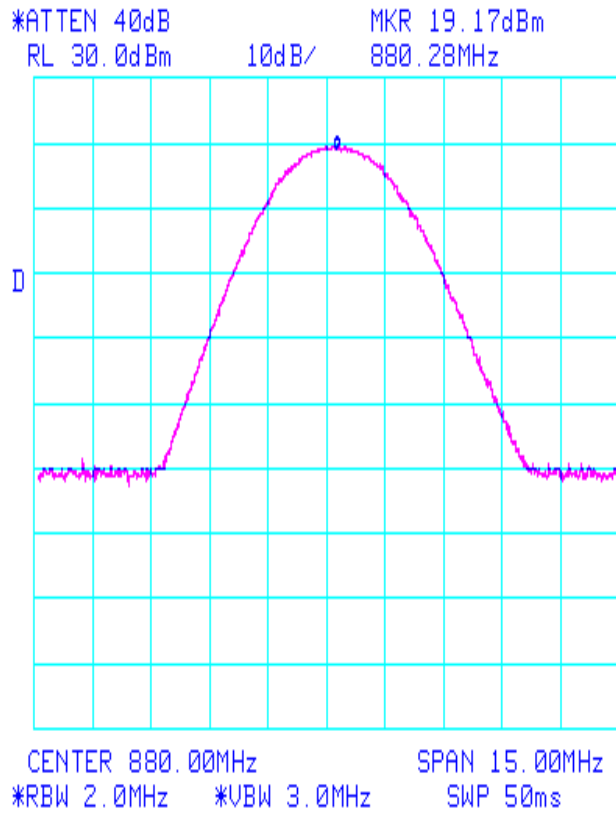


Figure 2. Photograph of Configuration for Part 22 Tests

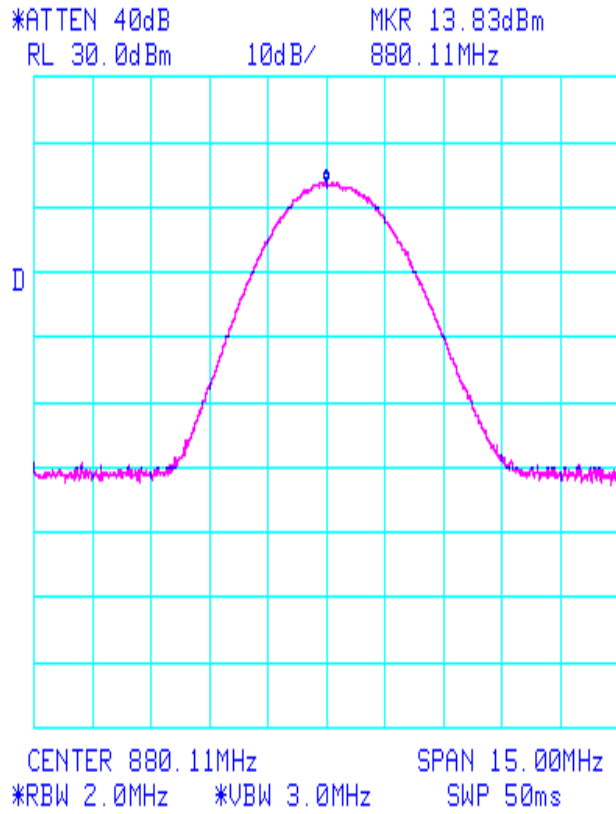
RF Output Power CDMA 2-CH Downlink Met11001



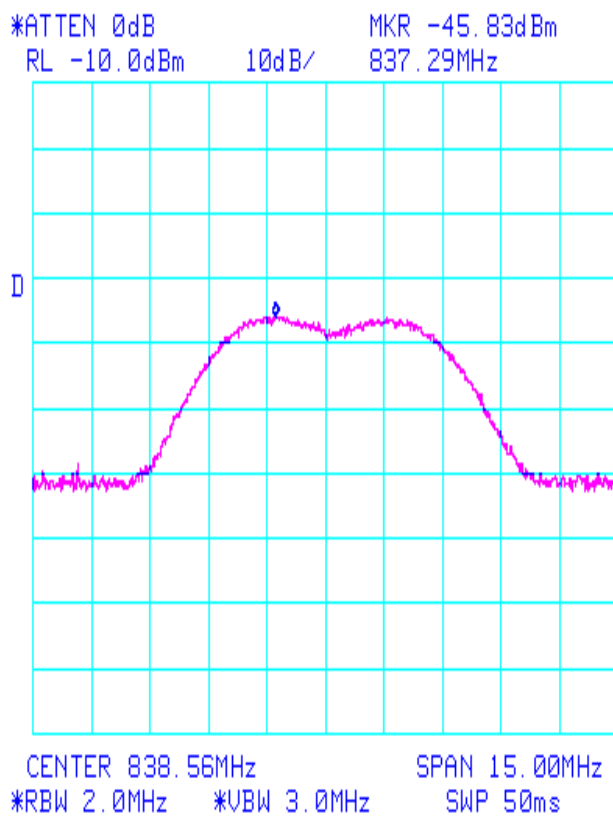
RF Output Power CDMA Downlink Met11001



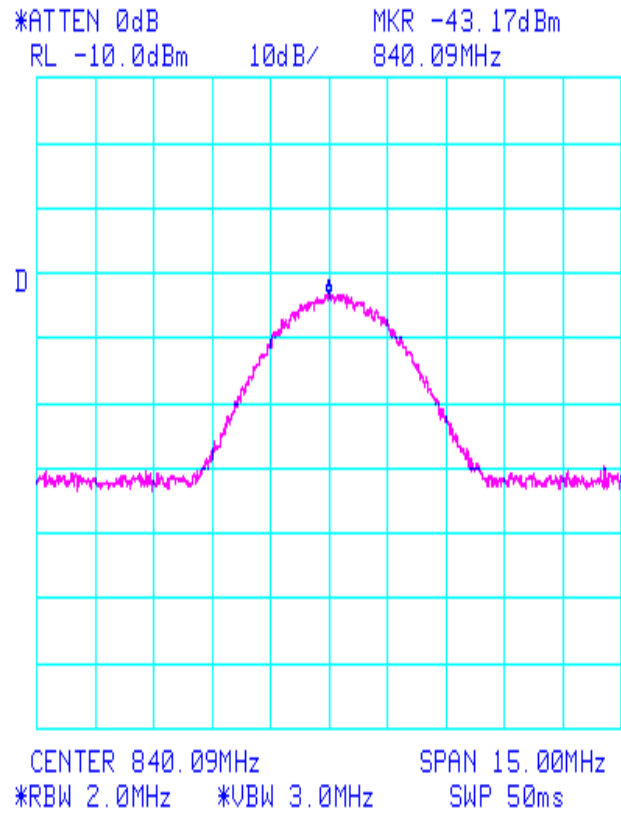
RF Output Power NADC Downlink Met11001



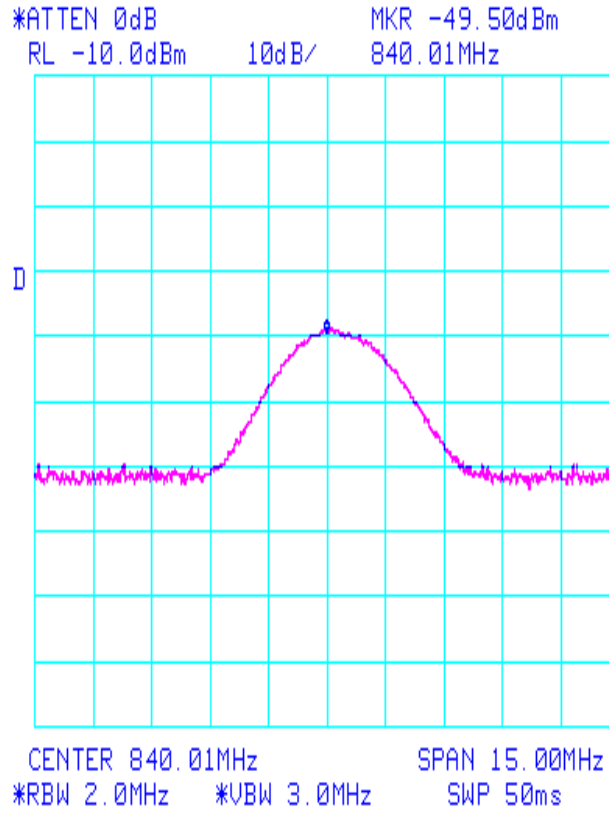
RF output power CDMA 2-ch Uplink Met11001



RF output power CDMA Uplink Met11001



RF output Power NADC Uplink Met11001



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):** August 29, 2001**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 30 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 2 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.

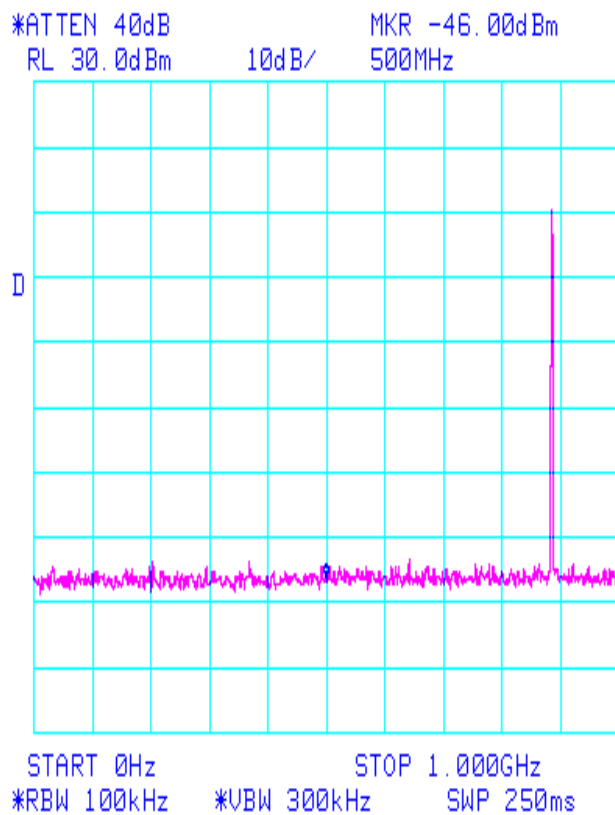
6.4.4 RESULTS:

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

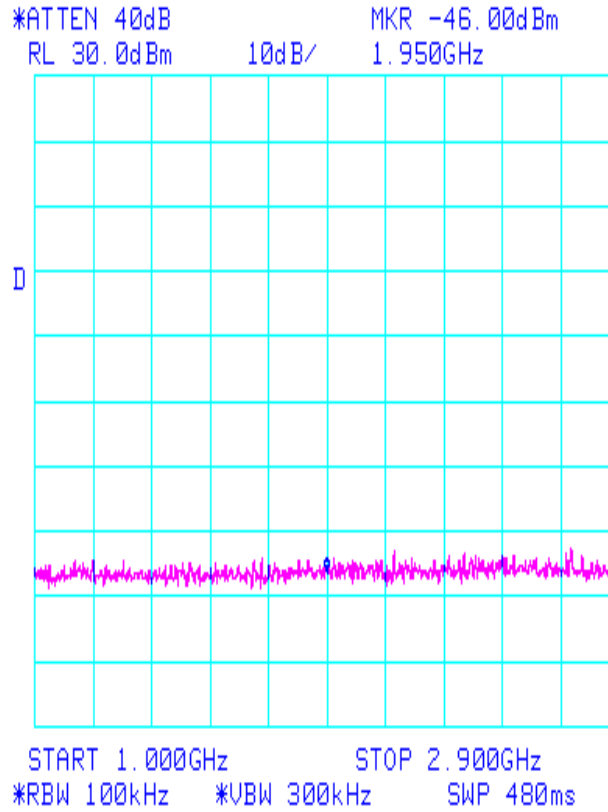
Equipment complies with Section 2.1051 and 22.917(e)

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

Spur emissions at antenna port Met11001

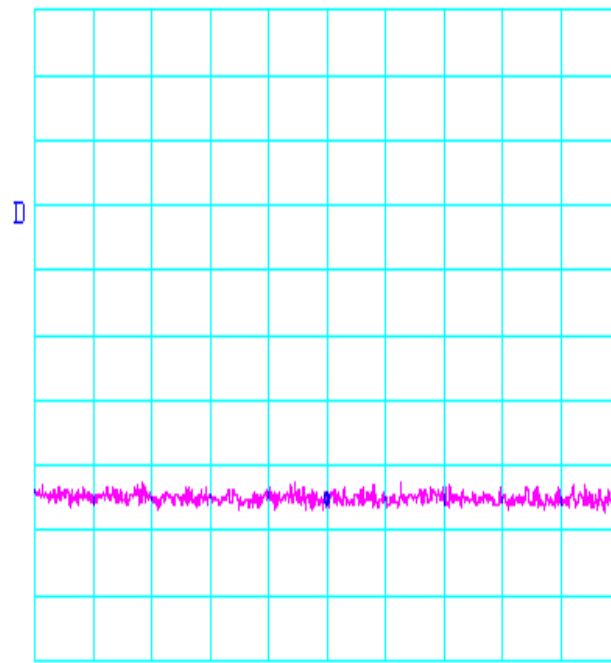


Spur emissions at antenna port Met 11001



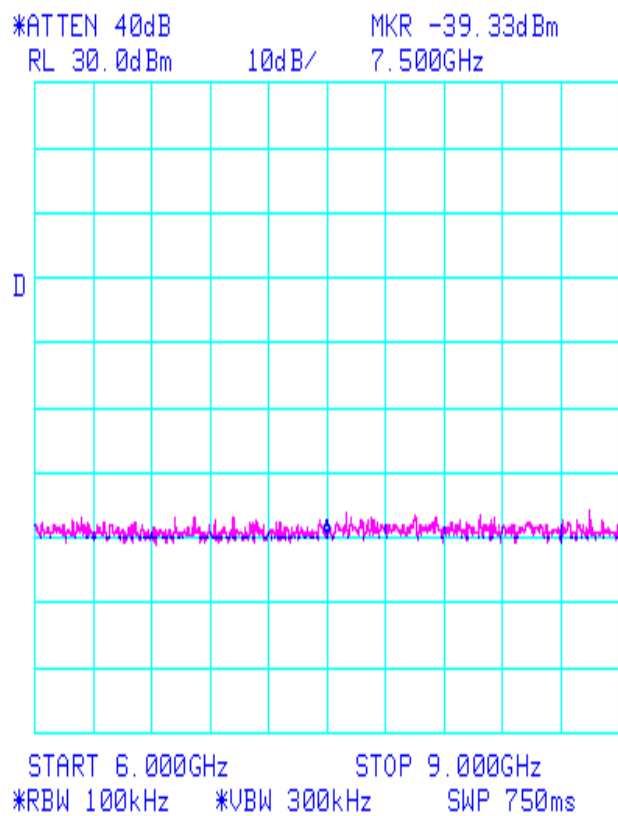
Spur emissions at antenna port Met11001

*ATTEN 40dB MKR -46.17dBm
RL 30.0dBm 10dB/ 4.450GHz

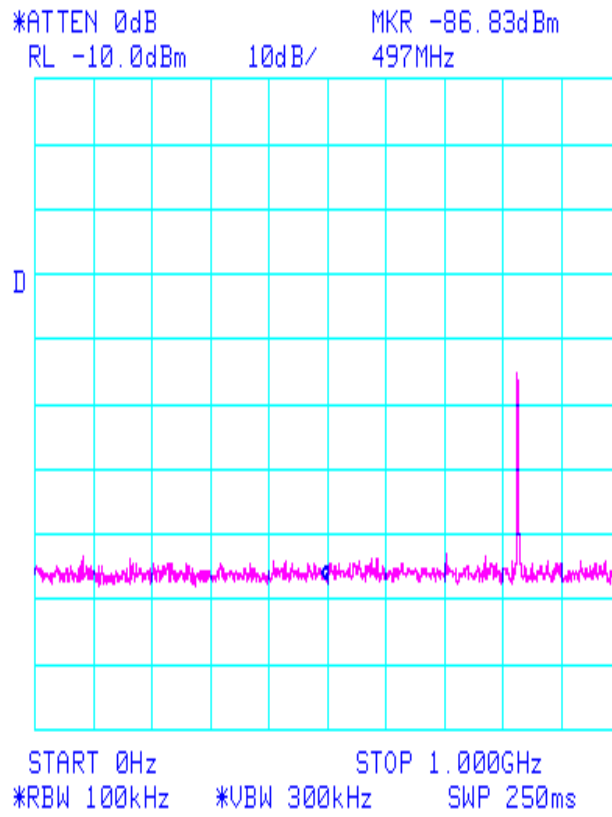


START 2.900GHz STOP 6.000GHz
*RBW 100kHz *VBW 300kHz SWP 780ms

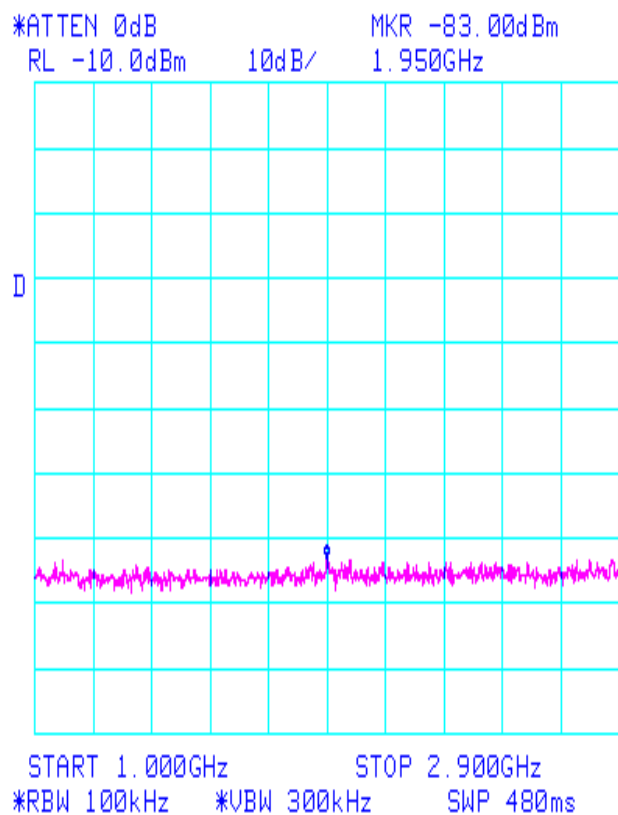
Spur emissions at antenna port Met11001



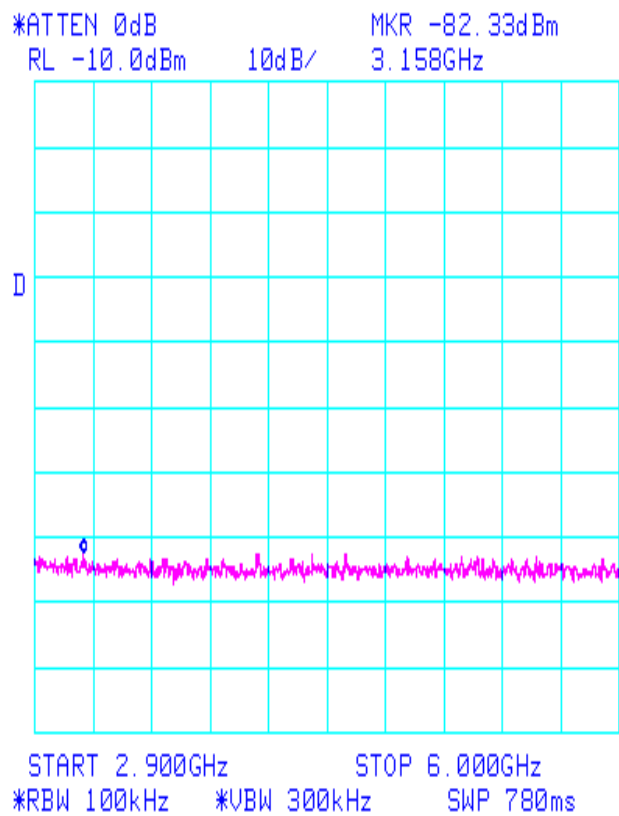
Spur emissions at Uplink side Met11001



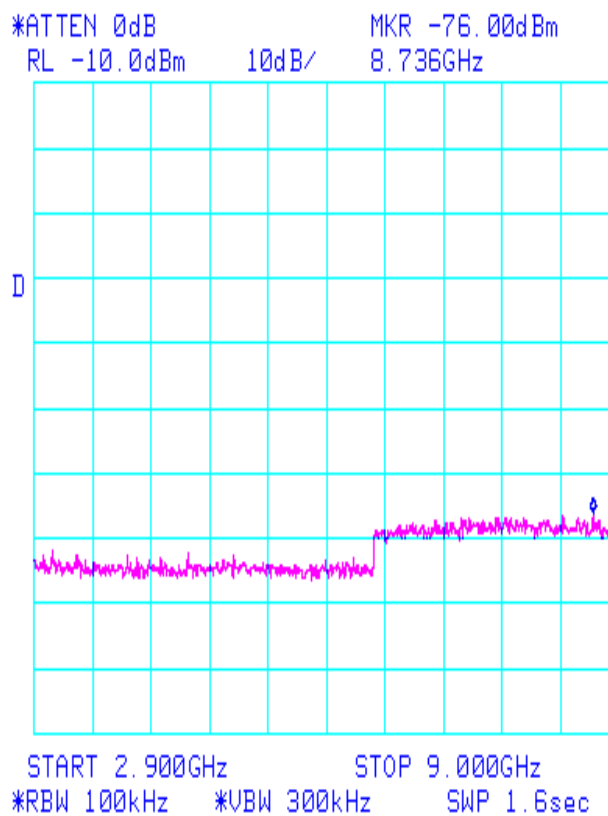
Spur emissions at Uplink side Met11001



Spur emissions at Uplink side Met11001



Spur emissions at Uplink side Met11001



6.5 TEST TYPE: Intermodulation Spurious Emissions at Antenna Terminals

6.51 TECHNICAL SPECIFICATION: 47 CFR 2.1051.

6.5.2 TEST DATE(S): August 29, 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.

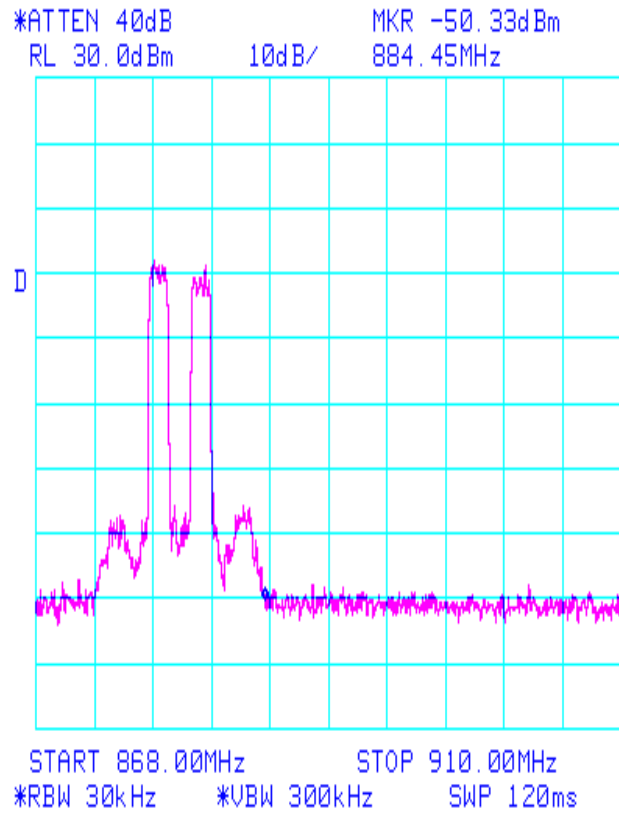
6.5.4 RESULTS:

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

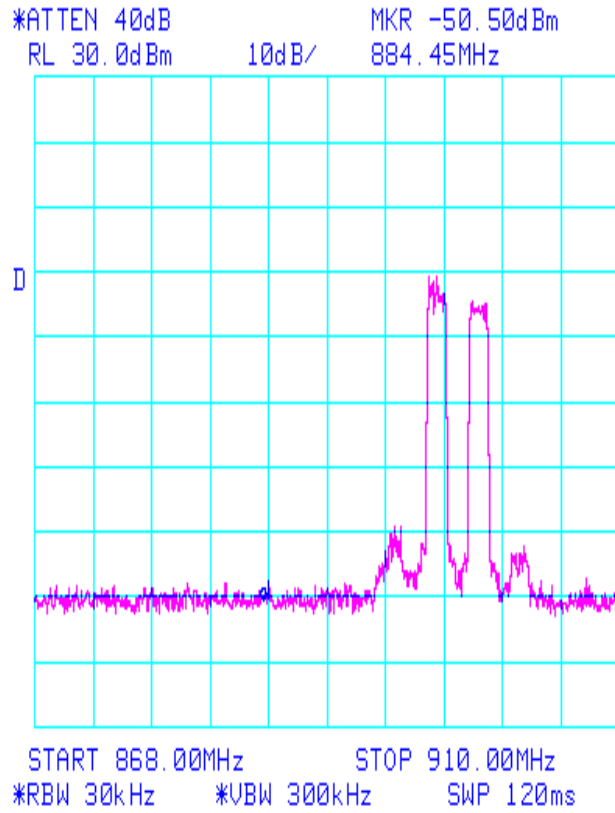
Spur limit = $P_o - (43 + 10\log P) = 94 \text{ dB}\mu\text{V} = -13.1 \text{ dBm}$

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

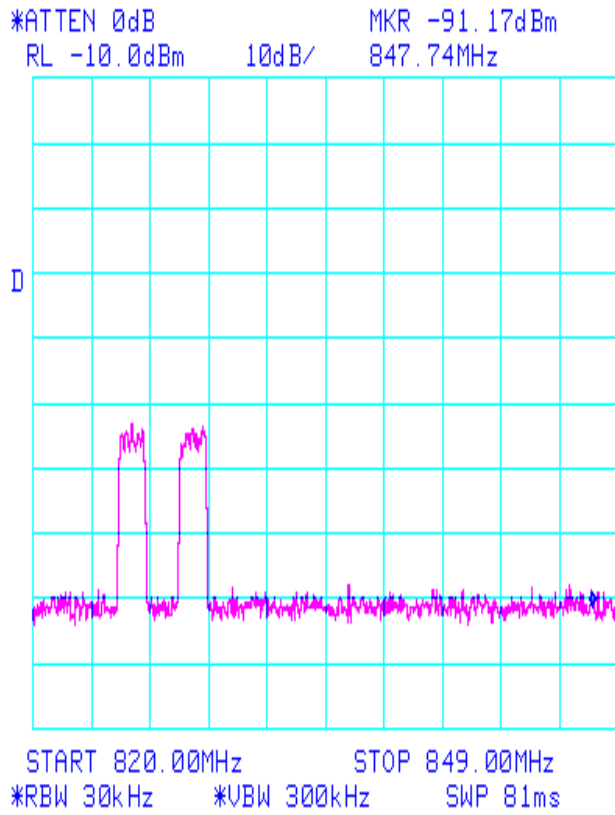
IMD spur CDMA at Low side of Downlink band Met11001



IMD spur CDMA at High side of Downlink band Met11001



IMD spur at Low side of frequency band 2-tone CDMA Met11001



IMD spur at High side of frequency band 2-tone CDMA Met11001

