October 12, 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, UK GU153-BW

Equipment: InLite Remote Unit

FCC ID: L7KINLITERU-01

Specification: 47 CFR 24 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 PCS 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 24, for a PCS 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:	LnLite Remote Unit
FCC ID::	L7KINLITERU-01
Specification:	47 CFR 24
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
Representative:	Mr. Marc Paull
Test Date(s):	August 28 through September 5, 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 24 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 24, of 47 CFR. All tests were conducted using measurement procedure ANSI C63.4-1992.

Type of Submission/Rule Part:	Original Filing/Part 24
EUT:	Nokia UK InLite Remote Unit
FCC ID:	L7KINLITERU-01
Type of Emissions:	F9W (CDMA) and DXW(NADC)
Frequency Range (MHz):	1850-1910 and 1930-1990
Frequency Stability:	N/A

Summary of Test Data

Name of Test	FCC Rule Part/Section	Results
Radiated Emissions	2.1053; 24.238(a)	Complies
Occupied Bandwidth; Input vs. Output	2.1049	Complies
RF Power Output	2.1046; 24.132(b),(c)	Complies
Spurious Emissions at Antenna Terminals (uplink&downlink)	2.1051; 24.238(a)	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 Limited, as verification of the compliance of the InLite Remote Unit (PCS Enhancer) to the requirements of 47CFR 24.

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 in 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	2/27/02	annual
Hewlett Packard	8546A Analyzer	8/23/02	annual
Hewlett Packard	E4331B Digital Signal Gen.	9/29/01	annual
Solar	LISN	7/27/02	annual

4.0 EQUIPMENT UNDER TEST CONFIGURATION

The EUT was configured with AC power supply modules and a digital signal generator was used to simulate a 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, 24.238(a)

5.2 Occupied Bandwidth: 47CFR2.1049, Input vs. Output

5.3 RF Power Output: 47CFR 2.1046, 24.132(b),(c)

5.4 Spurious Emission at Antenna Terminals:(uplink & downlink) 47CFR 2.1051, 24.238(a)

5.5 IMDSpur emissions - 2tone at high and low side of the band (UL and DL)

6.0 TEST RESULTS

6.1 TEST TYPE: Radiated Emissions

6.1.1 TECHNICAL SPECIFICATION: 2.1053; 24.238(a)

6.1.2 TEST DATE(S): 31 August 2001

6.1.3 MEASUREMENT PROCEDURES:

As required by 47 CFR 2.1053, *field strength of spurious radiation measurements* were made in accordance with the general procedures of ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz". Preliminary radiated emission measurements were performed inside a shielded chamber with all digital signal generators on and terminated. The frequency list from the preliminary measurements was used as a guide for making final measurements on a 10 meter open area test site. The unit was scanned over the frequency range of 9 kHz to 20 Ghz.

The Radiated Spurious Emissions *Limit* is obtained by the following:
Based on an output power (as measured at the output of the RF Amplifier) of 0.05 watts:

$$P_o = 0.05\ W$$

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

$$Po-[43 + 10Log(0.05) = -13dBm$$

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.

The device complies with 47 CFR 2.1053; 24.238(a)

.

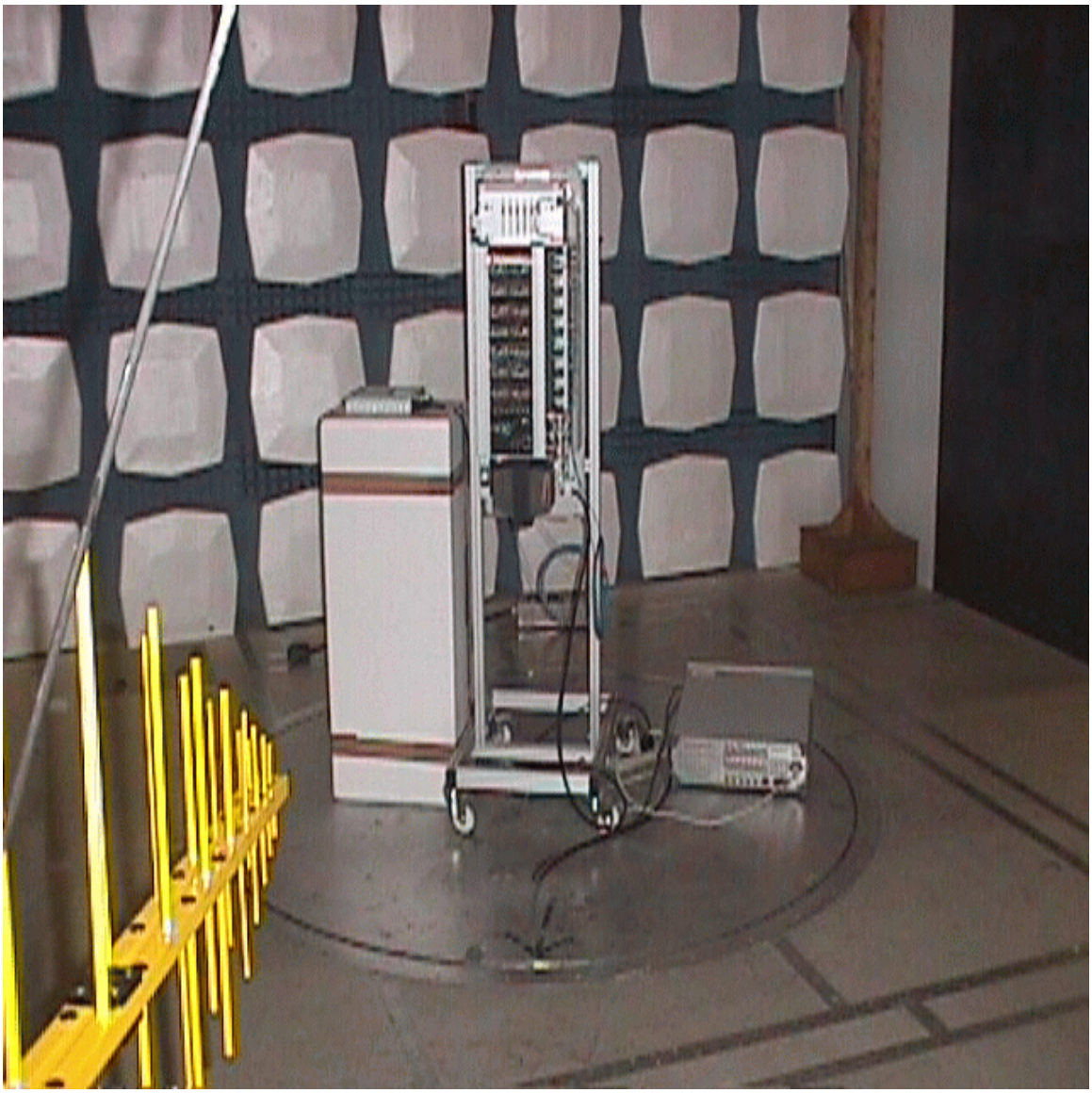


Figure 1. EUT Test Setup for Emissions

6.2 TEST TYPE: Occupied Bandwidth**,** Input vs. Output

6.2.1 TECHNICAL SPECIFICATION: 47 CFR 2.1049

6.2.2 TEST DATE(S): 05 Septemeber 2001

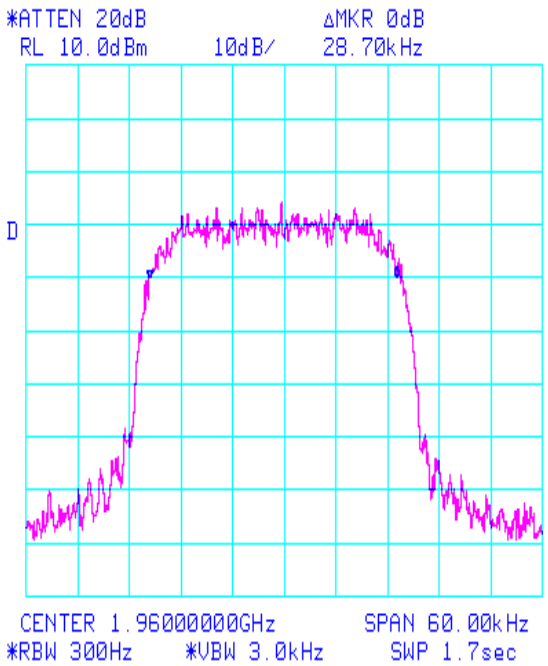
6.2.3 MEASUREMENT PROCEDURES:

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

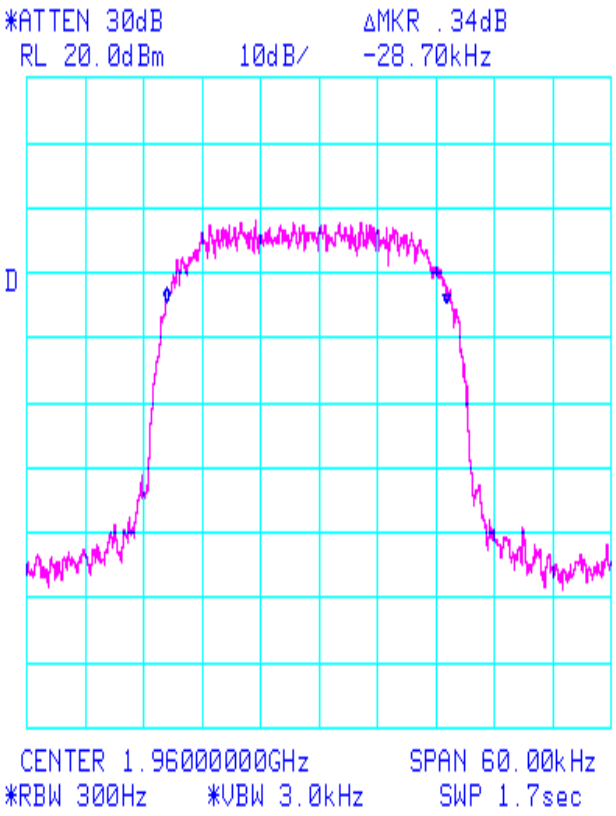
6.2.4 RESULTS:

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

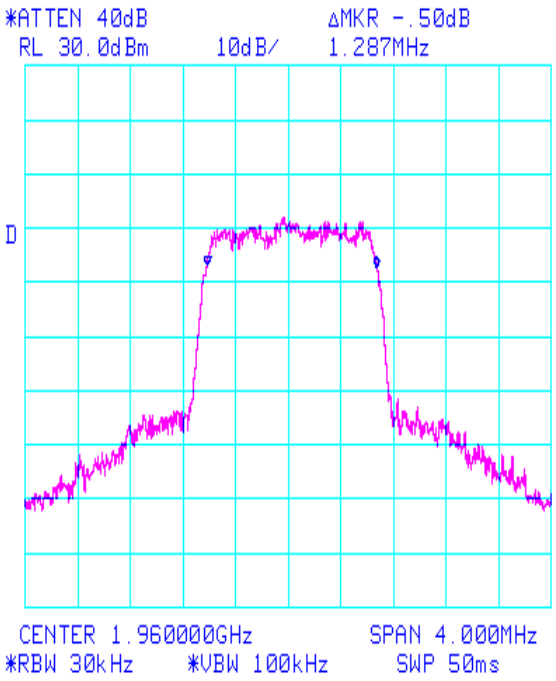
Occupied B/W NADC at Input side Downlink Met11001



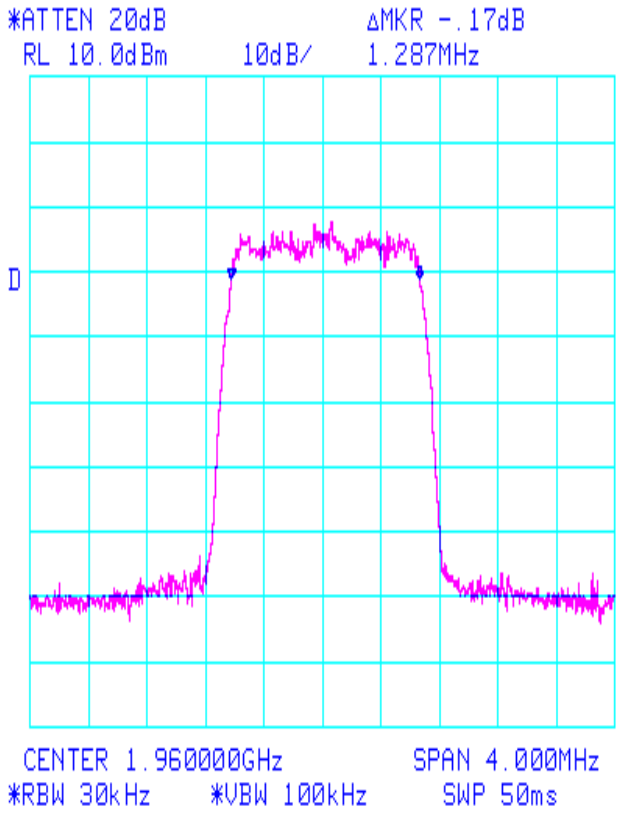
Occupied B/W NADC at Output side Downlink Met11001



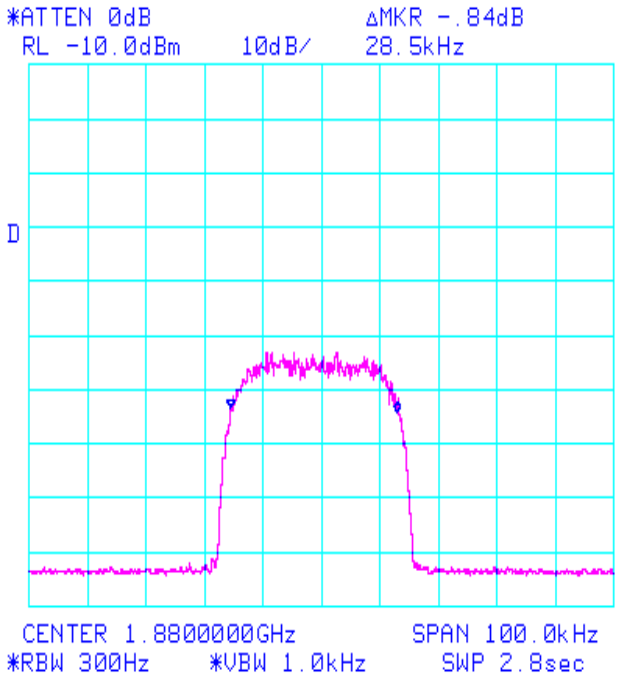
Occupied B/W CDMA at Dowlink PCS band Met11001



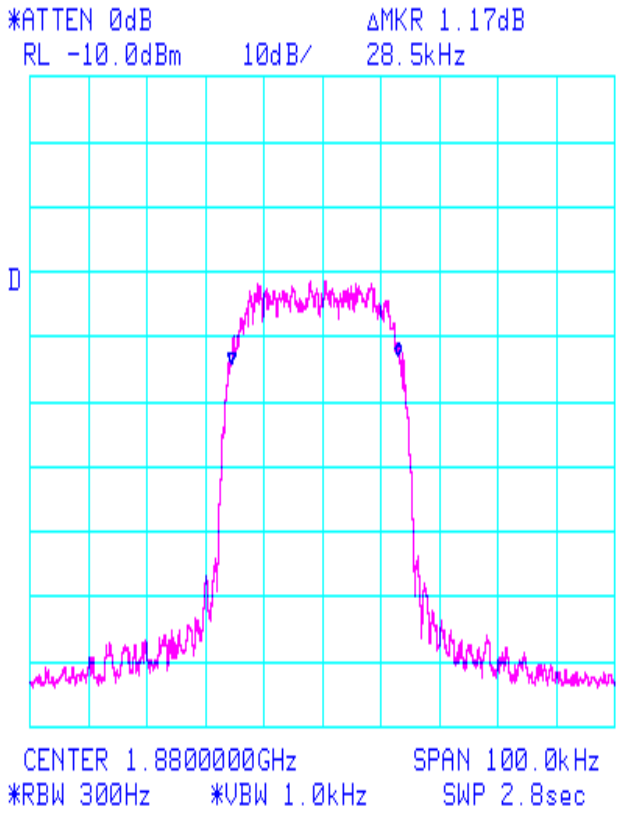
Occupied B/W CDMA at input side Met11001



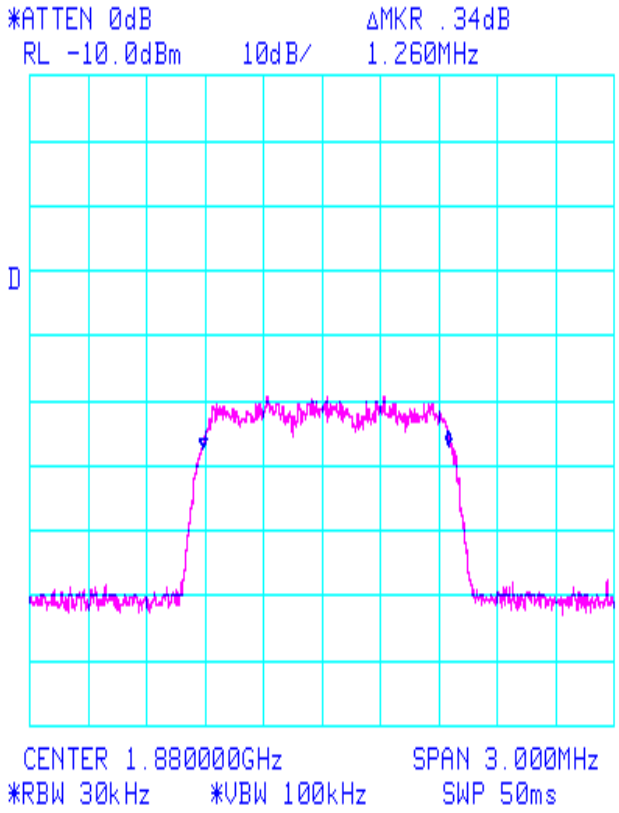
Occupied B/W NADC at output side Uplink Met11001



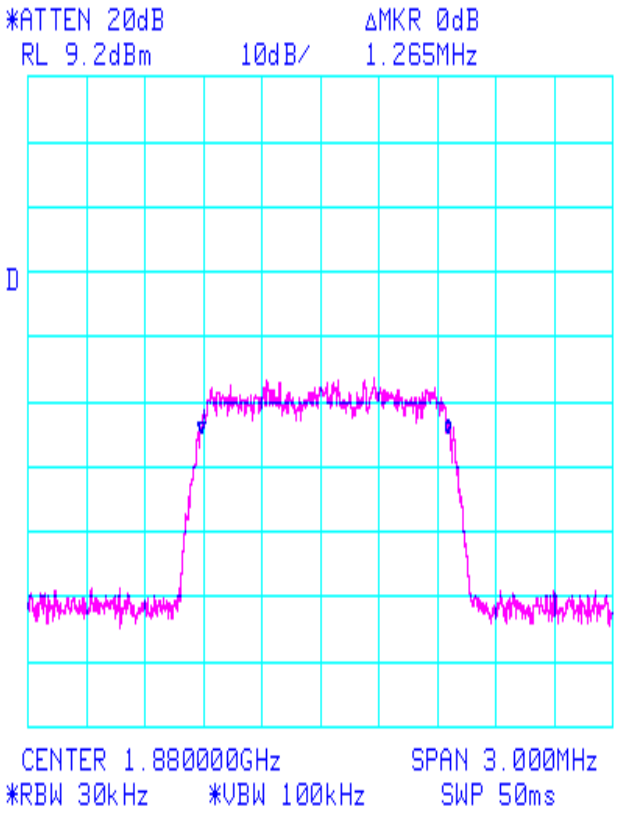
Occupied B/W NADC at Input side Uplink Met11001



Occupied B/W CDMA at output side 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 24.132(b)(c)

6.3.2 TEST DATE(S): 31 August 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 and NADC modulated signal.

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

6.3.4 RESULTS:

Equipment complies with 47CFR 2.1046 and 24.132(b)(c). The PCS repeater conducted power does not exceed 100 W (50 dBm) at the carrier frequency.

All RF Power output measurements are conducted peak envelope power with instrument set RBW=1 or 2 MHz; the results are the same, which verified by a digital power meter (HP436A power meter and HP8481B power sensor).

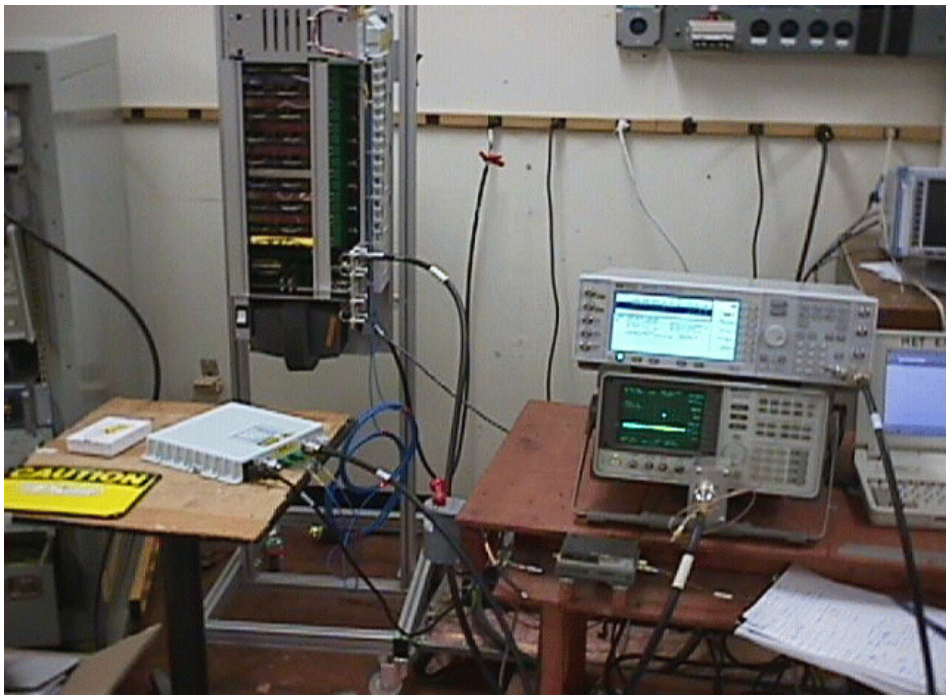
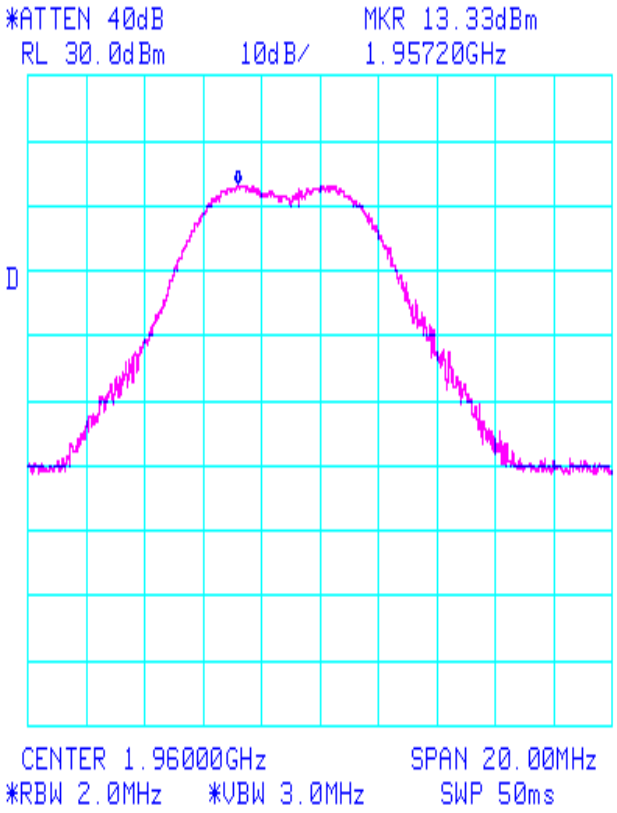
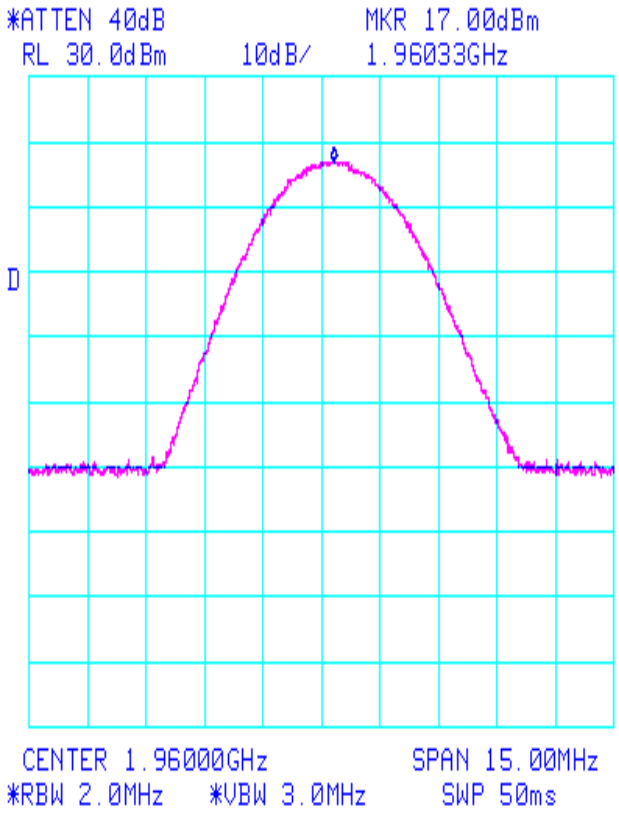


Figure 2. EUT Test Setup for Part 24 Tests

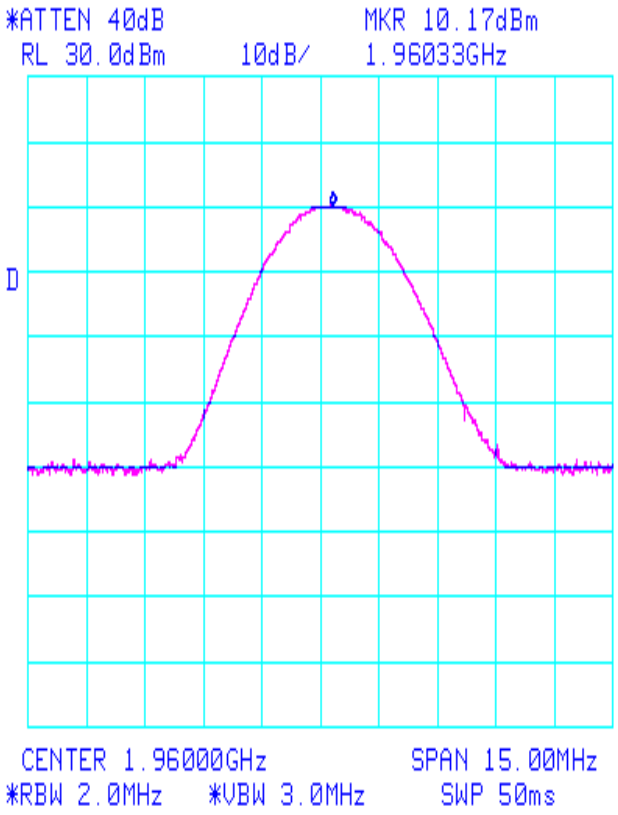
RF Output Power CDMA 2-CH at Downlink PCS band Met11001



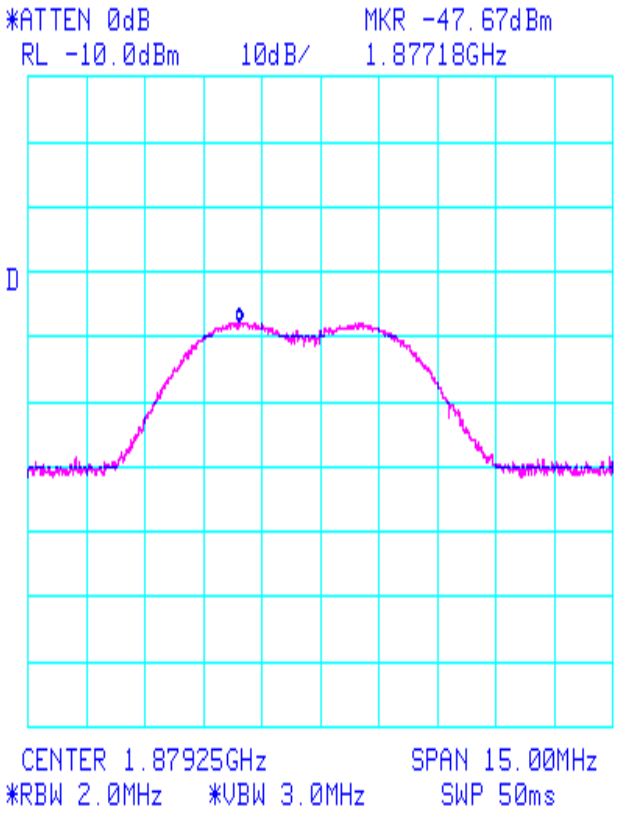
RF output Power CDMA at Downlink PCS band Met11001



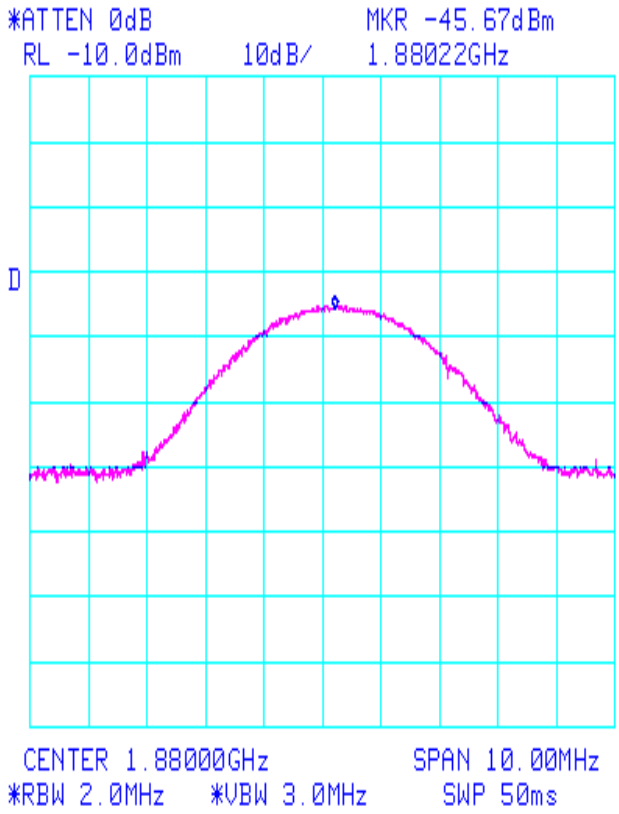
RF Output Power NADC at Downlink PCS band Met11001



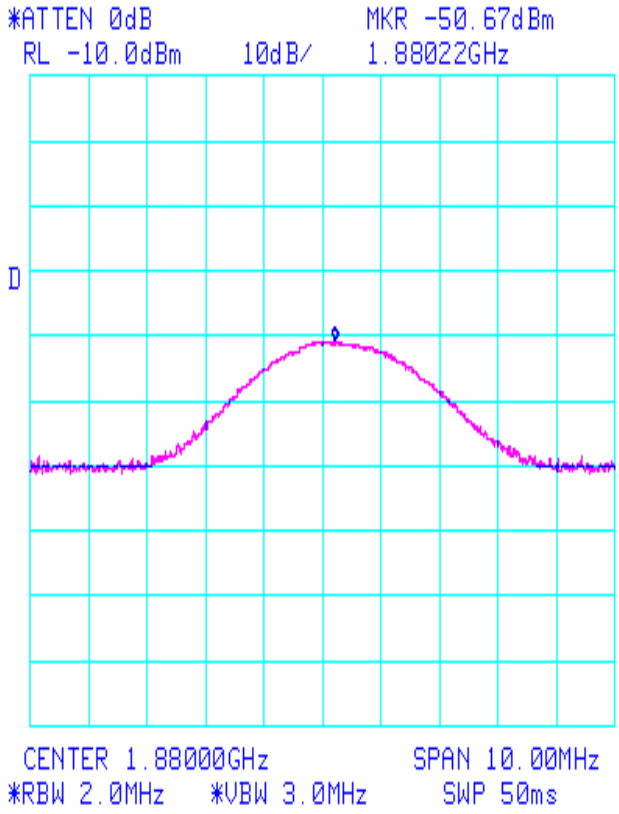
RF Output Power CDMA 2-Ch Uplink Met11001



RF Output Power CDMA Uplink Met11001



RF Output Power NADC Uplink Met11001



6.4 TEST TYPE: Spurious Emissions at Antenna Terminals (Downlink and Uplink)

6.4.1 TECHNICAL SPECIFICATION: 2.1051; 24.238(a)

6.4.2 TEST DATE(S): 31 August 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 300 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 20.0 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.

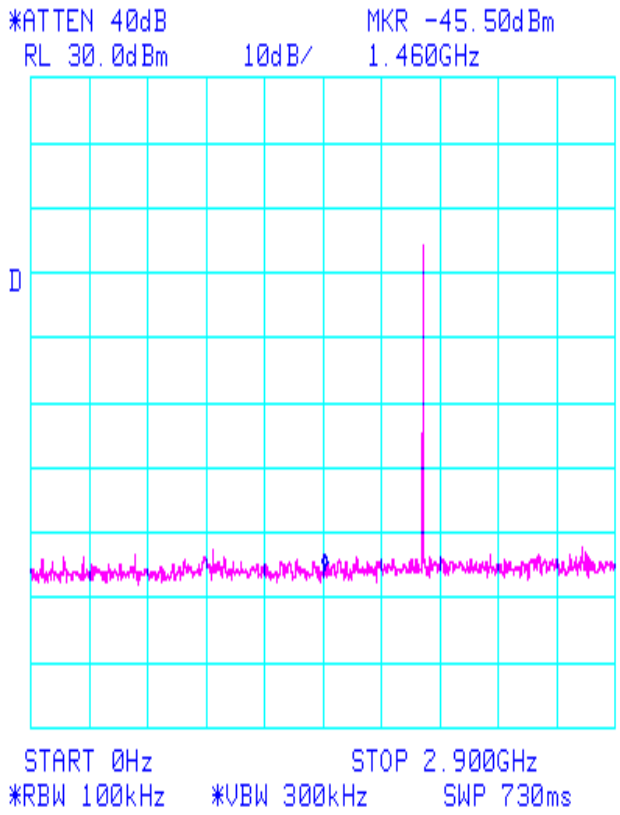
6.4.4 RESULTS:

Spur limit = Po - (43 + 10logP) = 94 dBµV = -13.1 dBm

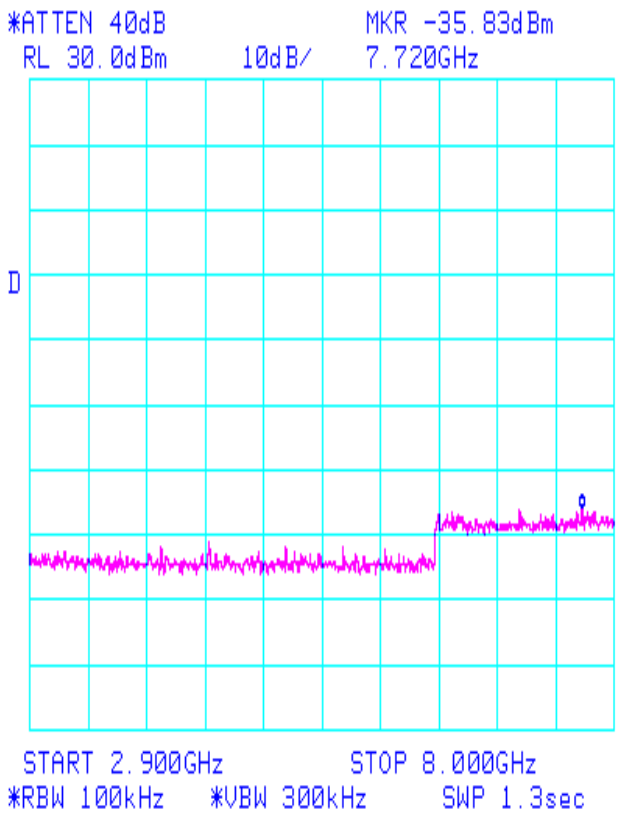
Equipment complies with Section 2.1051 and 24.238(a)

PLOTS OF SPURIOUS EMISSIONS AT ANTENNA TERMINALS :

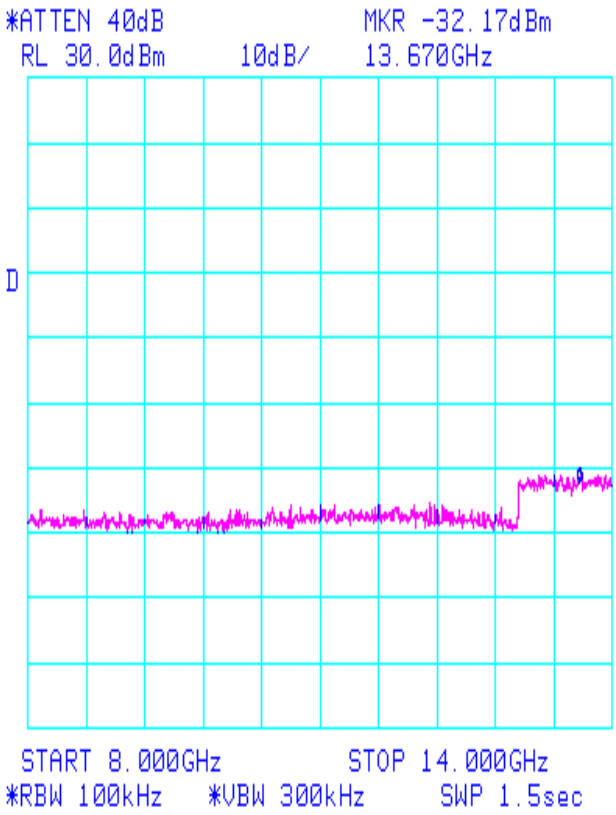
Spur emissions at antenna port Downlink Met11001 PCS band



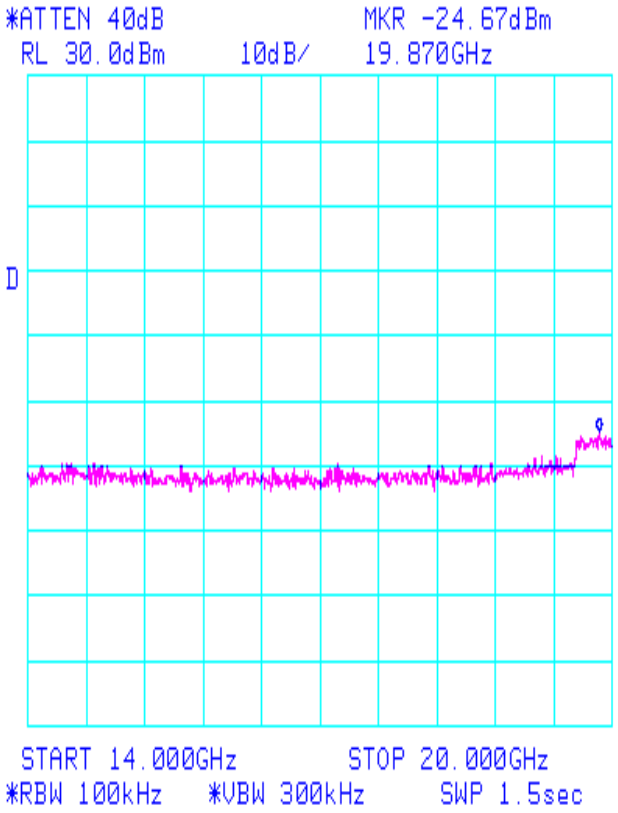
Spur emissions at antenna port Downlink PCS band Met11001



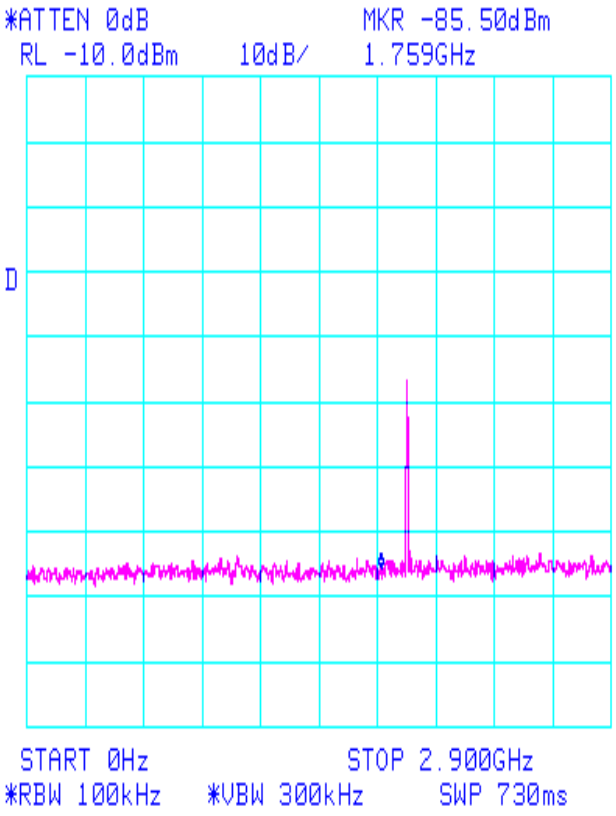
Spur emissions at antenna port Downlink PCS band Met11001



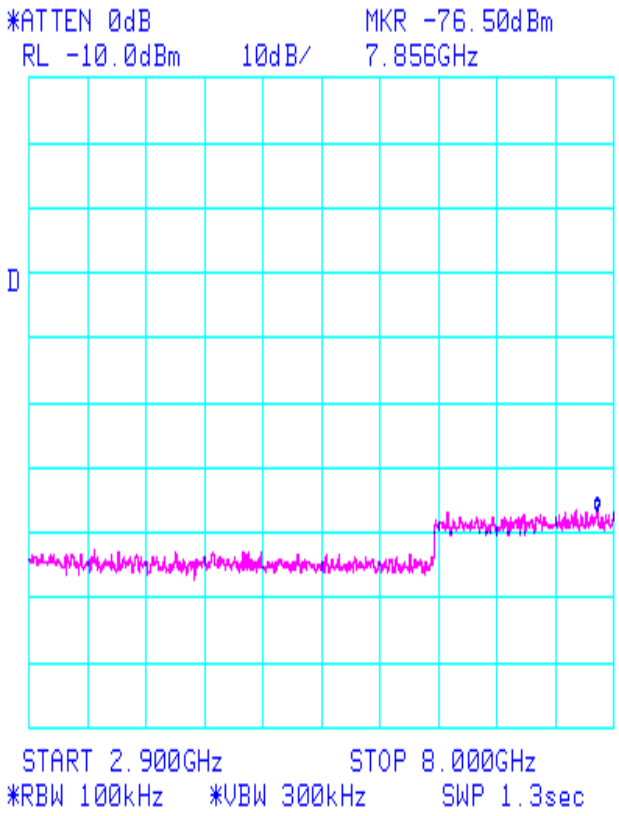
Spur emissions at antenna port Downlink PCS band Met11001



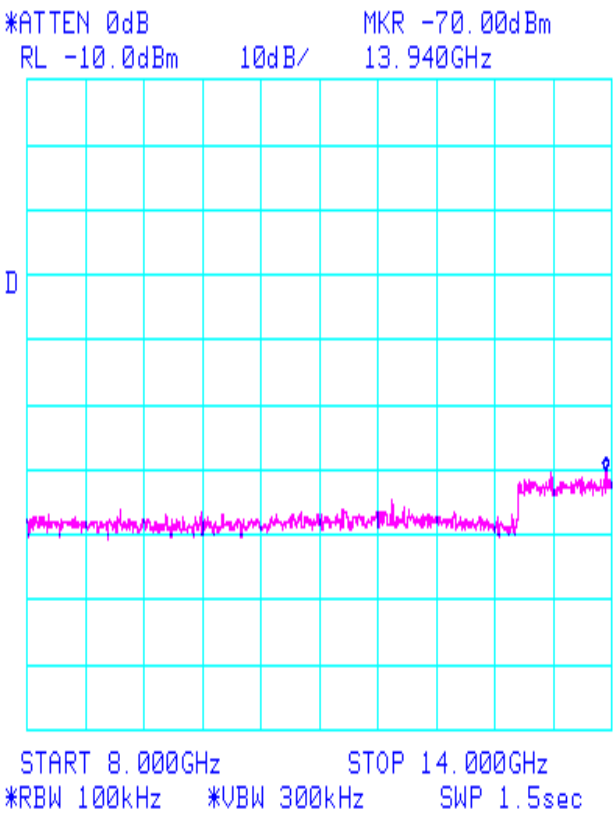
Spur emissions at antenna port Uplink Met11001



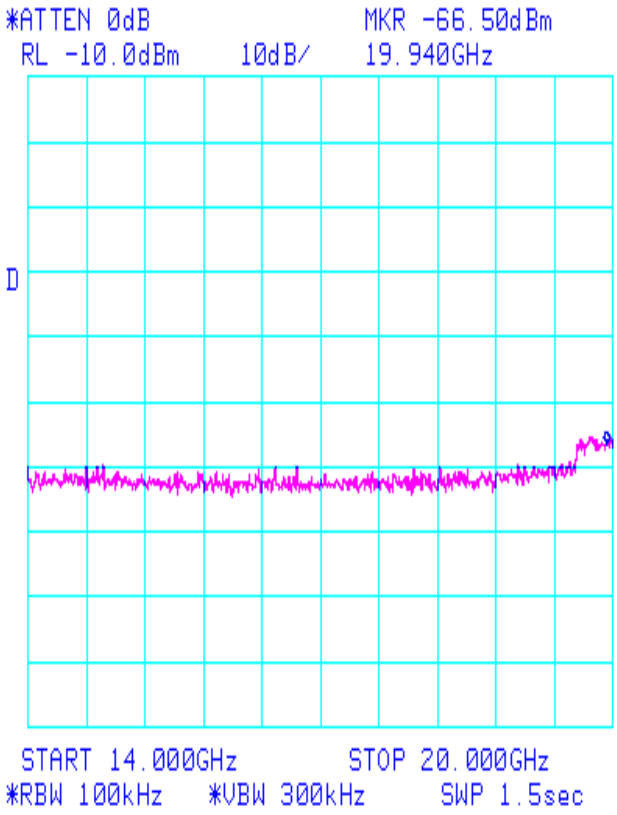
Spur emissions at antenna port Uplink Met11001



Spur emissions at antenna port Uplink Met11001



Spur emissions at antenna port Uplink Met11001



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): 5 September 2001

6.5.3 MEASURMENT PROCEDURES: UPLINK and DOWNLINK

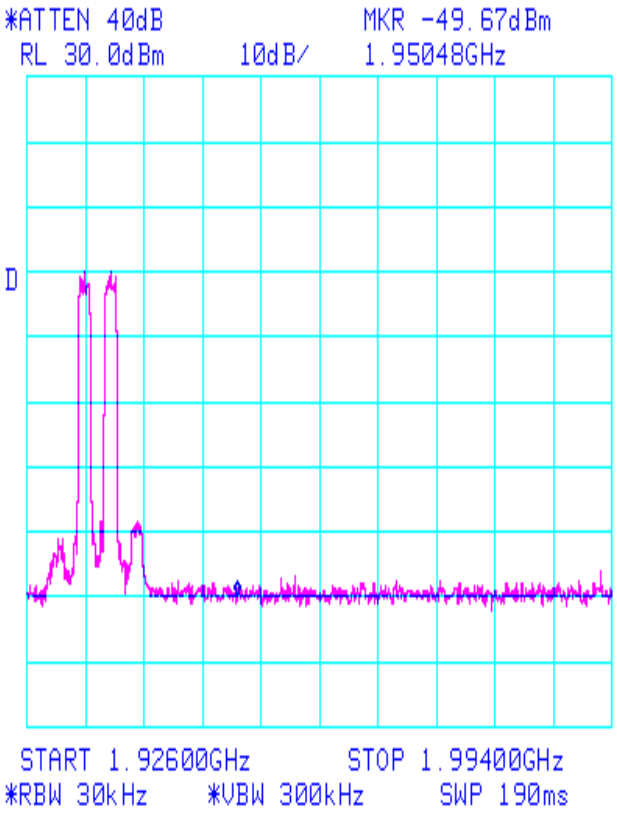
Spurious emissions were measured at the antenna terminal with the Digital signal generator tuned to transmit on a 2-tone simultaneous signal in the uplink/downlink of its tuneable range.

6.5.4 RESULTS:

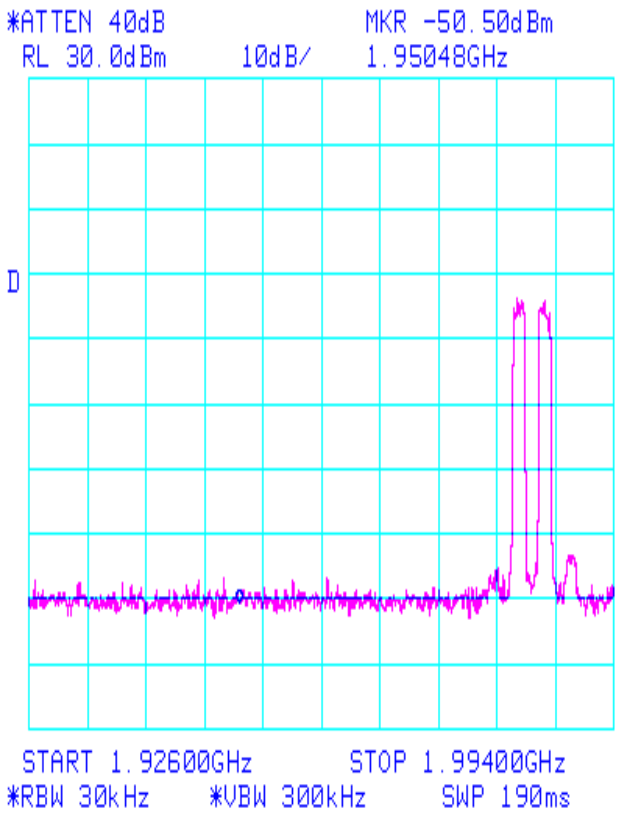
Intermodulation Spurious Products from 2-tone Simultaneous RF (CDMA) Injection at low side and high side of Cellular band. Uplink and Downlink.

Spur limit = Po - (43 + 10logP) = 94 dBµV = -13.1 dBm

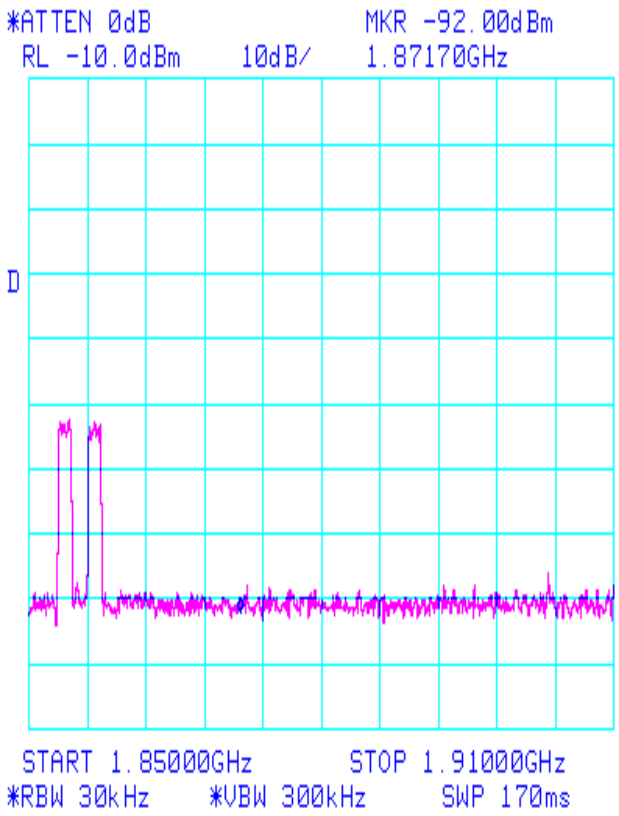
IMD spur at Low side of Downlink band PCS Met11001



IMD spur at high side of Downlink PCS band Met11001



IMD spur emissions at Low side of frequency band Uplink Met11001



IMD Spur emissions at High side of frequency band Uplink Met11001