

August 28, 2001

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

Attention: Applications Examiner

**Applicant: Cellular Transmission Solutions
P.O. Box 106, Tavor building 1,
Yoqne'am Ilit 20692, ISRAEL**

**Equipment: BEAMER Active Radiating Module System (PCS Rev 3.21 x 4 Array)
FCC ID: PNQC-BPB**

Specification: 47 CFR, Part 24 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 BEAMER, PCS Repeater.

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: BEAMER
Active Radiating Module System

FCC ID: PNQC-BPB

Specification: 47 CFR 24

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

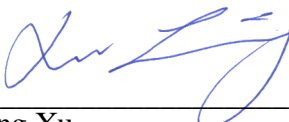
Manufacturer: Cellular Transmission Solutions
P.O. Box 106, Tavor building 1,
Yoqne'am Ilit 20692, ISRAEL

Manufacturer's Representative: Mr. Israel Eldar

Test Date(s): July 2 thru 10, 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

1.0 INTRODUCTION

The following data is presented on behalf of the Applicant, Cellular Transmission Solutions as verification of the compliance of the Beamer Array (PCS Repeater), 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 on a three-meter open area test site (OATS). 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	6/14/01	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	8/23/01	annual
Rhode & Swartz (X3)	SMIQ 03 Digital Signal Gen.	8/16/01	N/A

4.0 EQUIPMENT UNDER TEST CONFIGURATION

The EUT 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 Channel operation and Multi-Channel (3 Channel separated and Adjacent) which results in maximum possible output gain.

5.0 TEST TYPE(S)

- 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: 47CFR 2.1051, 24.238(a)
- 5.5 Intermodulation spur emissions

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):** July 8, 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 10 watts:

$$P_o = 10 \text{ W}$$

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

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

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.

6.2 TEST TYPE: Occupied Bandwidth

6.2.1 TECHNICAL SPECIFICATION: 47 CFR 2.1046

6.2.2 TEST DATE(S): May 17, 2001

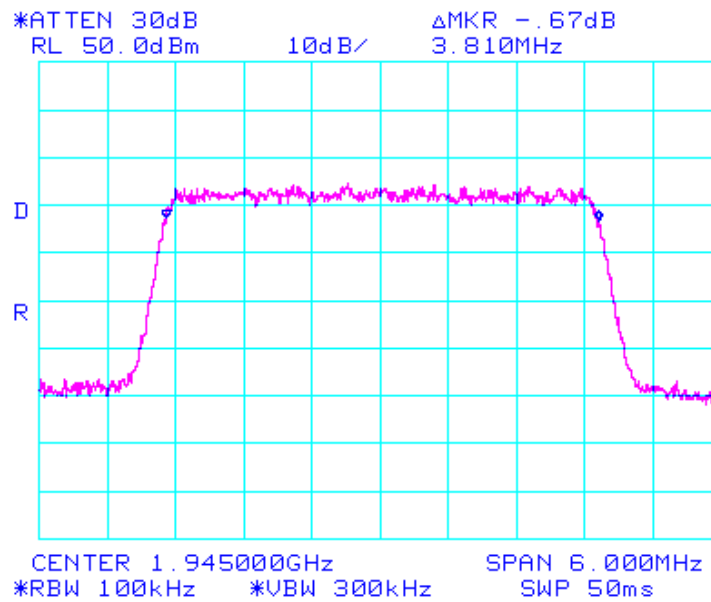
6.2.3 MEASUREMENT PROCEDURES:

As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made on the PCS Repeater pre- and post- repeater. A digital signal generator was configured to transmit a CDMA carrier signal. Using an IF bandwidth of 100kHz, we determined the occupied bandwidth of the emission at the Input vs Output.

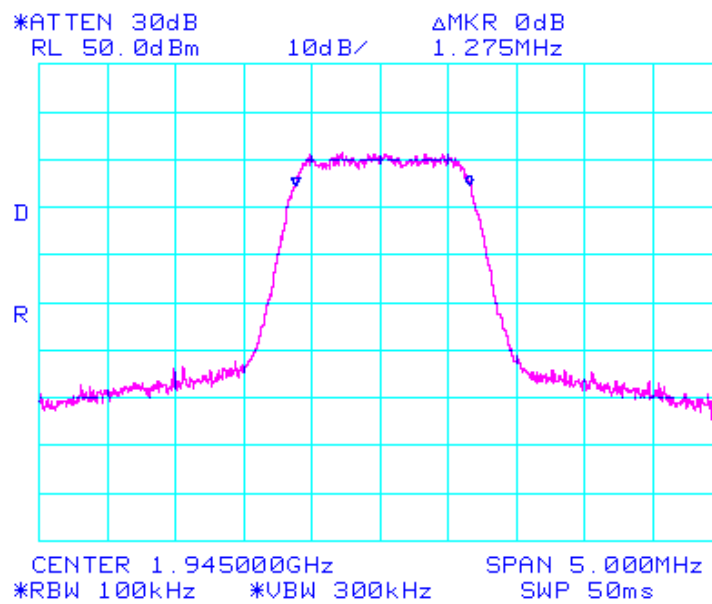
6.2.4 RESULTS:

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

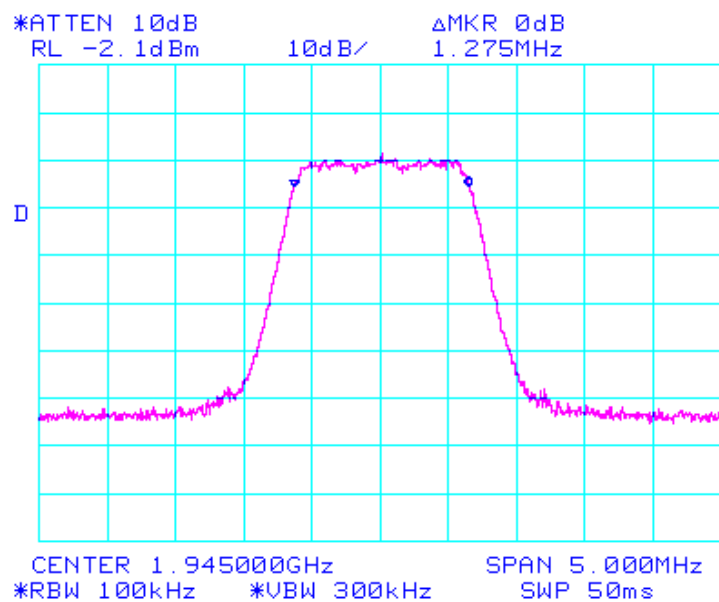
Occupied B/W CDMA multi-carrier downlink Met11086



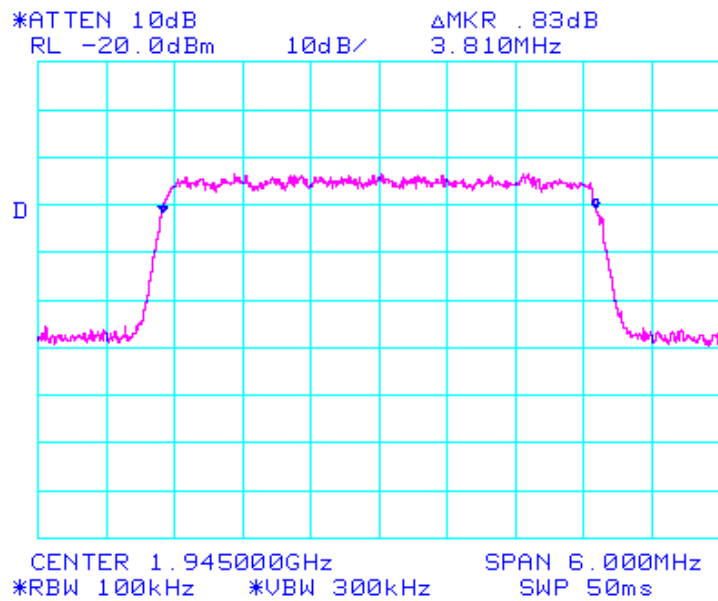
Occupied B/W CDMA downlink single carrier Met11086



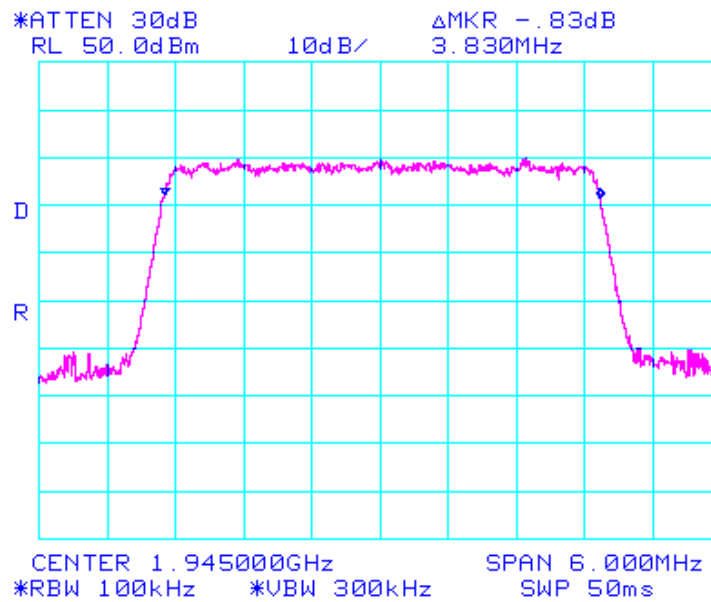
Occupied B/W CDMA at Input side Met 11086



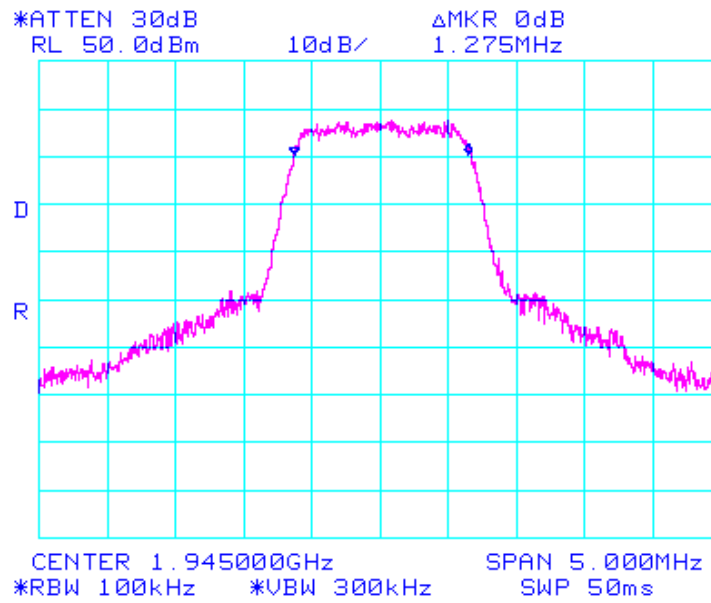
Occupied B/W CDMA multi-carrier downlink Met11086



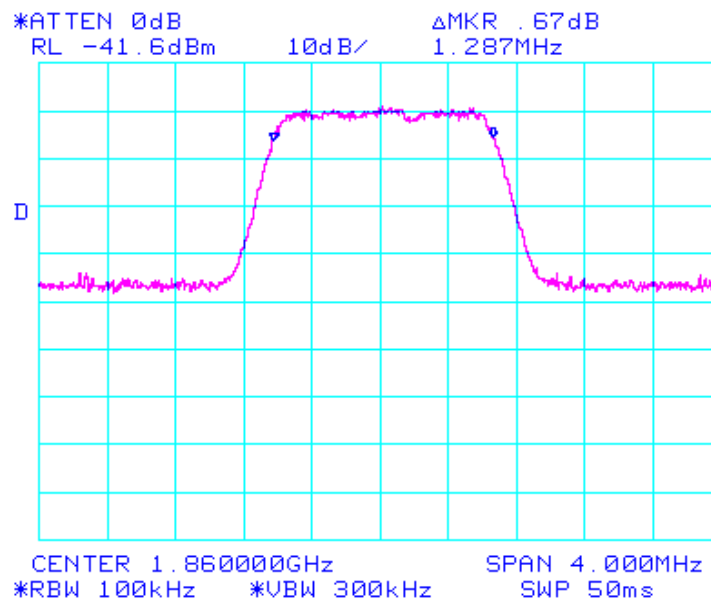
Occupied B/W CDMA multi-carrier downlink Met11086



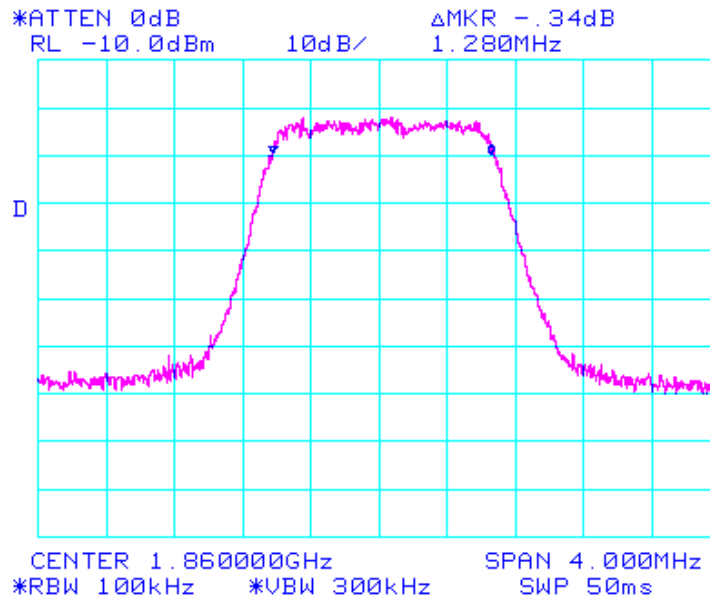
Occupied B/W CDMA Downlink single carrier Met11086



Occupied B/W CDMA at input side uplink Met11086



Occupied B/W CDMA at output side uplink Met11086



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): July 9, 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, modulated signal.

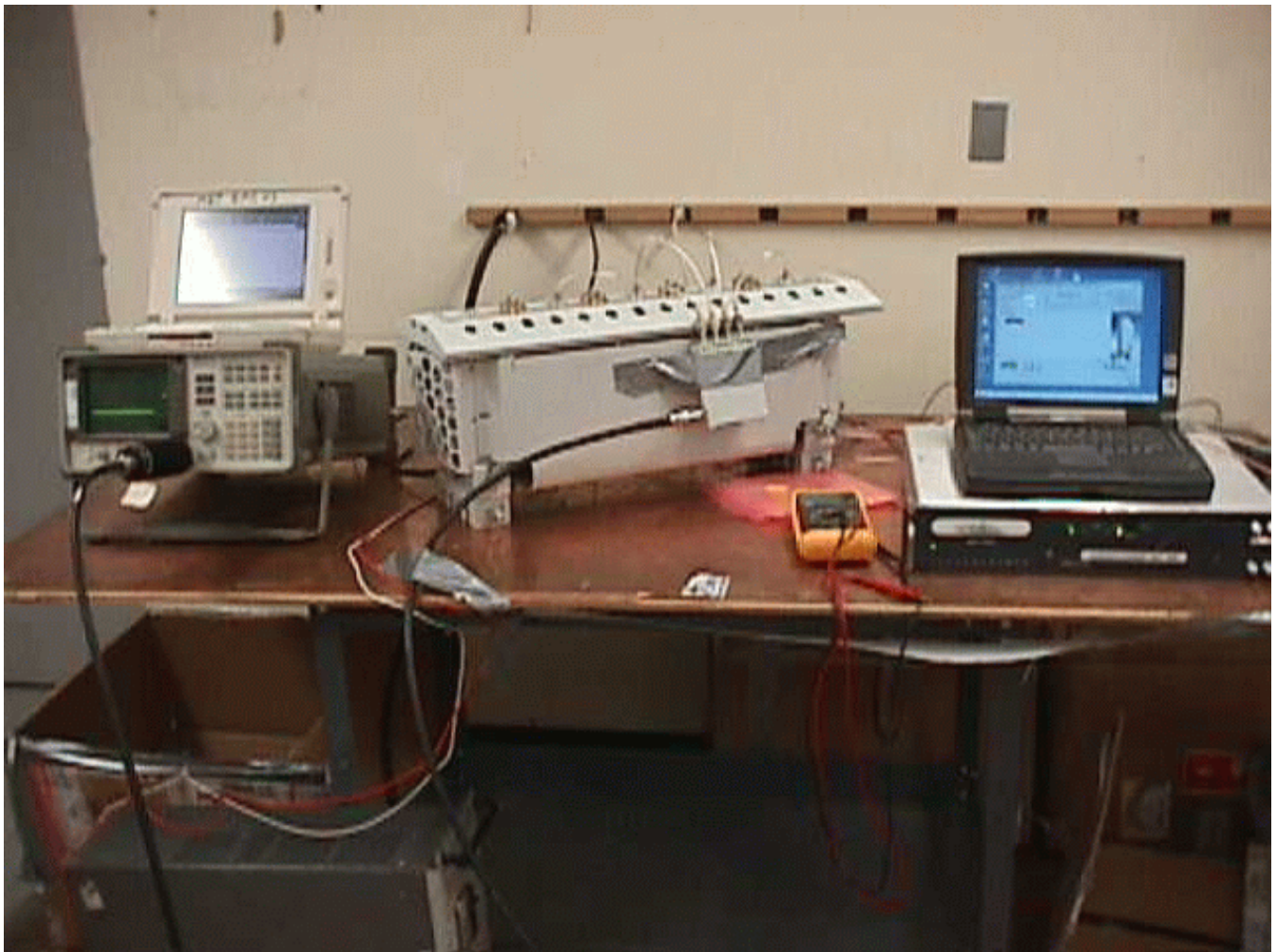
Plots of the RF output Power level of the Digitally modulated carrier, as measured at the RF output of the signal generator and at the RF output terminals of the EUT appear on the following pages:

6.3.4 RESULTS:

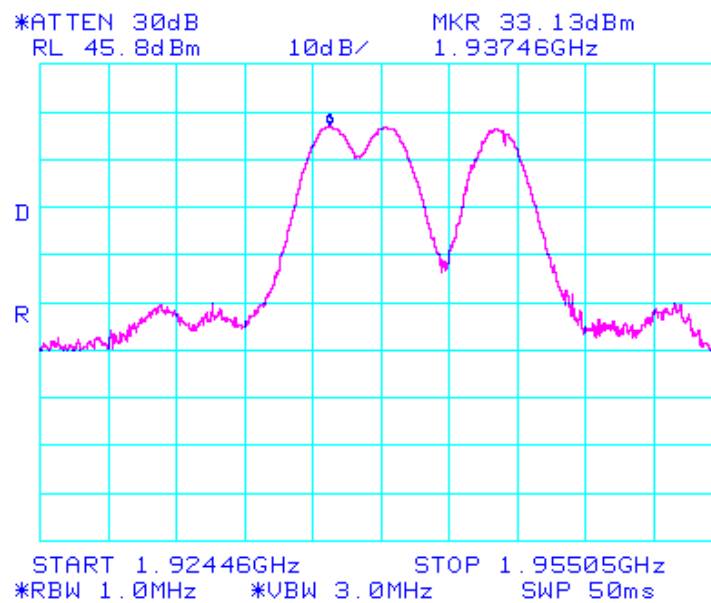
Equipment complies with 47CFR 2.1046 and 24.132(b)(c). The PCS repeater conducted power does not exceed 100 W (50 dBm) at the carrier frequency.

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 (HP 436A power meter and HP8481B power sensor).

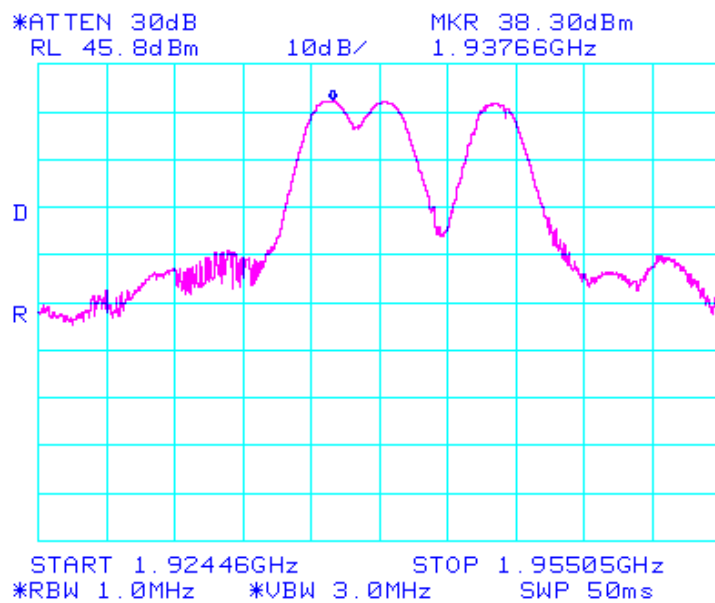
Photograph of Antenna Conducted Spurious Emissions and RF Power Output Test Configuration



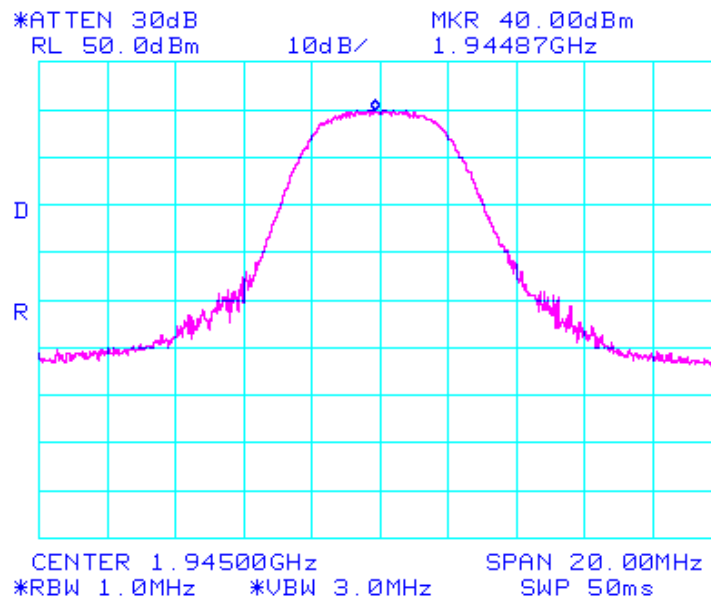
**RF power output CDMA non-adjacent multi-carrier downlink
Met 11086**



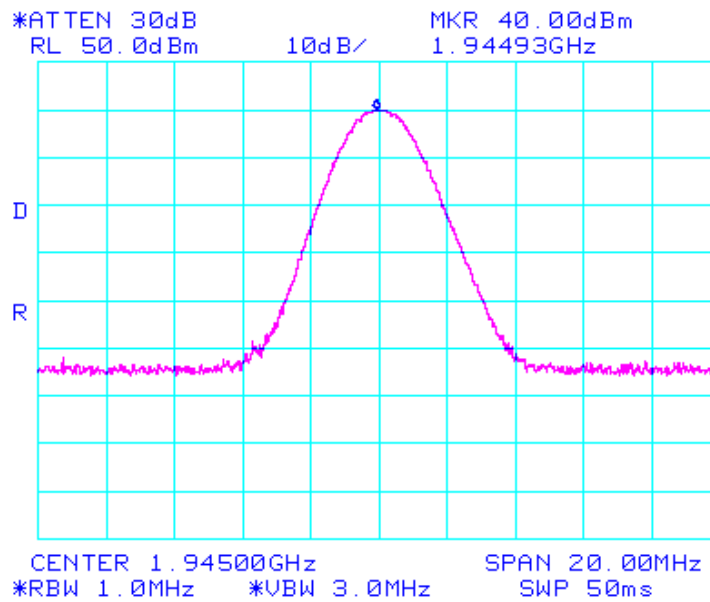
**RF power output CDMA non-adjacent multi-carrier downlink
Met 11086**



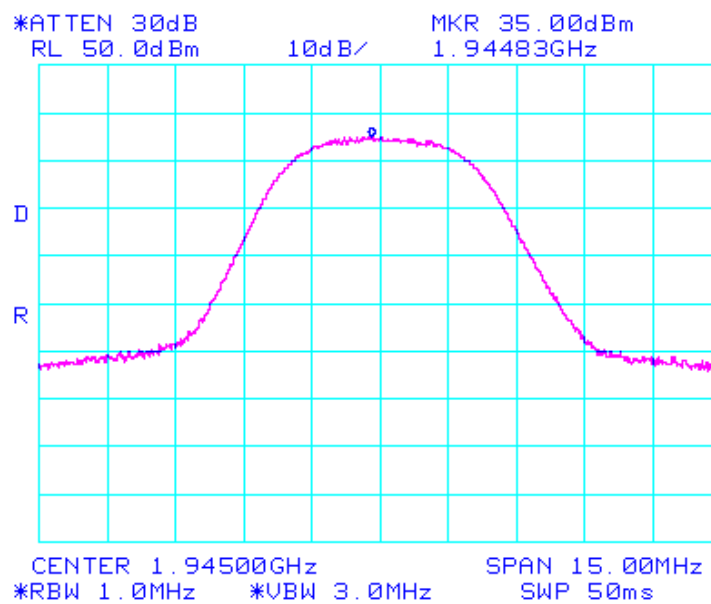
RF power output CDMA multi-carrier downlink Met11086



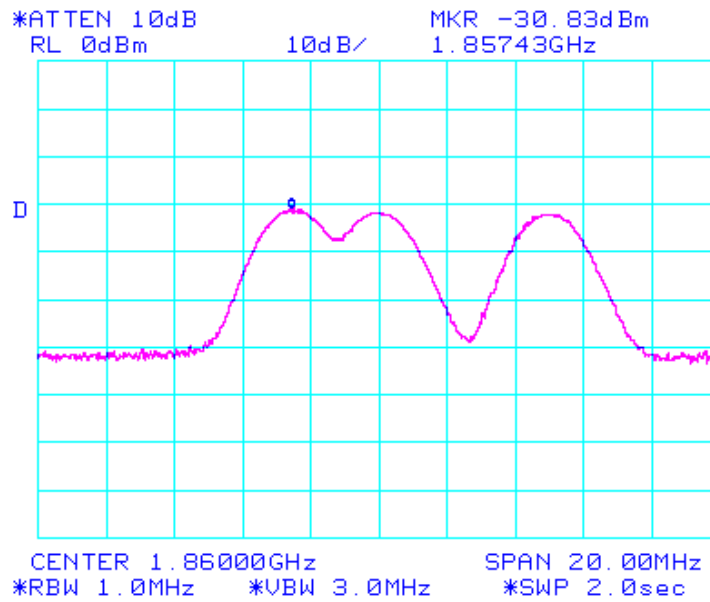
RF power output CDMA downlink single carrier Met11086



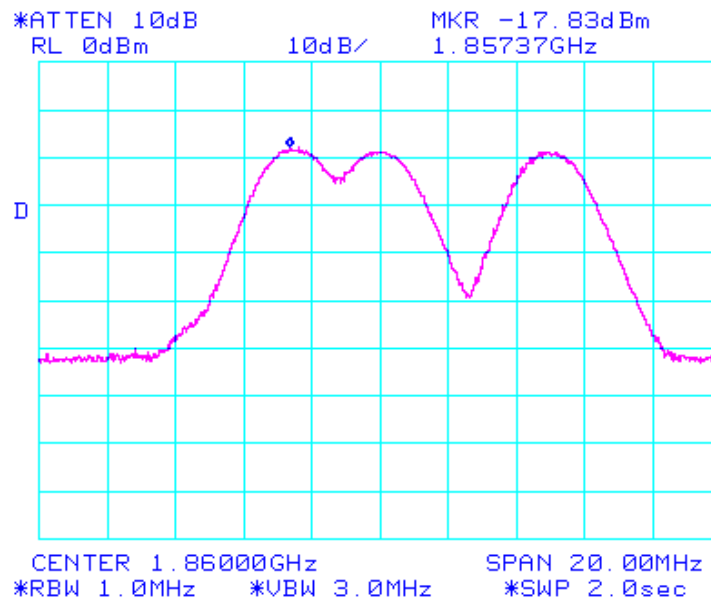
RF power output CDMA multi-carrier downlink Met11086



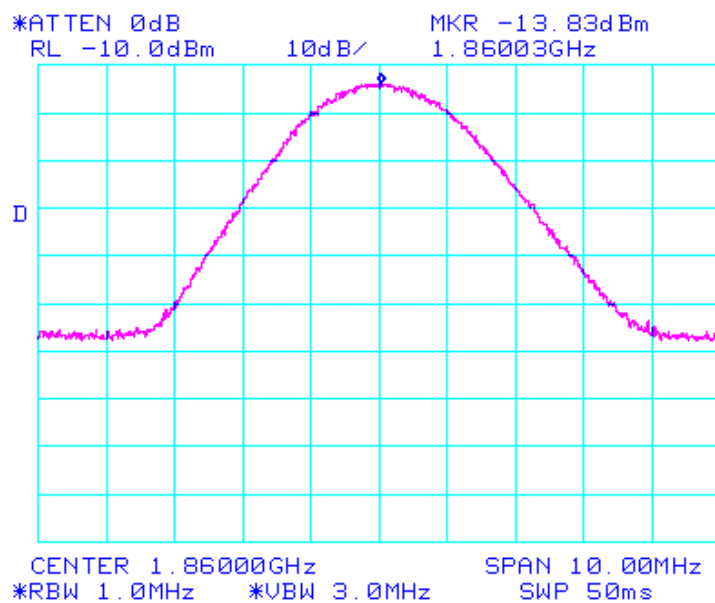
RF power output w/ 3-tone CDMA input at uplink side Met11086



IMS spur emissions w/ 3-tone input -50dBm at uplink side Met11086



RF power output uplink side CDMA Met11086



6.4 TEST TYPE: Spurious Emissions at Input and output Terminals (**Downlink and Uplink**)**6.4.1 TECHNICAL SPECIFICATION:** 2.1051; 24.238(a)**6.4.2 TEST DATE(S):** July 6-9, 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.

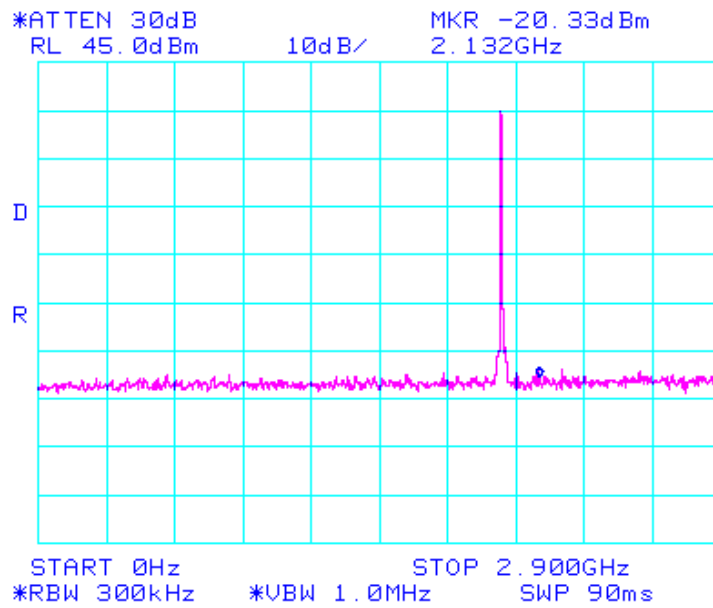
6.4.4 RESULTS:

Spur limit = $P_o - (43 + 10\log P) = 143 \text{ dB}\mu\text{V} - (49 \text{ dB}) = 94 \text{ dB}\mu\text{V} = -13.1 \text{ dBm}$

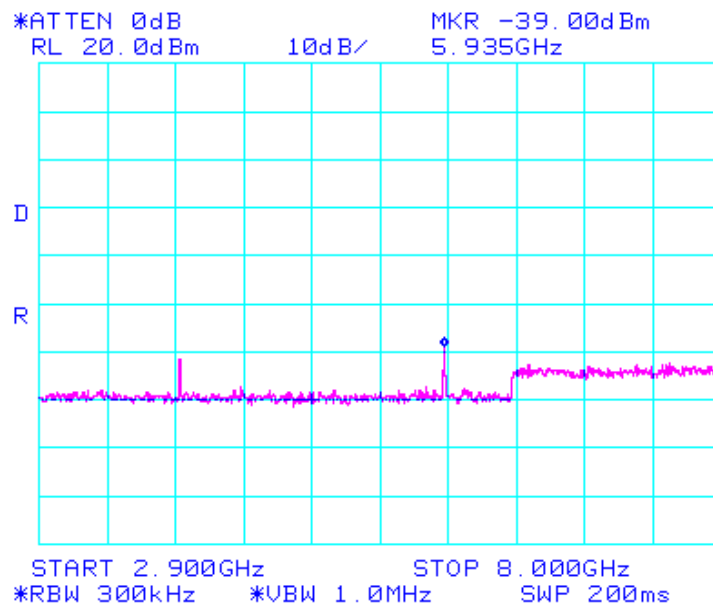
Equipment complies with Section 2.1051 and 24.238(a)

PLOTS OF SPURIOUS EMISSIONS AT ANTENNA TERMINALS : on following pages

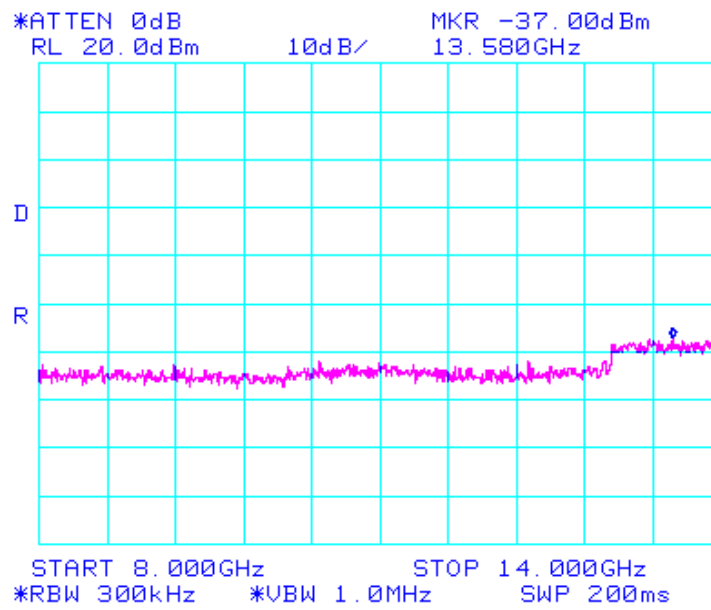
Spur emissions at antenna terminal Met10935



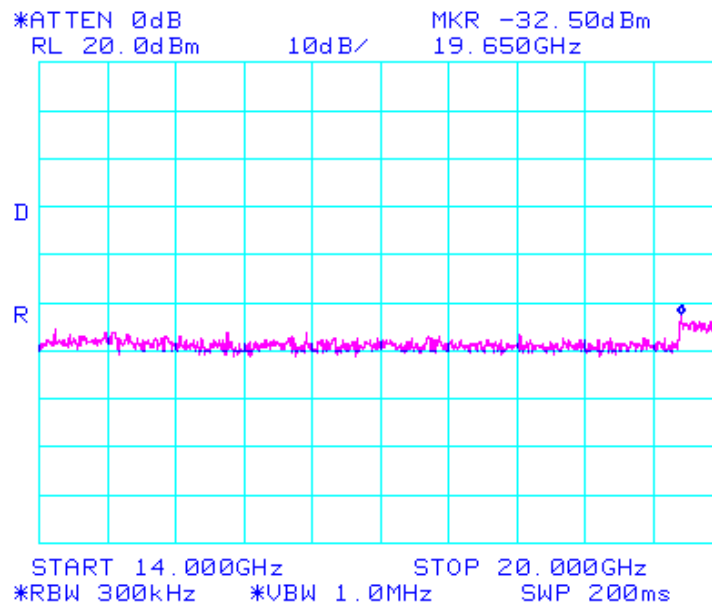
Spur emissions at antenna terminal Met10935



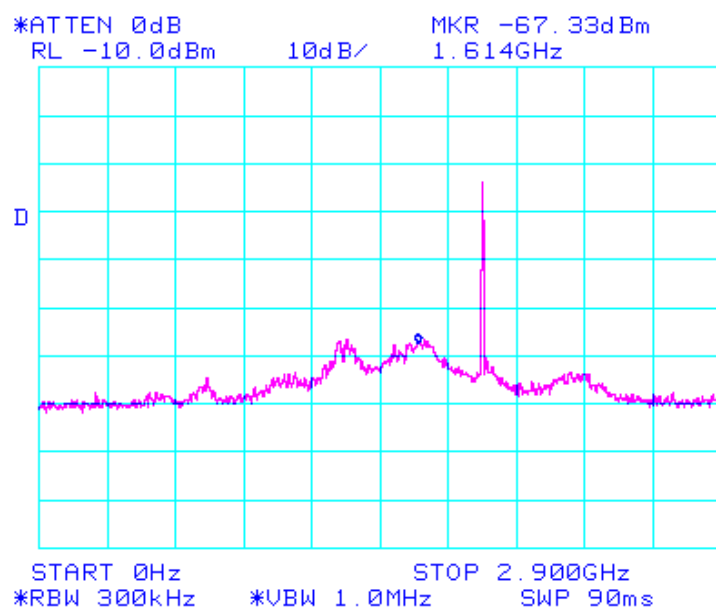
Spur emissions at antenna terminal Met10935



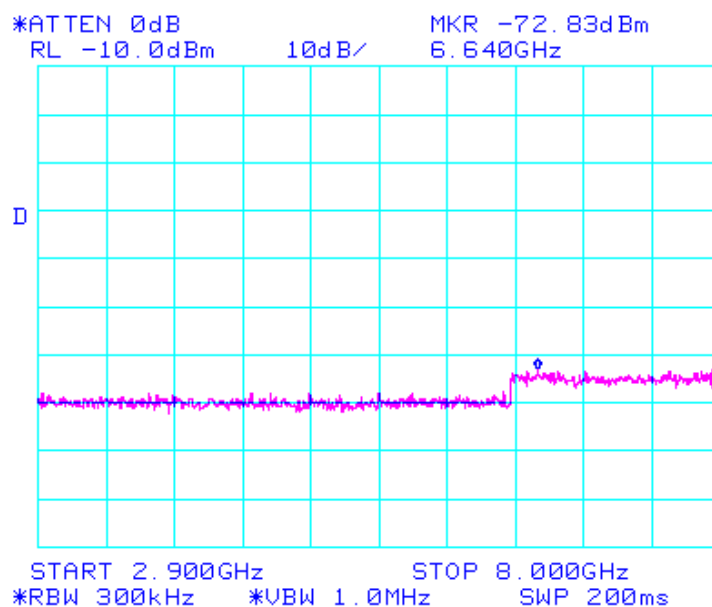
Spur emissions at antenna terminal Met10935



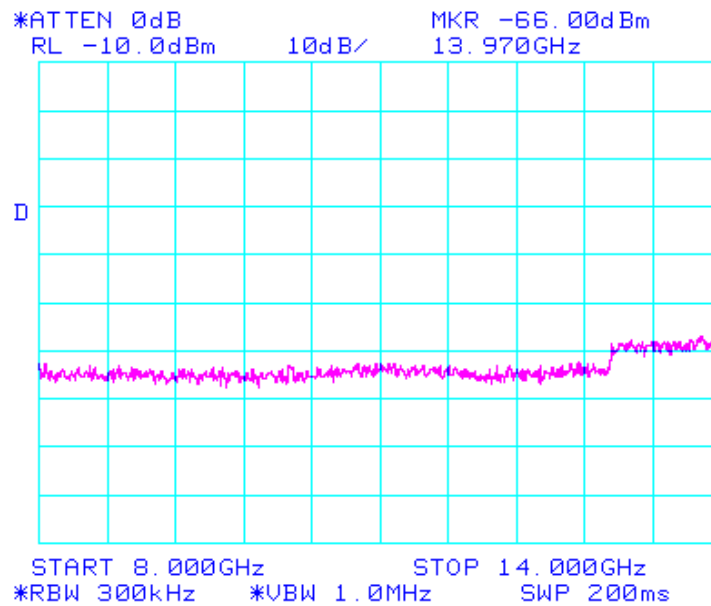
Spur emissions at antenna terinal Rx Met10935



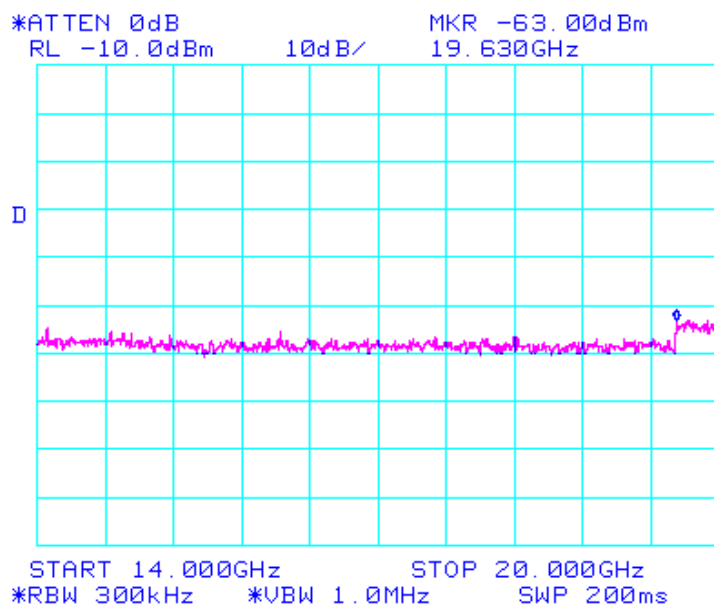
Spur emissions at antenna terminal Rx Met10935



Spur emissions at antenna terminal Rx Met10935



Spur emissions at antenna terminal Rx Met10935



6.6 TEST TYPE: Intermodulation Spurious Emissions at Input and output Terminals

6.6.1 TECHNICAL SPECIFICATION: 47 CFR 2.1051.

6.6.2 TEST DATE(S): July 6-9, 2000

6.6.3 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.

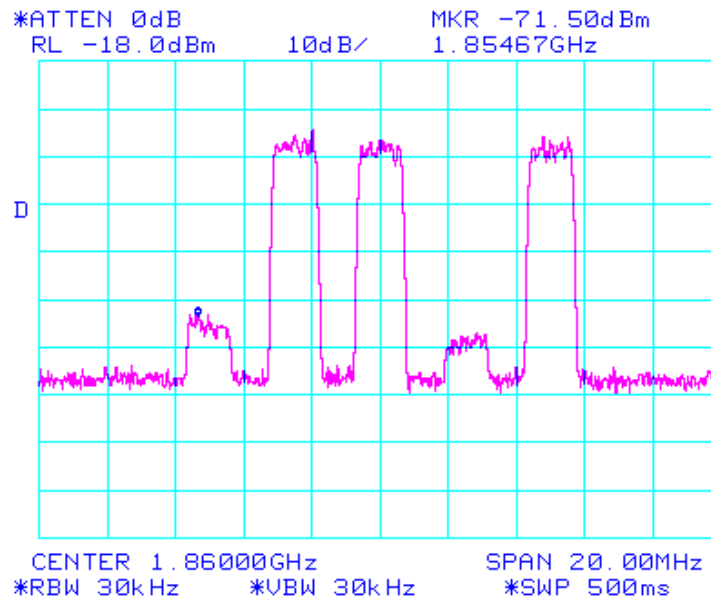
6.6.4 RESULTS:

Equipment complies with 47CFR 2.1051. Plots of the spurious emissions as measured at the antenna ports are included in this application as file attachment:

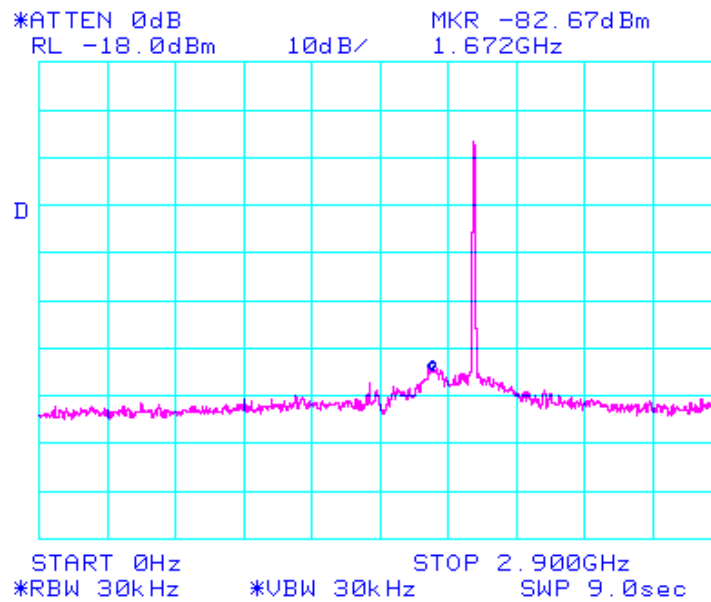
Intermodulation Spurious Products from 3-tone Simultaneous RF Injection At low side and high side of Cellular band. **Uplink and Downlink**

Spur limit = $P_o - (43 + 10\log P) = 132.5 \text{ dB}\mu\text{V} - (38.44 \text{ dB}) = 94 \text{ dB}\mu\text{V} = -13.1 \text{ dBm}$

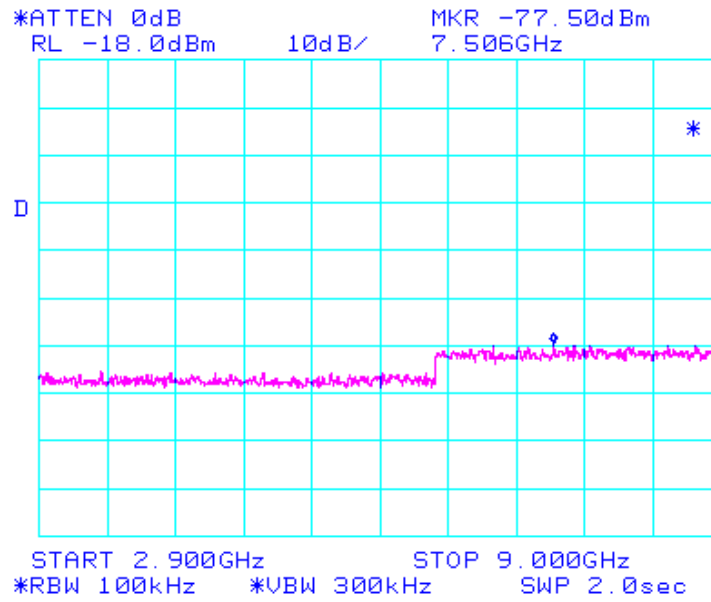
IMS spur emissions w/ 3-tone CDMA input at uplink side Met11086



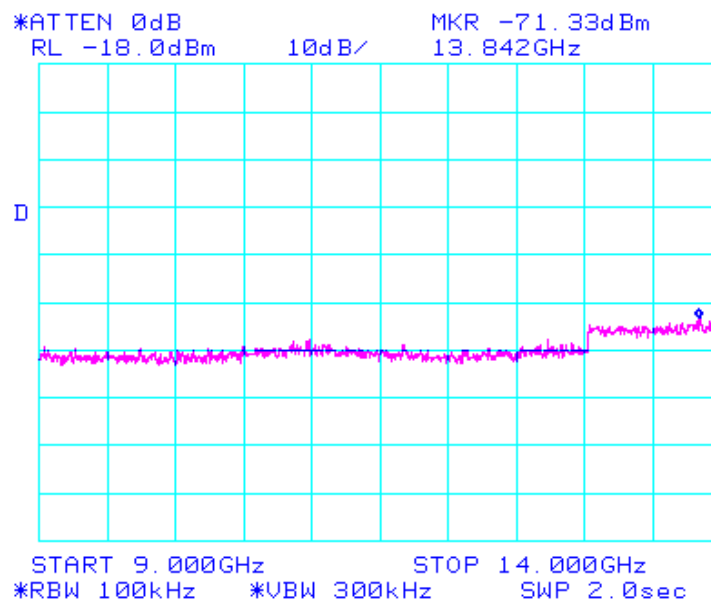
IMS spur emissions w/ 3-tone CDMA input at uplink side Met11086



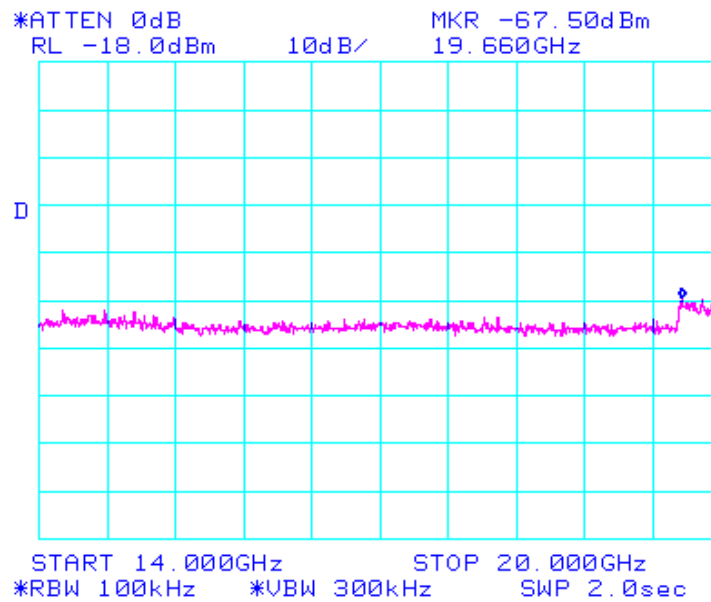
IMS spur emissions w/ 3-tone CDMA input at uplink side Met11086



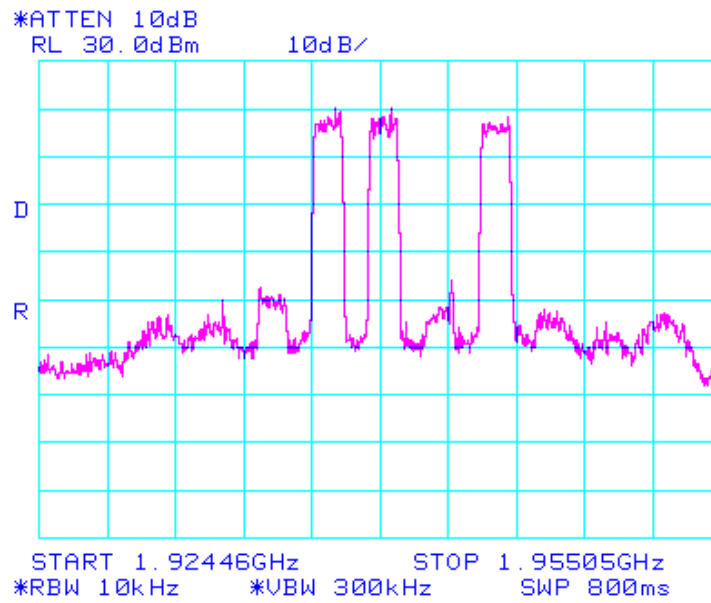
IMS spur emissions w/ 3-tone CDMA input at uplink side Met11086



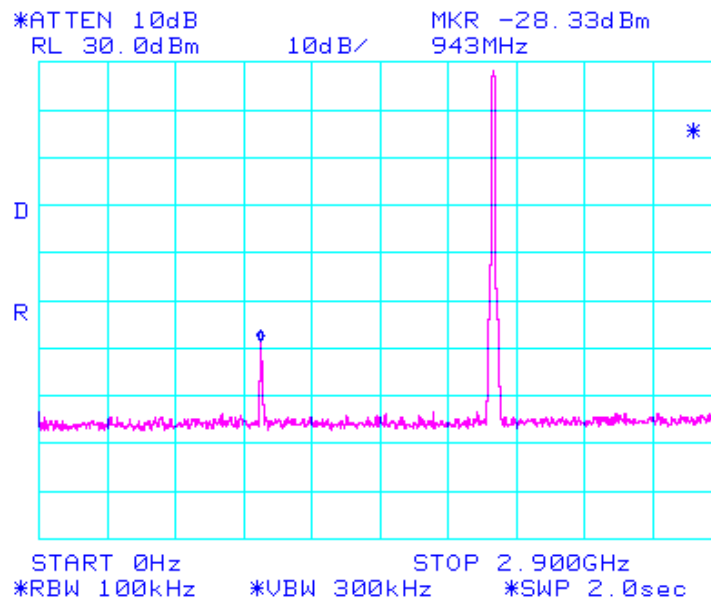
IMS spur emissions w/ 3-tone CDMA input at uplink side Met11086



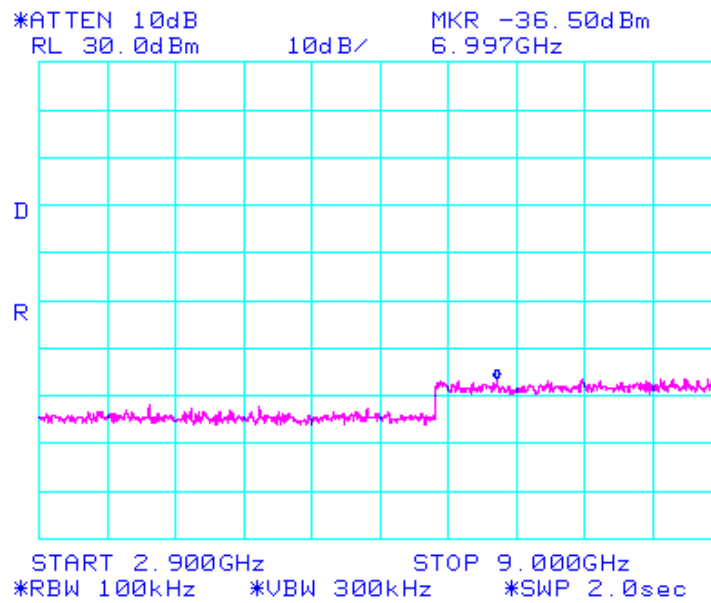
IMS spur emissions w/ 3-tone CDMA input at downlink side
Met11086



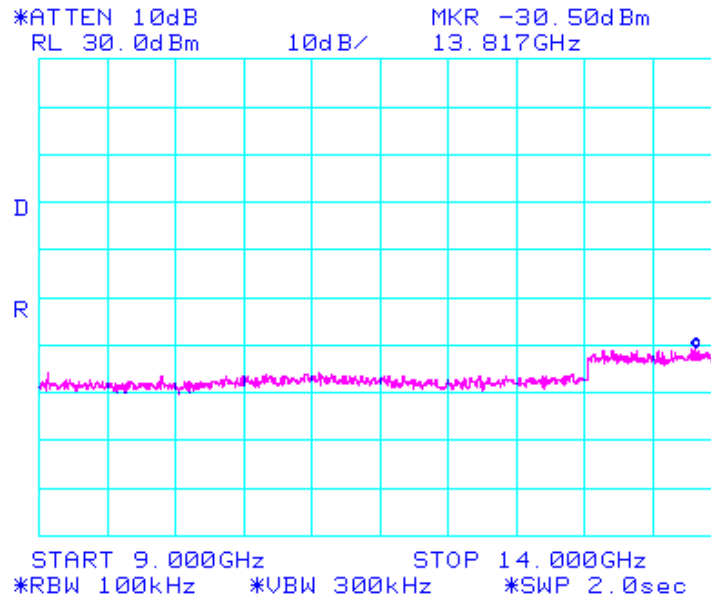
IMS spur emissions w/ 3-tone CDMA input at downlink side
Met 11086



IMS spur emissions w/ 3-tone CDMA input at downlink side
Met 11086



IMS spur emissions w/ 3-tone CDMA input at downlink side Met 11086



IMS spur emissions w/ 3-tone input at downlink side Met11086

