

April 9, 2001

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

Attention: Applications Examiner

Applicant: Allgon Telecom, Ltd.
7317 Jack Newell Blvd. North Fort Worth, Texas 76118

Equipment: CDMA 800 Channel Selective Repeater , Model: AR4540/001
FCC ID: L6GAR4540

Specification: 47 CFR 22 Licensed Certification

Dear Examiner:

The following application for Grant of Equipment Authorization is presented on behalf of Allgon Telecom Ltd.. for the Licensed Certification of their Model: AR4540, CDMA 800 channel selective repeater.

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: CDMA 800 channel selective repeater, Model AR4540

FCC ID:: L6GAR4540

Specification: 47 CFR 22

On Behalf of the Applicant: Allgon Telecom Ltd.
7317 Jack Newell Blvd. North
FortWorth, TX 76118

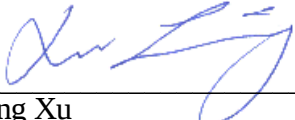
Manufacturer: Allgon Telecom Ltd.
7317 Jack Newell Blvd. North
FortWorth, TX 76118

Manufacturer's Representative Mr. Tim Purvis

Test Date(s): March 6 thru March 16, 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

1.0 INTRODUCTION

The following data is presented on behalf of the Applicant, Allgon Telecom Ltd. as verification of the compliance of the Allgon CDMA 800 channel selective repeater, Model AR4540 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 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	3/21/01	annual
EMCO	EMCO Log Periodic Antenna	11/01/01	annual
EMCO	Double Ridge Guided Horn	6/3/01	annual
Hewlett Packard	8546A Analyzer	08/23/01	annual
Rhode & Swartz (X3)	SMIQ 03 Digital Signal Gen.	08/16/01	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 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, (with the exception of intermodulation tests), the EUT was configured for Single 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).

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):** March 12, 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 6 watts,

$$P_o = 6 \text{ W}$$

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

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

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 2.1049

6.2.2 TEST DATE(S): March 9, 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 modulated carrier signal. Using an IF bandwidth of 10kHz, 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) Downlink Input side M10694

18:18:48 MAR 09, 2001
~~18~~

MARKER Δ
 1.290 MHz
 .07 dB

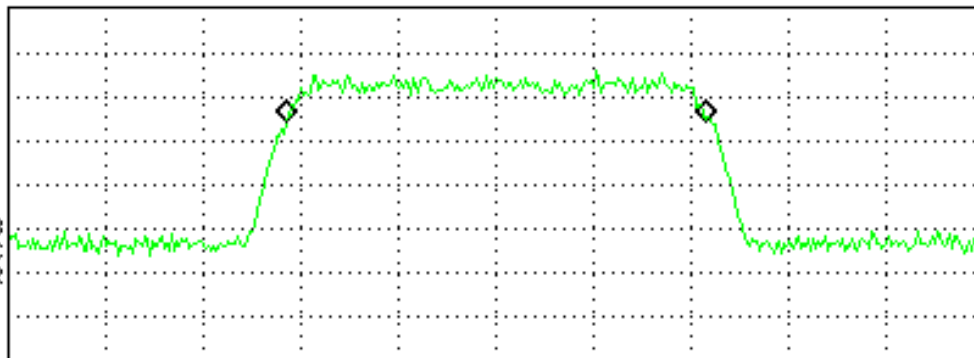
ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ 1.290 MHz
 .07 dB

MARKER
 NORMAL

MARKER
 Δ

LOG REF -50.0 dBm
 10
 dB/
 #ATN
 0 dB

VA SB
 SC FC
 CORR



CENTER 882.000 MHz
 RL #IF BW 10 kHz

AVG BW 30 kHz

SPAN 3.000 MHz
 SWP 90.0 msec

MARKER
 AMPTD

SELECT
1 2 3 4

MARKER 1
ON OFF

More
 1 of 3

Occupied B/W (CDMA) Downlink Output side M10694

18:29:27 MAR 09, 2001

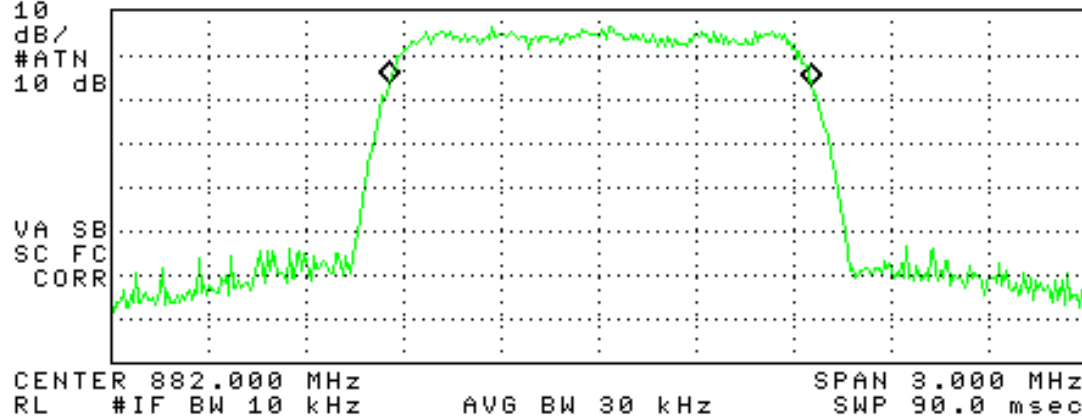
HP

MARKER Δ
1.298 MHz
-.36 dB

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR Δ 1.298 MHz
-.36 dB

MARKER
NORMAL

LOG REF OFFST 30.0 dB
10 REF 22.0 dBm
dB/
#ATN
10 dB



MARKER
 Δ

MARKER
AMPTD

SELECT
1 2 3 4

MARKER 1
ON OFF

More
1 of 3

Occupied B/W (CDMA) Uplink Input side M10694

18:13:41 MAR 09, 2001

MARKER Δ
1.298 MHz
.70 dB

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR Δ 1.298 MHz
.70 dB

MARKER
NORMAL

MARKER
 Δ

LOG REF -50.0 dBm
10
dB/
#ATN
0 dB

VA SB
SC FC
CORR



MARKER
AMPTD

SELECT
1 2 3 4

MARKER 1
ON OFF

More
1 of 3

CENTER 837.000 MHz
RL #IF BW 10 kHz
AVG BW 30 kHz
SPAN 3.000 MHz
SWP 90.0 msec

Occupied B/W (CDMA) Uplink Output side M10694

18:02:46 MAR 09, 2001

MARKER Δ
1.290 MHz
-.05 dB

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR Δ 1.290 MHz
-.05 dB

MARKER
NORMAL

LOG 10
dB/
#ATN
10 dB
REF OFFST 30.0 dB
REF 25.0 dBm

MARKER
 Δ



MARKER
AMPTD

SELECT
1 2 3 4

MARKER 1
ON OFF

More
1 of 3

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): March 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.

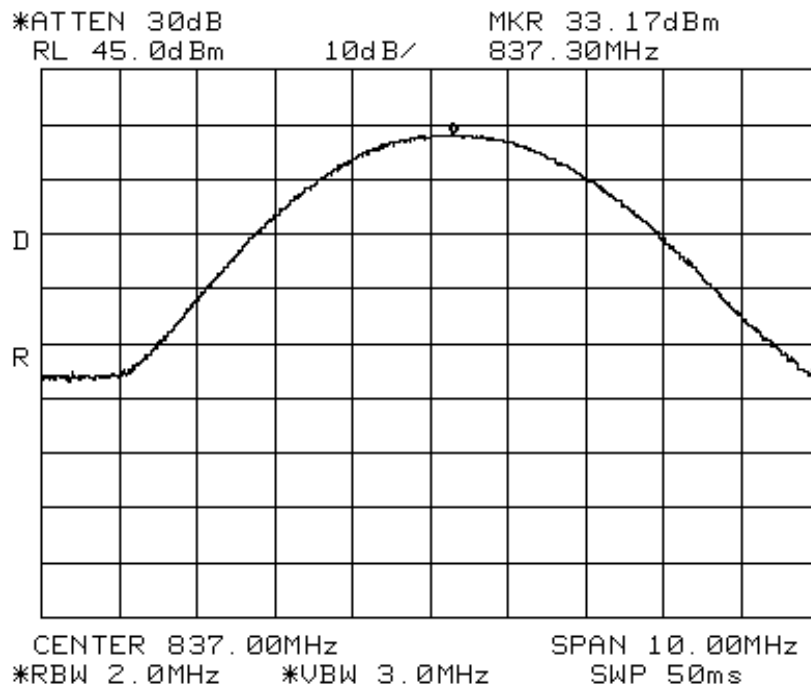
Plots of the RF output Power level of the Digitally modulated carrier, as measured at the RF output of the signal generator and at the RF output terminals of the EUT appear on the following pages:

6.3.4 RESULTS:

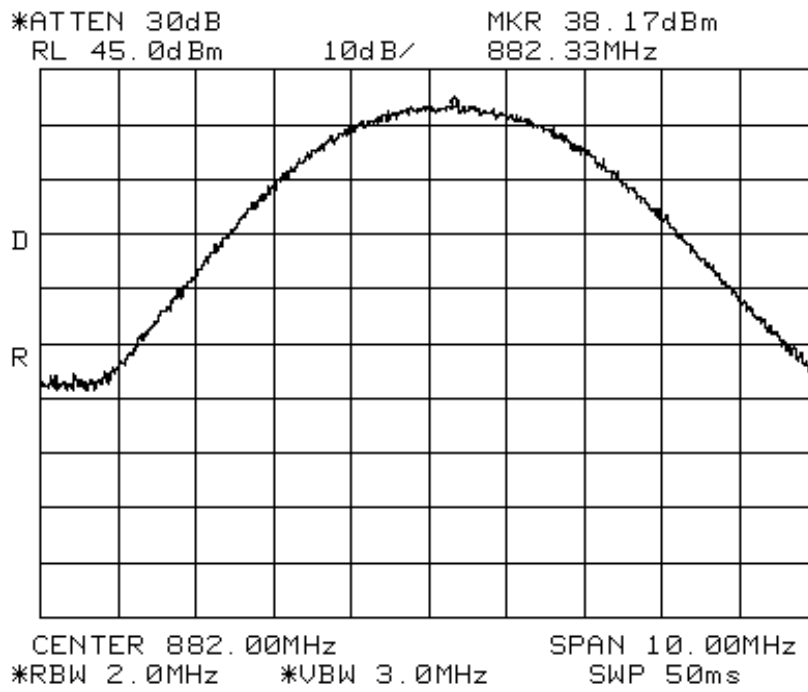
Equipment complies with 47CFR 2.1046 and 22.913(a). The PCS repeater power does not exceed 100 W (50 dBm) at the carrier frequency.

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





RF output power Uplink M10694



RF output power Downlink M10694

6.4 TEST TYPE: Spurious Emissions at Antenna Terminals**6.4.1 TECHNICAL SPECIFICATION:** 2.1051; 22.917(e)**6.4.2 TEST DATE(S):** March 12, 20001**6.4.3 MEASUREMENT PROCEDURES:**

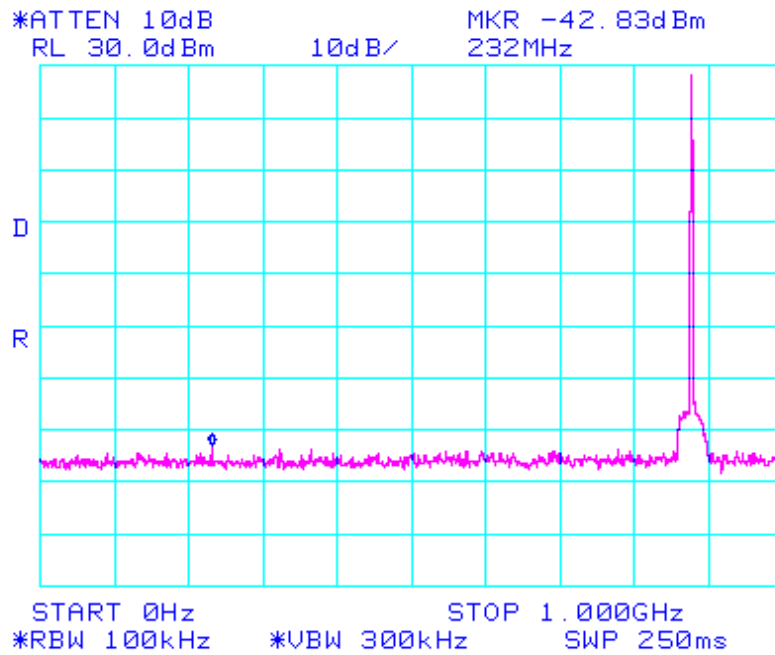
As required by 47 CFR 2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a 50 S attenuator and spectrum analyzer set for a 30 kHz bandwidth. This test was performed with Digitally modulated carrier signals. The Digital signal generator was adjusted 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.

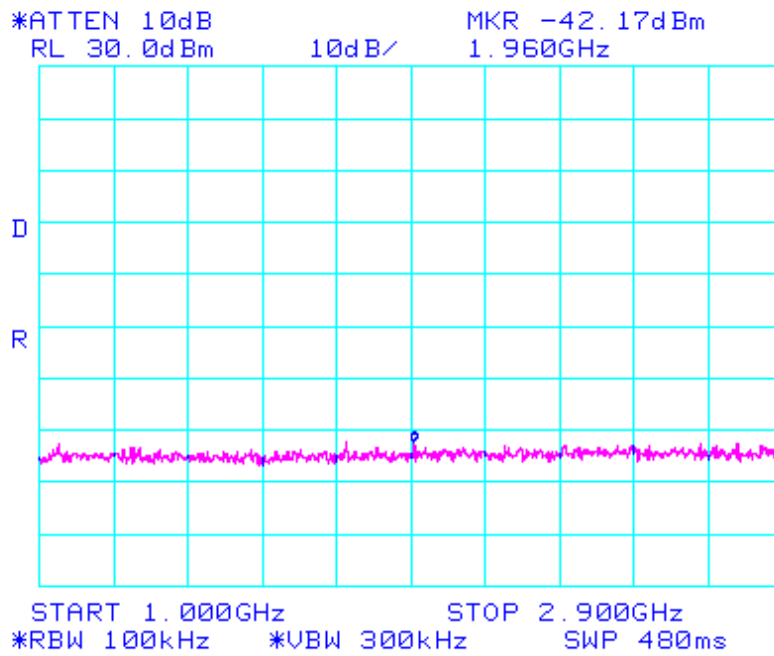
6.4.4 RESULTS:

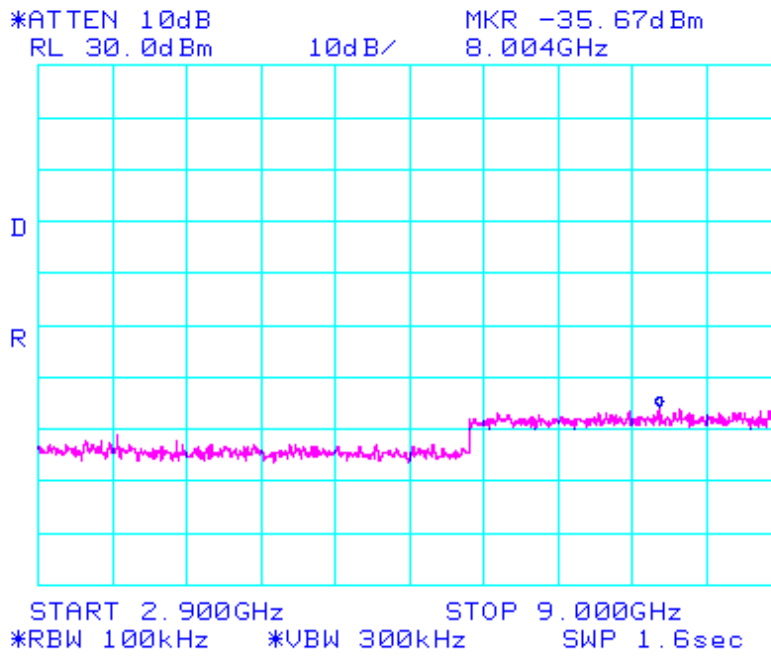
Spur limit = $P_o - (43 + 10\log P) = 143 \text{ dB}\mu\text{V} - (49 \text{ dB}) = 94 \text{ dB}\mu\text{V} = -13.1 \text{ dBm}$

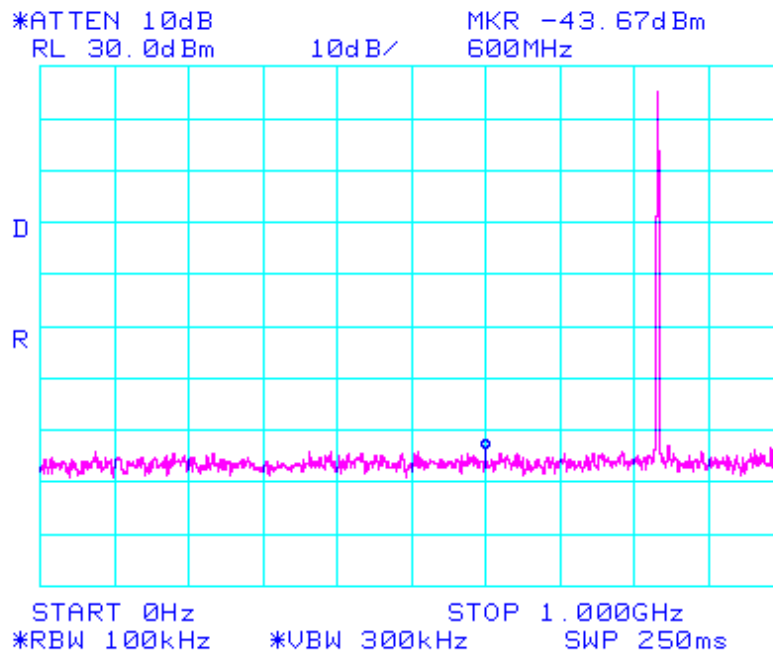
Equipment complies with Section 2.1051 and 24.238(a)

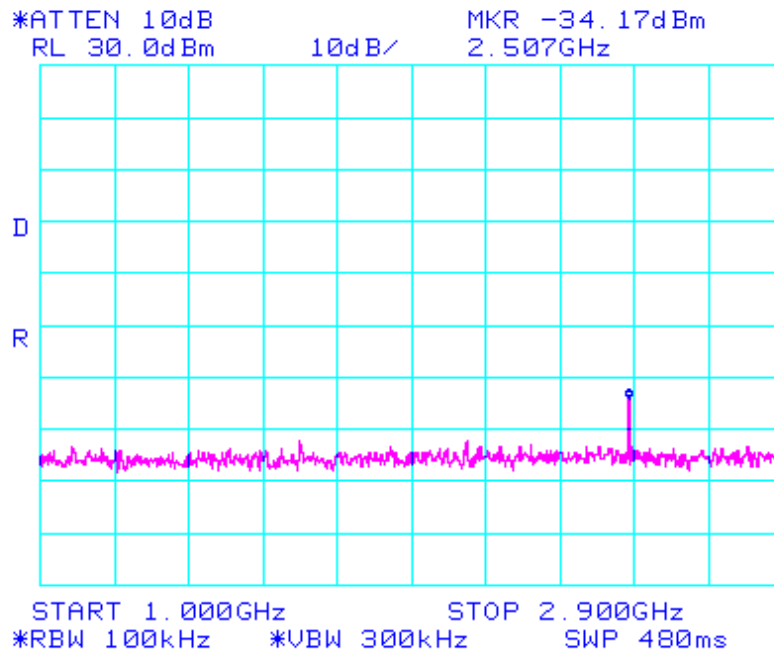
PLOTS OF SPURIOUS EMISSIONS AT ANTENNA TERMINALS : on following pages

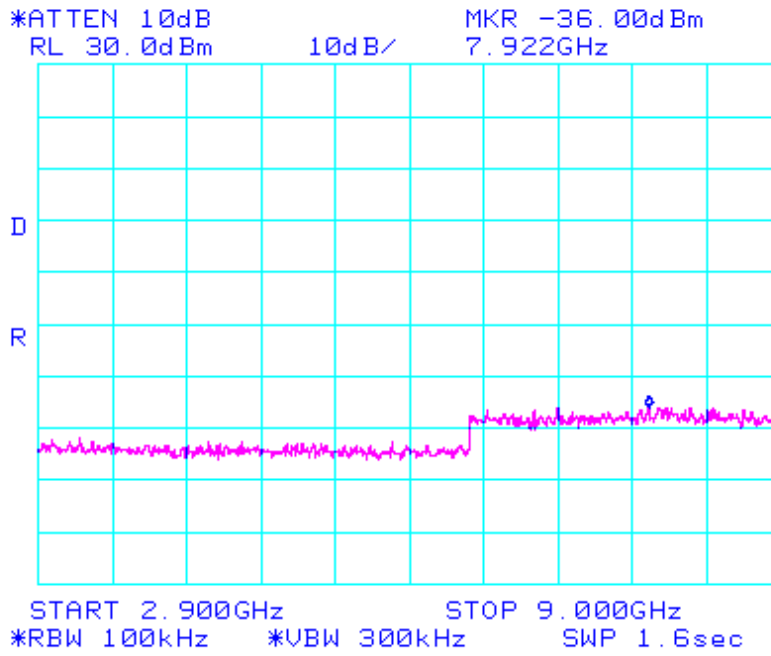
Spur emissions at antenna terminal Downlink M10694

Spur emissions at antenna terminal downlink M10694

Spur emissions at antenna terminal Downlink M10694

Spur emissions at antenna terminal Uplink M10694

Spur emissions at antenna terminal Uplink M10694

Spur emissions at antenna terminal Uplink M10694

6.6 TEST TYPE: Intermodulation Spurious Emissions at Antenna Terminals**6.6.1 TECHNICAL SPECIFICATION:** 47 CFR 2.1051.**6.6.2 TEST DATE(S):** March 15, 2001**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:

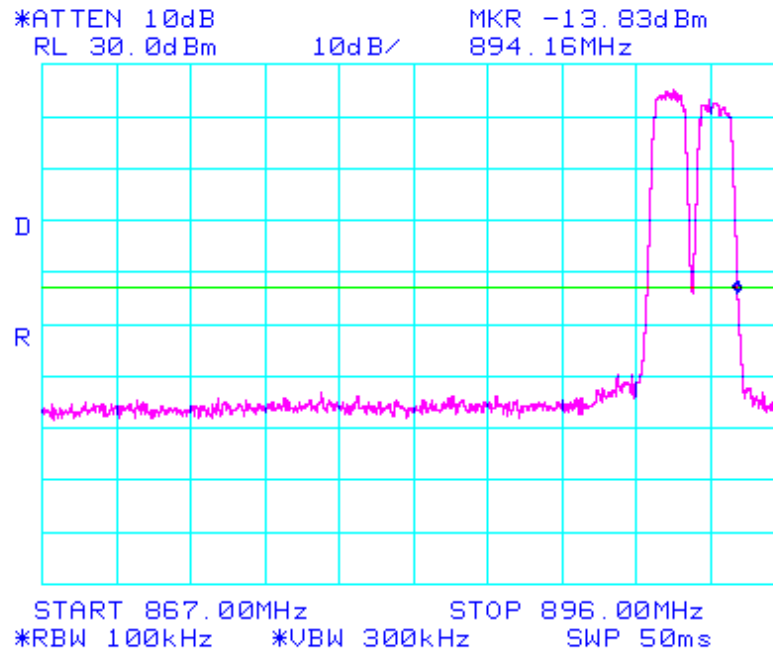
Equipment complies with 47CFR 2.1051. Plots of the spurious emissions as measured at the antenna ports are included in this application as file attachment:

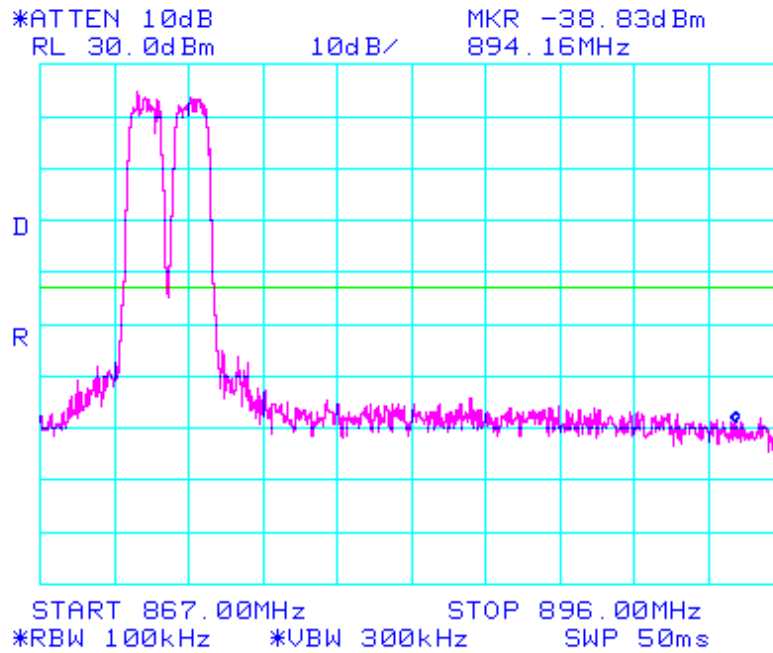
Intermodulation Spurious Products from 2-tone Simultaneous RF(CDMA) Injection At low side and high side of Cellular band. Uplink and Downlink

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

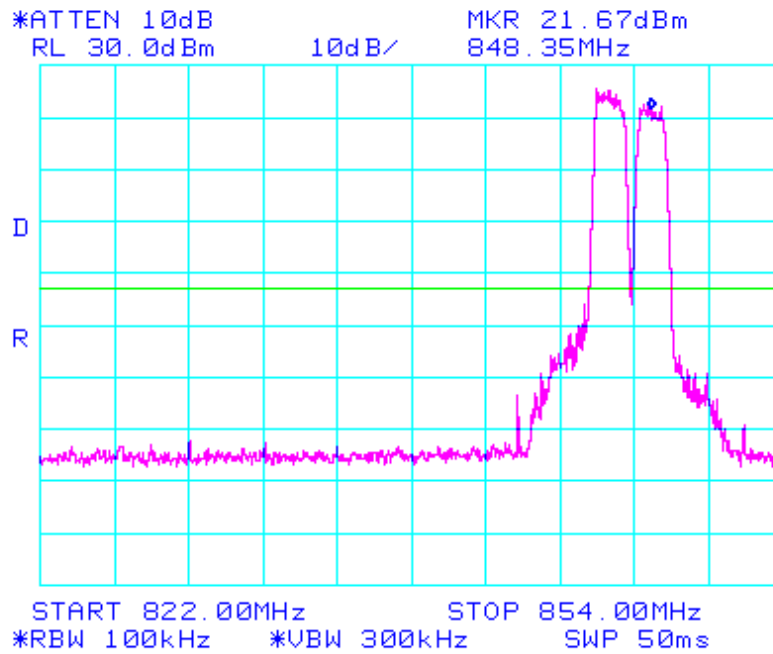
modulation type	Intermodulation products (MHZ)	Emission Level (dBm)	Limit (dBm)
CDMA(Downlink)	894.16	-38.83	-13.1
CDMA(Uplink)	845.05	-44.17	-13.1

**Intermodulation Distortion CDMA modulated input at High side
of the band M10694 Downlink**



Intermodulation Distortion CDMA modulated 2-tone input at low side of the band Downlink M10694

Intermodulation Distortion CDMA modulated 2-tone input at high side of the band M10694 Uplink



Intermodulation Distortion CDMA modulated 2-tone input M10694
At low side of the band Uplink

