



Test Report: 5W40259

Applicant: Dekolink Wireless Ltd.
16 Bazel St, Qiryat Arieh
Petah-Tikva, 49510
Israel

Equipment Under Test: MW-CSR-800AB-25W90
(EUT)

FCC ID: OIWCSR800AB25W90

In Accordance With: **FCC Part 22, Subpart H**

Tested By: Nemko Canada Inc.
303 River Road, R.R. 5
Ottawa, Ontario K1V 1H2

Authorized By: Jason Nixon, Telecommunications Specialist

Date: 24 March 2005

Total Number of Pages: 54

Table of Contents

Section 1. Summary of Test Results	3
Section 2. General Equipment Specification	5
Section 3. RF Power Output	7
Section 4. Occupied Bandwidth.....	11
Section 5. Spurious Emissions at Antenna Terminals	18
Section 6. Field Strength of Spurious Emissions.....	51
Section 7. Block Diagrams	52
Section 8. Test Equipment List.....	54

Section 1. Summary of Test Results**General****All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 22, Subpart H.

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.



TESTED BY: _____
Roman Kuleba, EMC/Wireless Test Specialist

DATE: 24 March 2005

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This report applies only to the items tested.

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	22.913(a)	Complies
Occupied Bandwidth	22.917(c)	Complies
Spurious Emissions at Antenna Terminals	22.917	Complies
Field Strength of Spurious Emissions	22.917	Complies
Frequency Stability	22.355	Complies

Notes:

1. Modulation characteristics were not tested since the tested equipment does not modulate or demodulate the carrier (i.e. the EUT processes the signal but does not produce a modulated waveform).
2. The tested equipment uses the same LO for frequency conversion; therefore the transmitted signal is identical in frequency to the received signal. This was verified by measuring the transmitted (output) signal frequency with a frequency counter that was phase-locked to a signal generator used to generate input RF signal. Measured frequency deviation was 0 Hz and the EUT was deemed to comply with frequency stability requirement.
3. Installation guidelines to be followed as well as recommended types of antennas and safe separation distances needed to meet FCC RF exposure requirements are provided by manufacturer in *Section 4* on pages 11–12 of EUT's *Product and Installation Manual (Revision 1.0)*.

Testing Environment Conditions:

Indoor Conditions: Temperature: 23°C
Humidity: 10%

Outdoor Conditions: Temperature: 5°C
Humidity: 40%

Section 2. General Equipment Specification

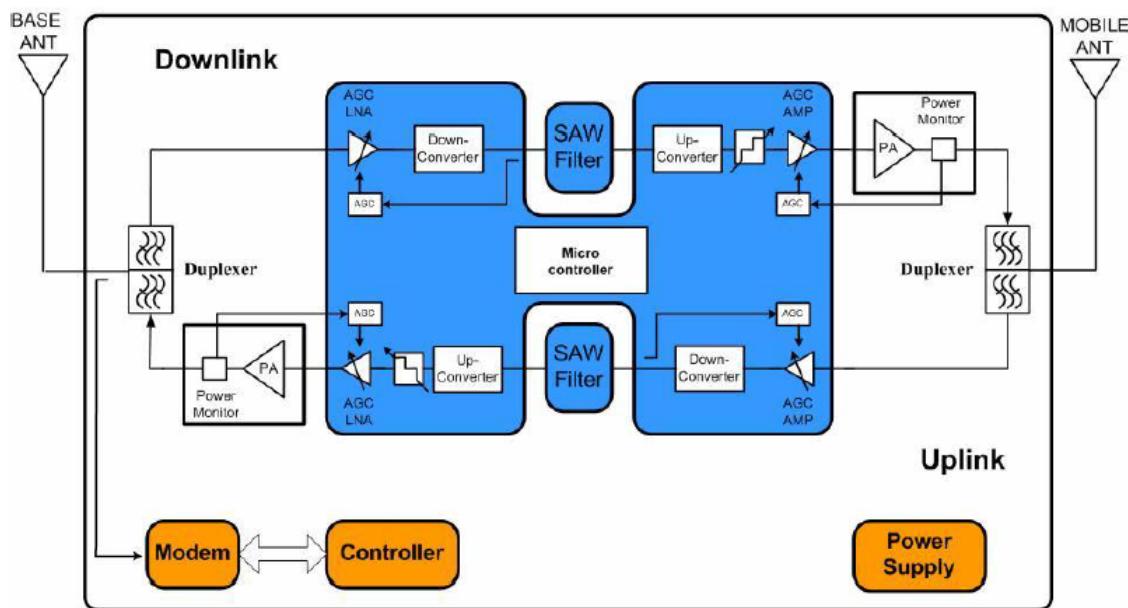
Manufacturer:	Dekolink Wireless Ltd.		
Model No.:	MW-CSR-800AB-25W90		
Serial No.:	0501D034		
Date Received In Laboratory:	March 8, 2005		
Nemko Identification No.:	5W40259, Items No. 1-3 (See Nemko Shipping and Receiving Report)		
Supply Voltage:	110 – 220 VAC		
Frequency Range:	UpLink:	824 – 849 MHz	
	DownLink:	869 – 894 MHz	
RF Output Power (Rated):	UpLink:	0.25 W (24.00 dBm)	
	DownLink:	4.00 W (36.00 dBm)	
RF Output Power (Measured):	See: Section 3		
Maximum Gain:	UpLink:	90 dB	
	DownLink:	90 dB	
Emission Designator:	CDMA (F9W)	GSM (GXW)	TDMA (NADC) (DXW)

Description of operation

Dekolink MW-CSR-800AB-25W90 is an Outdoor CDMA Repeater. The block diagram showed in Figure 1 below illustrates the overall functionality of the repeater.

The EUT is based on a duplexer path configuration, having sharp out of band attenuation filters to improve the isolation between the receiving and transmitting paths. In addition it employs advanced up/down conversion Intermediate Frequency (IF) Surface Acoustic Waves (SAW) filtering architecture in each path for better spectrum purity.

The *Channeler* module (blue colored) consists of dual Radio Frequency (RF) Up/Down Converter sub-modules for Downlink and Uplink paths. The *Channeler* amplifies the received RF signals and converts them into an intermediate frequency (IF). The IF outputs are connected to a SAW Filter. The IF outputs are converted back to the original RF frequencies.

Figure 1:

Section 3. RF Power Output

Test Performed By:	Roman Kuleba	Date of Test: March 8, 2005
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Minimum Standard: 22.913(a)**Test Results:** CompliesUpLink Transmission:

Antenna recommended by manufacturer (highly directional Yagi or similar) to be used for uplink transmission can provide gain: $G_i = 12 - 20 \text{ dBi}$.

Maximum RF output power measured on the uplink transmitter was $P_{TXMAX} = 25.00 \text{ dBm}$ (see measurement data).

The highest ERP that can be transmitted from uplink antenna is then:

$$\begin{aligned} \text{ERP}_{MAX} &= P_{TXMAX} (\text{dBm}) + G_i (\text{dBi}) - 2.1 \text{ dB} \\ \text{ERP}_{MAX} &= 25 \text{ dBm} + 20 \text{ dBi} - 2.1 \text{ dB} = 42.9 \text{ dBm} = 19.5 \text{ W} \end{aligned}$$

Margin to the limit (500 W):

$$\text{Margin} = \text{Limit} - \text{ERP}_{MAX} = 57.00 \text{ dBm} - 42.9 \text{ dBm} = 14.1 \text{ dB}$$

Outdoor DownLink Transmission:

Antenna recommended by manufacturer (omni-directional or wide beam) to be used for outdoor downlink transmission can provide isotropic gain up to: $G_i = 10 \text{ dBi}$.

Maximum RF output power measured on the downlink transmitter did not exceed maximum rated power: $P_{TXMAX} = 36 \text{ dBm}$ (see measurement data).

The highest ERP that can be transmitted from outdoor downlink antenna is then:

$$\begin{aligned} \text{ERP}_{MAX} &= P_{TXMAX} (\text{dBm}) + G_i (\text{dBi}) - 2.1 \text{ dB} \\ \text{ERP}_{MAX} &= 36 \text{ dBm} + 10 \text{ dBi} - 2.1 \text{ dB} = 43.9 \text{ dBm} = 24.5 \text{ W} \end{aligned}$$

Margin to the limit (500 W):

$$\text{Margin} = \text{Limit} - \text{ERP}_{MAX} = 57.00 \text{ dBm} - 43.9 \text{ dBm} = 13.1 \text{ dB}$$

RF Power OutputIndoor DownLink Transmission:

Antenna recommended by manufacturer (omni-directional) to be used for indoor downlink transmission can provide isotropic gain up to: $G_i = 2 \text{ dBi}$. Output power of the transmitter has to be split into 5 or more antennas (7 dB attenuation) to keep ERP transmitted from single indoor antenna below 1.5 W.

Maximum RF output power measured on the downlink transmitter did not exceed maximum rated power: $P_{TXMAX} = 36 \text{ dBm}$ (see measurement data).

The highest ERP that can be transmitted from indoor downlink antenna is then:

$$\begin{aligned} \text{ERP}_{MAX} &= P_{TXMAX} (\text{dBm}) + G_i (\text{dBi}) - 2.1 \text{ dB} - 7 \text{ dB} \\ \text{ERP}_{MAX} &= 36 \text{ dBm} + 2 \text{ dBi} - 2.1 \text{ dB} - 7 \text{ dB} = 28.9 \text{ dBm} = 0.78 \text{ W} \end{aligned}$$

Margin to the limit (1.5 W):

$$\text{Margin} = \text{Limit} - \text{ERP}_{MAX} = 31.8 \text{ dBm} - 28.9 \text{ dBm} = 2.9 \text{ dB}$$

Measurement Data:

See enclosed tables. The maximum RF output power is within $\pm 1 \text{ dB}$ of the manufacturers rated power.

*EQUIPMENT: MW-CSR-800AB-25W90***RF Power Output****CDMA (IS95 QPSK):**

UpLink:

Channel Freq. MHz	Measured Power (dBm)	Rated Power (dBm)
824.0	23.79	24.00
836.5	24.63	24.00
845.0	24.38	24.00

DownLink:

Channel Freq. MHz	Measured Power (dBm)	Rated Power (dBm)
869.0	35.25	36.00
881.5	35.73	36.00
894.0	35.05	36.00

GSM (GMSK):

UpLink:

Channel Freq. MHz	Measured Power (dBm)	Rated Power (dBm)
824.0	24.40	24.00
836.5	25.00	24.00
845.0	25.00	24.00

DownLink:

Channel Freq. MHz	Measured Power (dBm)	Rated Power (dBm)
869.0	35.30	36.00
881.5	35.77	36.00
894.0	35.00	36.00

RF Power Output**TDMA (NADC $\pi/4$ DQPSK):**

UpLink:

Channel Freq. MHz	Measured Power (dBm)	Rated Power (dBm)
824.0	23.34	24.00
836.5	24.10	24.00
845.0	23.82	24.00

DownLink:

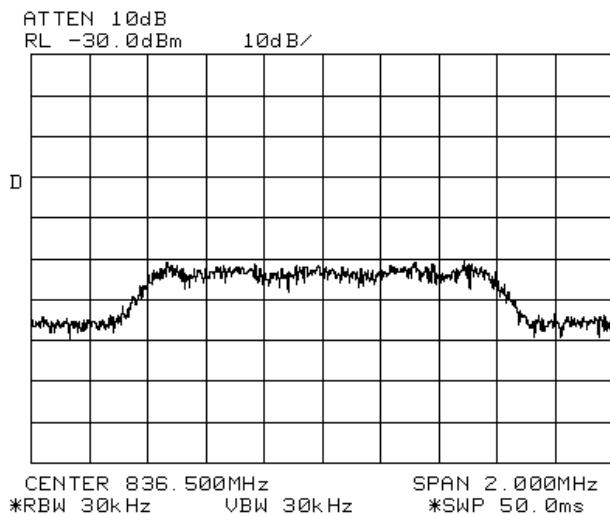
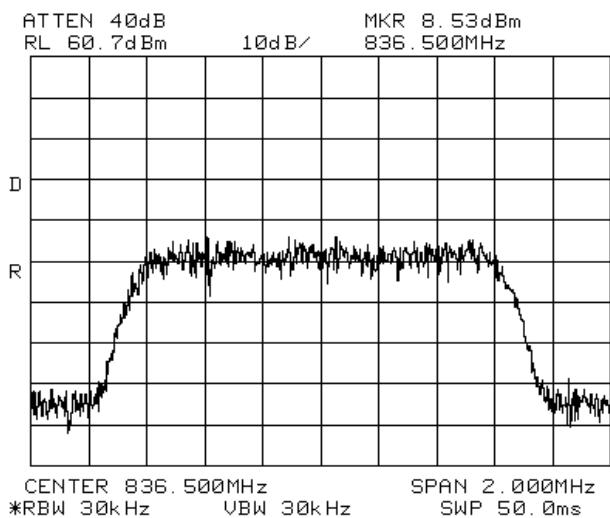
Channel Freq. MHz	Measured Power (dBm)	Rated Power (dBm)
869.0	35.30	36.00
881.5	35.76	36.00
894.0	35.05	36.00

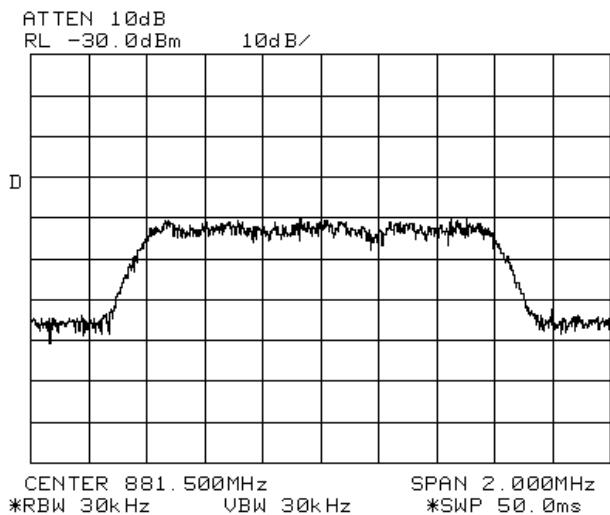
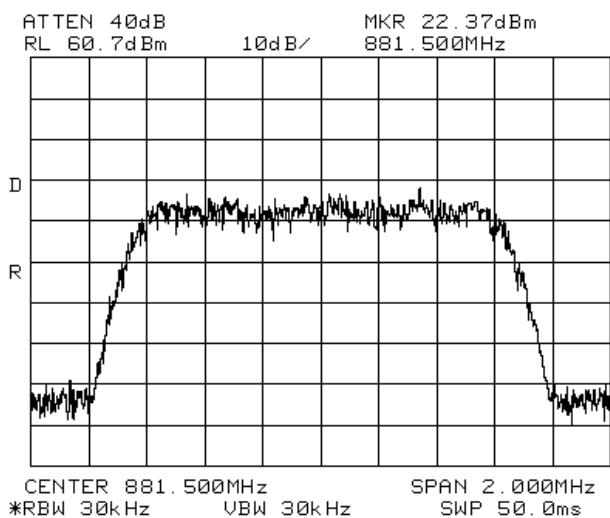
Section 4. Occupied Bandwidth**Para. No.: 2.1049**

Test Performed By:	Roman Kuleba	Date of Test: March 9, 2005
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Minimum Standard: 22.917, Input vs. Output**Test Results:** Complies**Measurement Data:** See Attached Graphs

The occupied bandwidth was measured by comparison of input to the output signal. This was done in order to determine if there was any degradation to the output signal due to the amplification through the repeater.

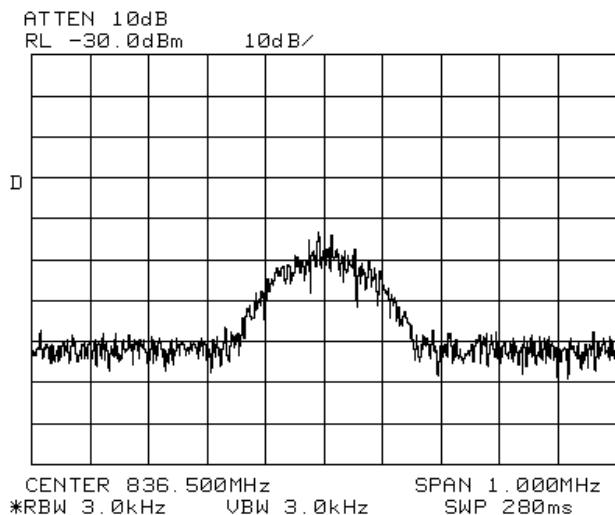
*EQUIPMENT: MW-CSR-800AB-25W90***Occupied Bandwidth****CDMA, UpLink Input:****CDMA, UpLink Output:**

*EQUIPMENT: MW-CSR-800AB-25W90***Occupied Bandwidth****CDMA, DownLink Input:****CDMA DownLink Output:**

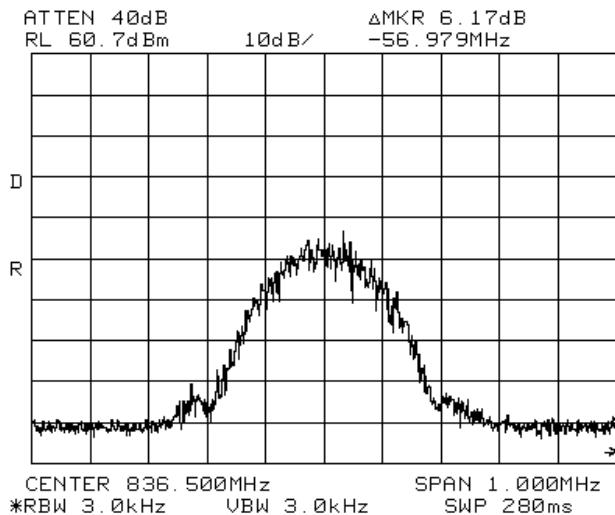
EQUIPMENT: MW-CSR-800AB-25W90

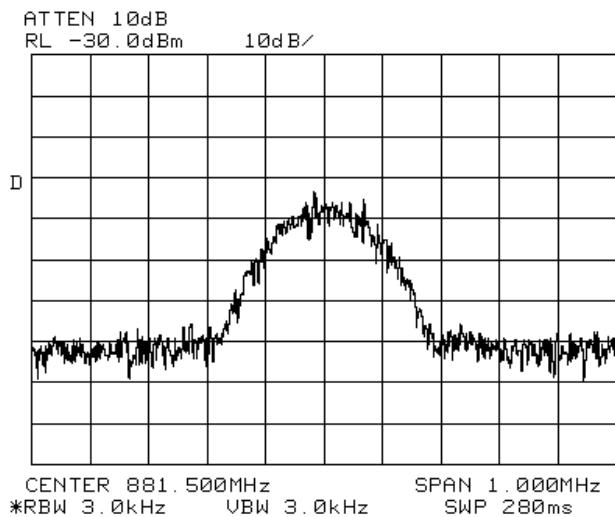
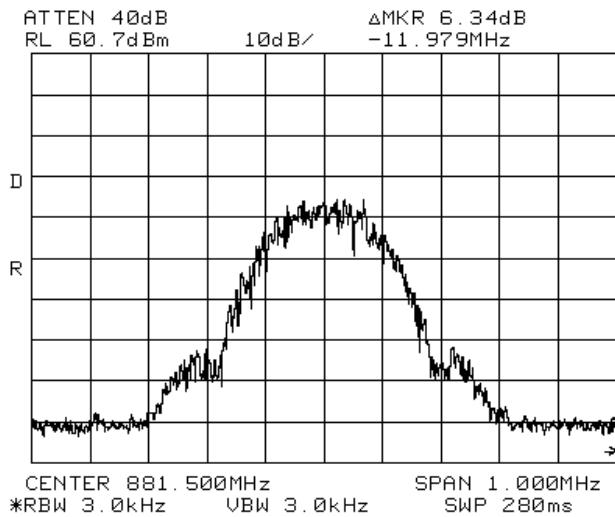
Occupied Bandwidth

GSM, UpLink Input:



GSM, UpLink Output:

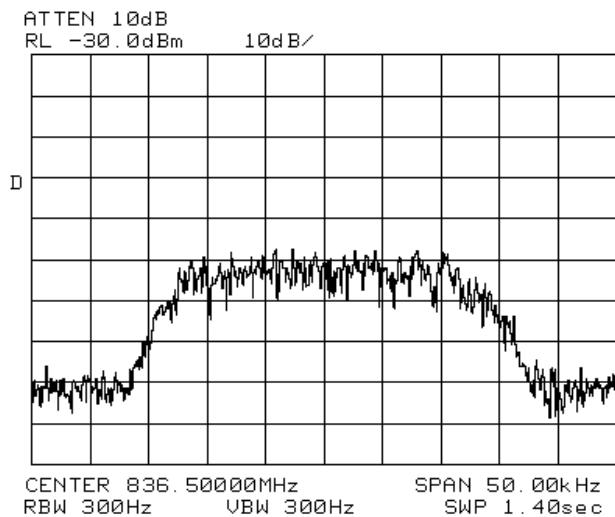


*EQUIPMENT: MW-CSR-800AB-25W90***Occupied Bandwidth****GSM, DownLink Input:****GSM, DownLink Output:**

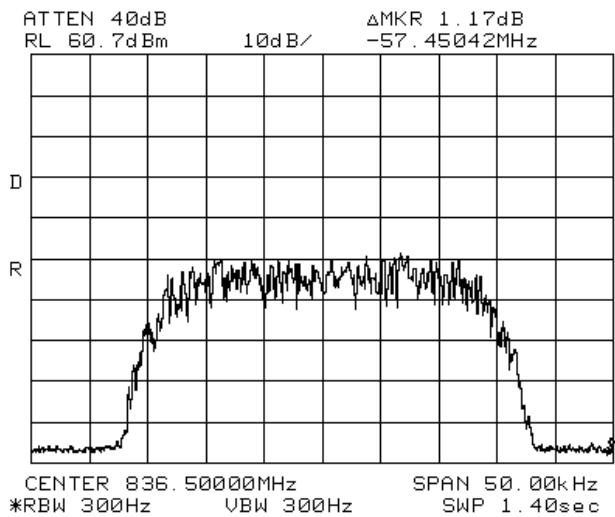
EQUIPMENT: MW-CSR-800AB-25W90

Occupied Bandwidth

TDMA (NADC), UpLink Input:



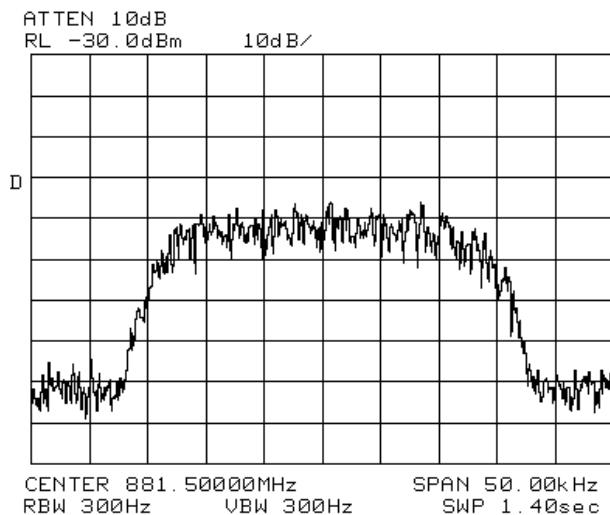
TDMA (NADC), UpLink Output:



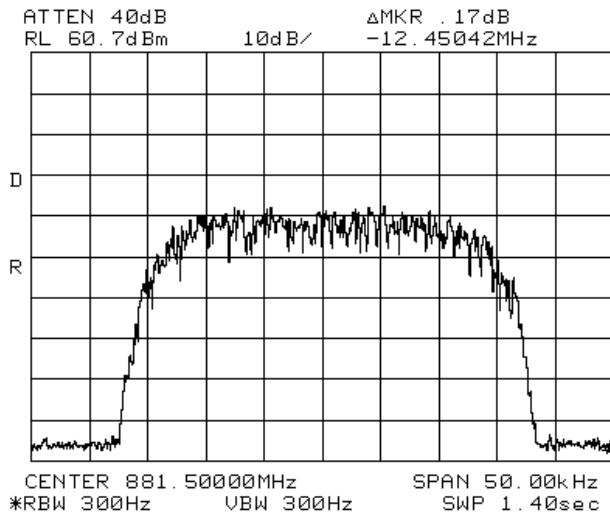
EQUIPMENT: MW-CSR-800AB-25W90

Occupied Bandwidth

TDMA (NADC), DownLink Input:



TDMA (NADC), DownLink Output:



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FCC PART 22, SUBPART H

EQUIPMENT: MW-CSR-800AB-25W90

Section 5. Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

Test Performed By:	Roman Kuleba	Date of Test: March 10, 2005
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Minimum Standard: 22.917(e): -13dBm

Test Results: Complies

Measurement Data: See attached graphs. Only worst case has been reported

Spurious Emissions at Antenna Terminals

UpLink

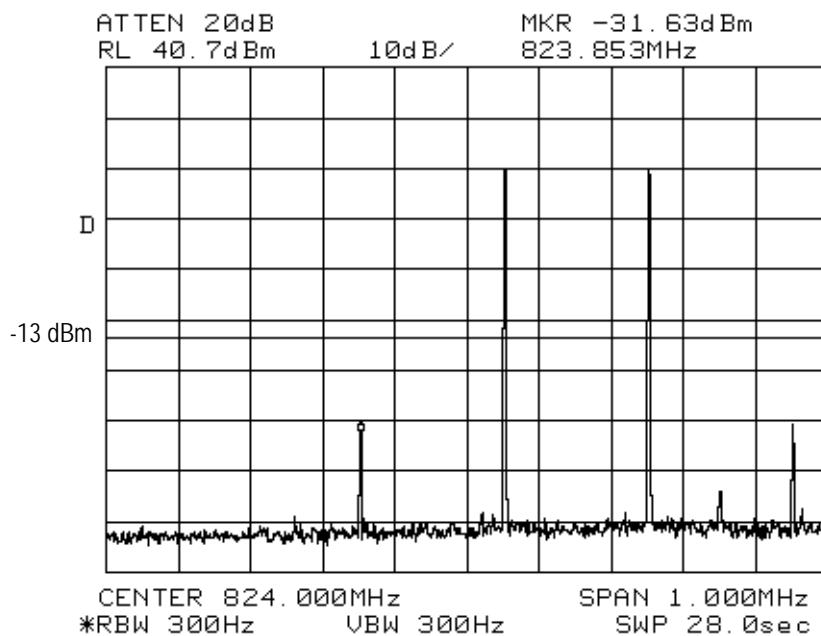
Unmodulated Carrier

Lower Band Edge (824 MHz)

$f_{TX1} = 824.05$ MHz

$f_{TX2} = 824.25$ MHz

21 dBm per carrier – 24 dBm composite



Spurious Emissions at Antenna Terminals

UpLink

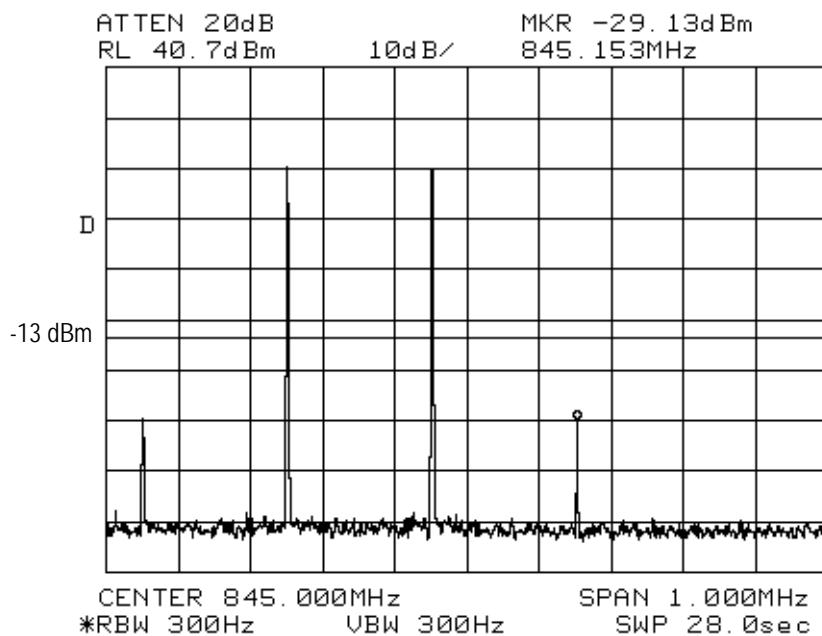
Unmodulated Carrier

Upper Band Edge (845 MHz)

$f_{TX1} = 844.75$ MHz

$f_{TX2} = 844.95$ MHz

21 dBm per carrier – 24 dBm composite



Spurious Emissions at Antenna Terminals

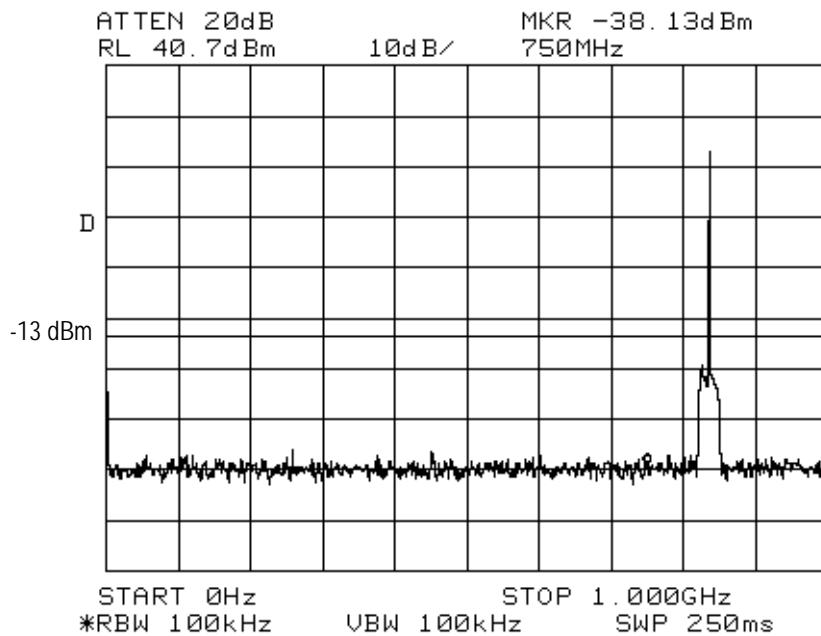
UpLink

Unmodulated Carrier

Frequency Range: 0 – 1000 MHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

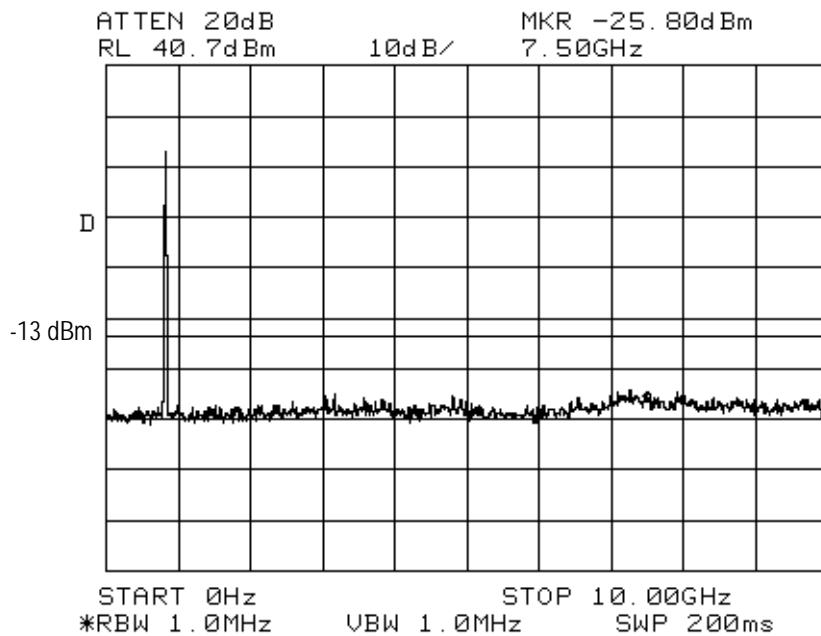
UpLink

Unmodulated Carrier

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

DownLink

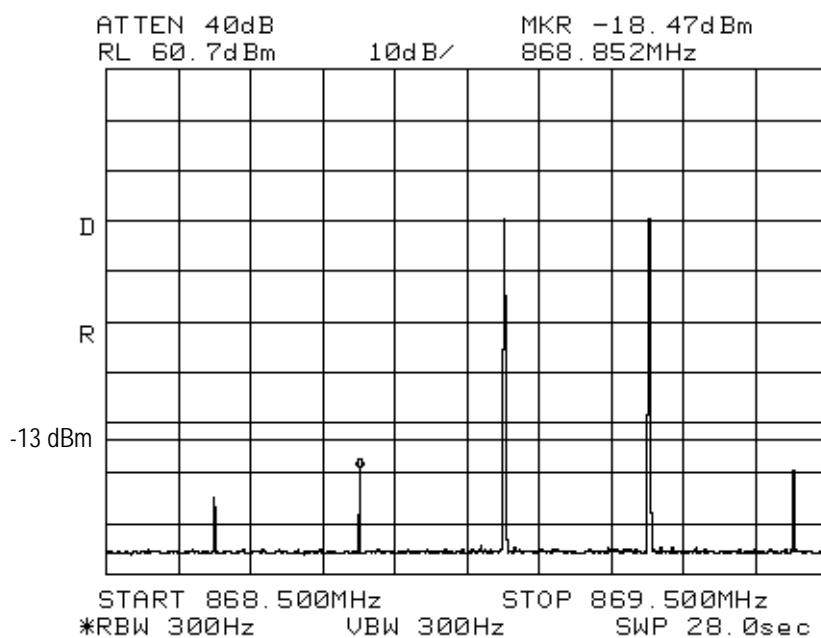
Unmodulated Carrier

Lower Band Edge (869 MHz)

$f_{TX1} = 869.05$ MHz

$f_{TX2} = 869.25$ MHz

33 dBm per carrier – 36 dBm composite



EQUIPMENT: MW-CSR-800AB-25W90

Spurious Emissions at Antenna Terminals

DownLink

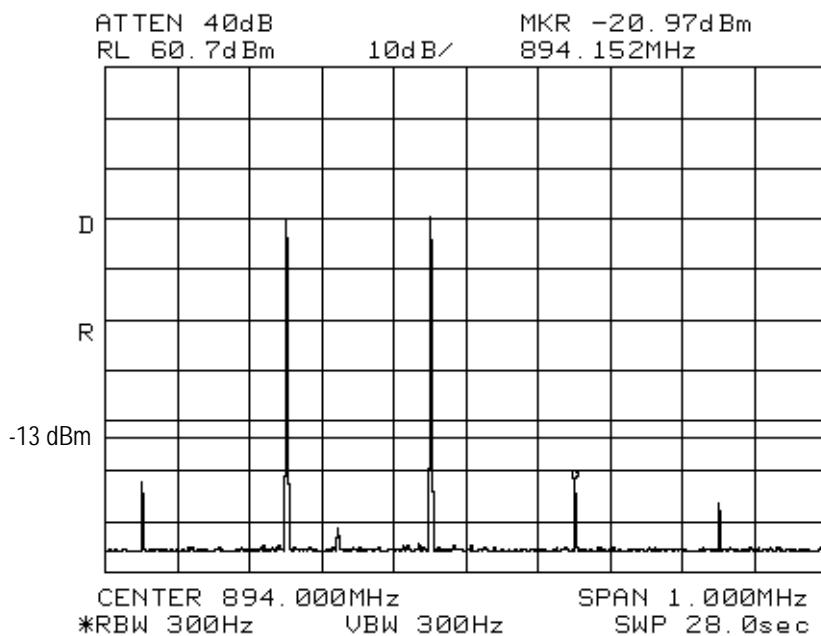
Unmodulated Carrier

Upper Band Edge (894 MHz)

$f_{TX1} = 893.75$ MHz

$f_{TX2} = 893.95$ MHz

33 dBm per carrier – 36 dBm composite



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FCC PART 22, SUBPART H

EQUIPMENT: MW-CSR-800AB-25W90

Spurious Emissions at Antenna Terminals

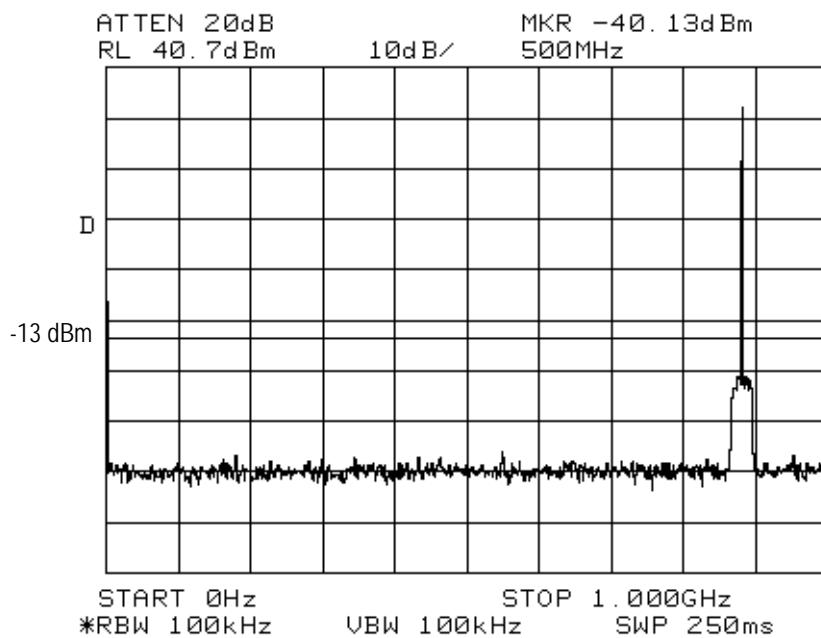
DownLink

Unmodulated Carrier

Frequency Range: 0 – 1000 MHz

Single Carrier:

$$f_{TX} = 881.50 \text{ MHz}, P_{TX} = 36 \text{ dBm}$$



Spurious Emissions at Antenna Terminals

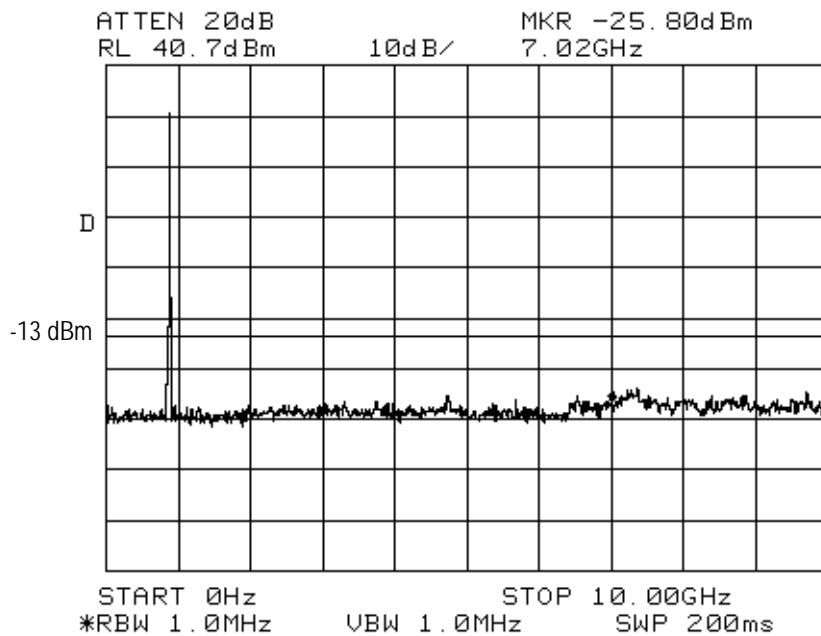
DownLink

Unmodulated Carrier

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 881.50$ MHz, $P_{TX} = 36$ dBm



Spurious Emissions at Antenna Terminals

UpLink

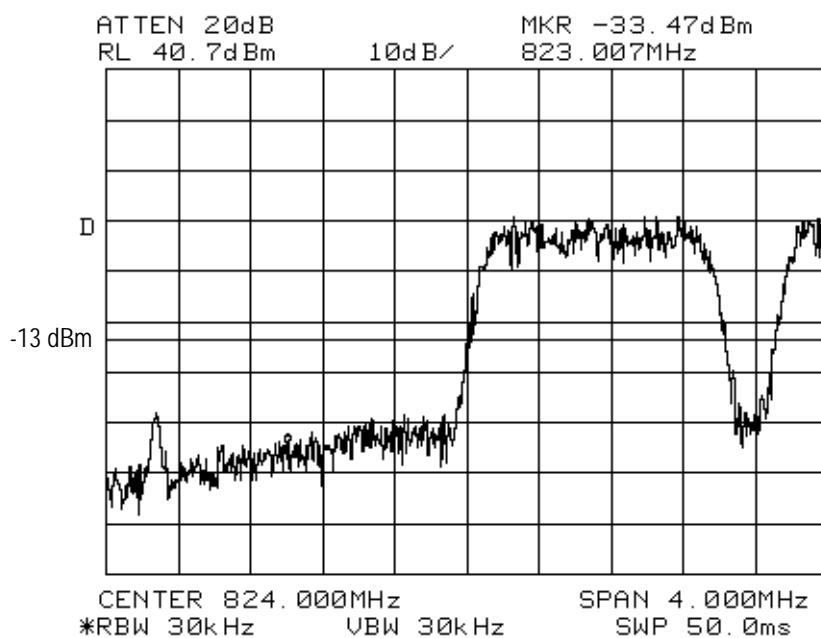
Modulation: CDMA

Lower Band Edge (824 MHz)

$f_{TX1} = 824.70$ MHz

$f_{TX2} = 826.40$ MHz

21 dBm per carrier – 24 dBm composite



Spurious Emissions at Antenna Terminals

UpLink

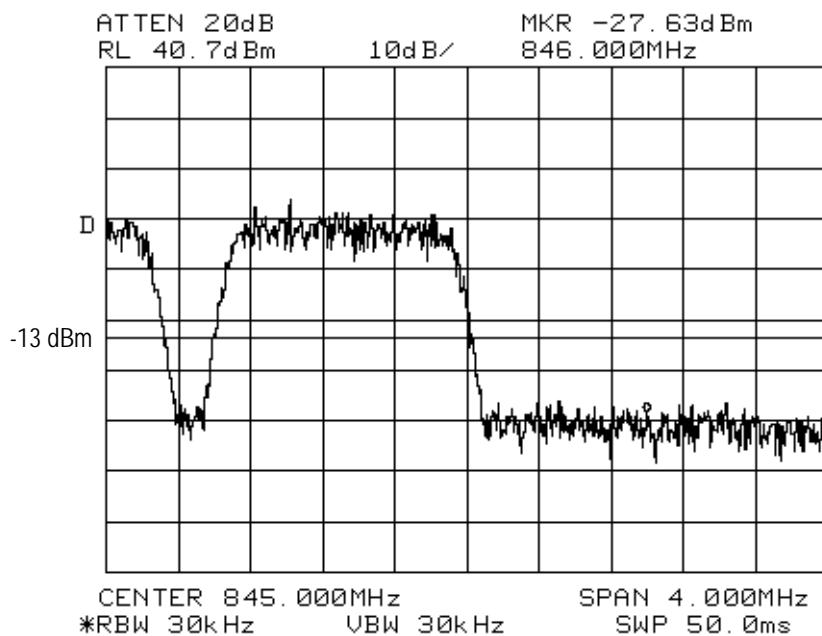
Modulation: CDMA

Upper Band Edge (845 MHz)

$f_{TX1} = 842.60$ MHz

$f_{TX2} = 844.30$ MHz

21 dBm per carrier – 24 dBm composite



Spurious Emissions at Antenna Terminals

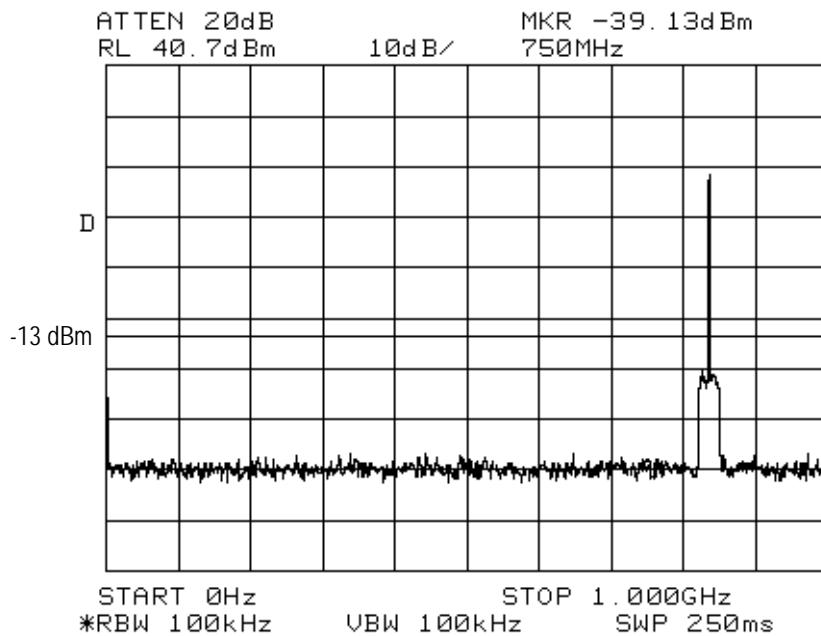
UpLink

Modulation: CDMA

Frequency Range: 0 – 1000 MHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

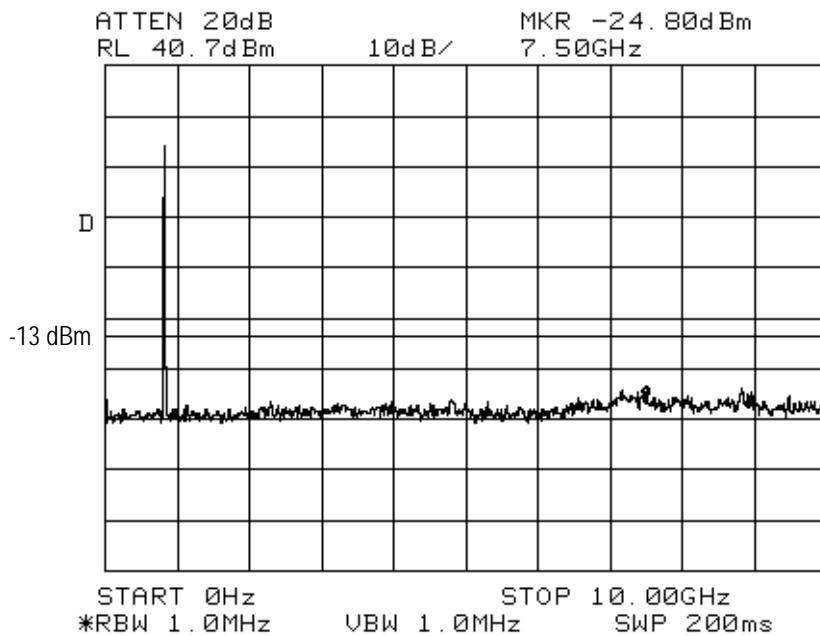
UpLink

Modulation: CDMA

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

DownLink

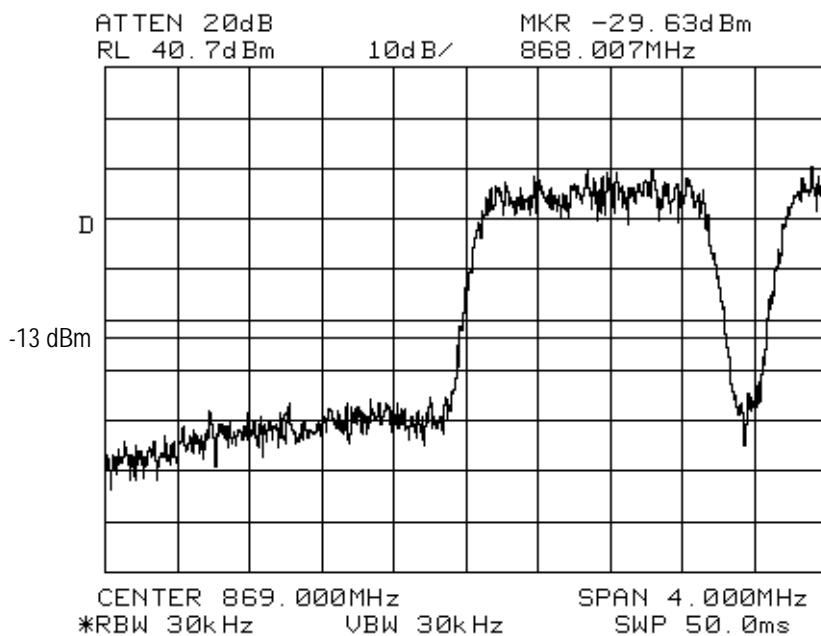
Modulation: CDMA

Lower Band Edge (869 MHz)

$f_{TX1} = 869.70$ MHz

$f_{TX2} = 871.40$ MHz

33 dBm per carrier – 36 dBm composite



Spurious Emissions at Antenna Terminals

DownLink

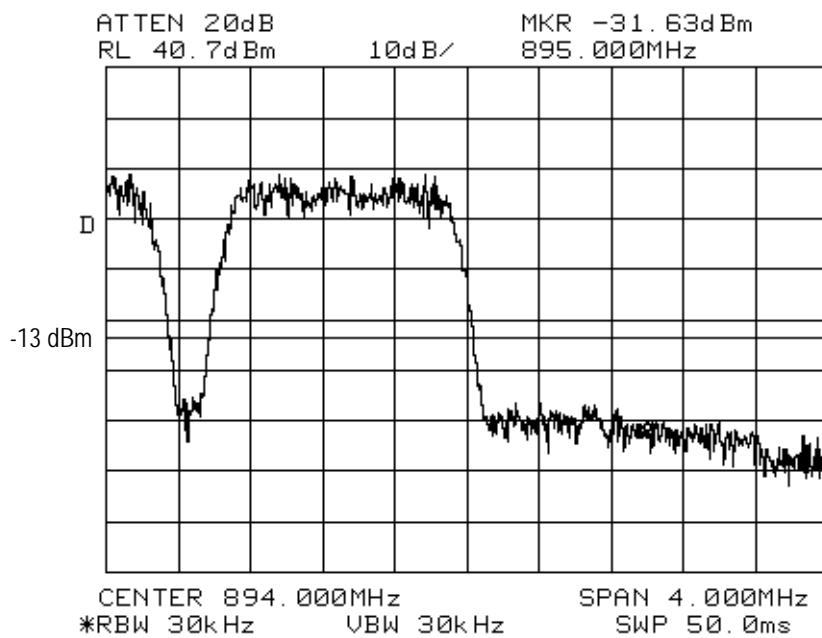
Modulation: CDMA

Upper Band Edge (894 MHz)

$f_{TX1} = 891.60$ MHz

$f_{TX2} = 893.30$ MHz

33 dBm per carrier – 36 dBm composite



Spurious Emissions at Antenna Terminals

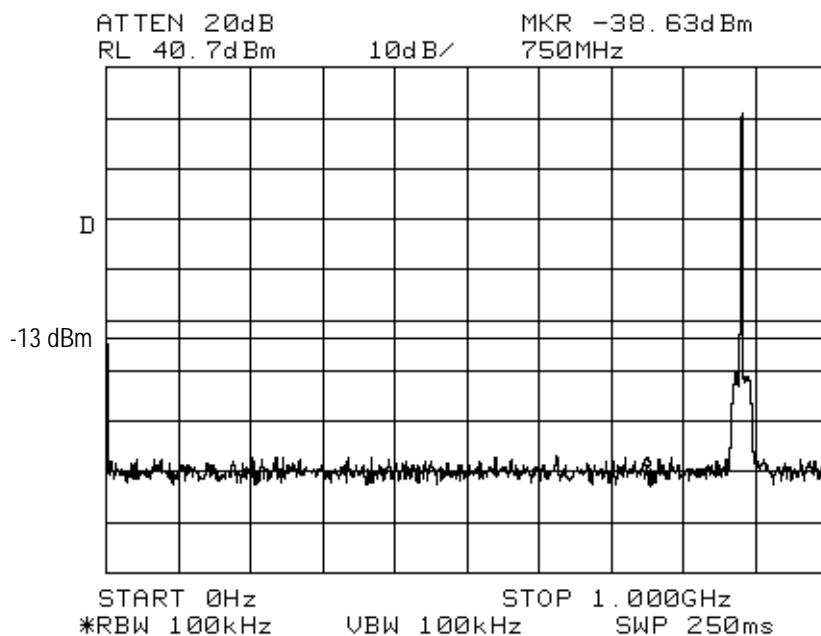
DownLink

Modulation: CDMA

Frequency Range: 0 – 1000 MHz

Single Carrier:

$f_{TX} = 881.50$ MHz, $P_{TX} = 36$ dBm



Spurious Emissions at Antenna Terminals

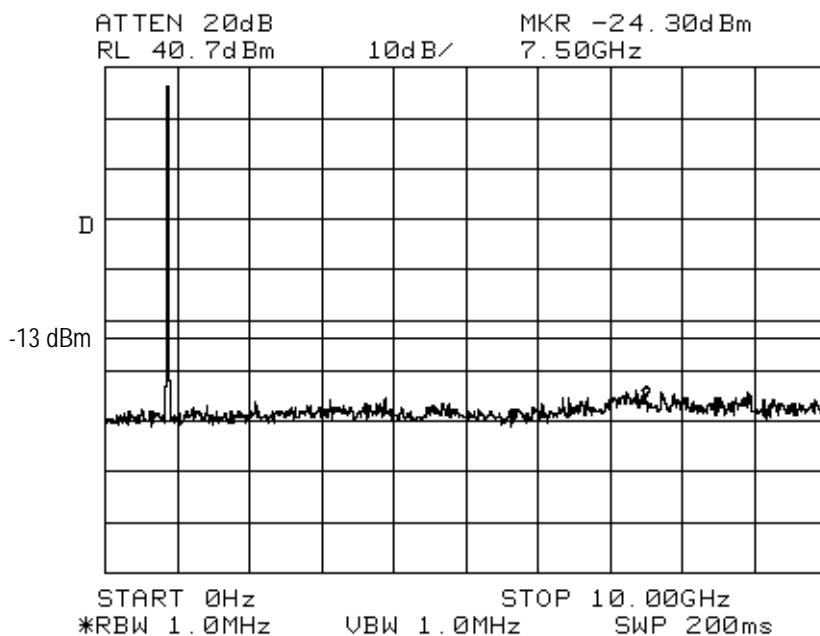
DownLink

Modulation: CDMA

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 881.50$ MHz, $P_{TX} = 36$ dBm



Spurious Emissions at Antenna Terminals

UpLink

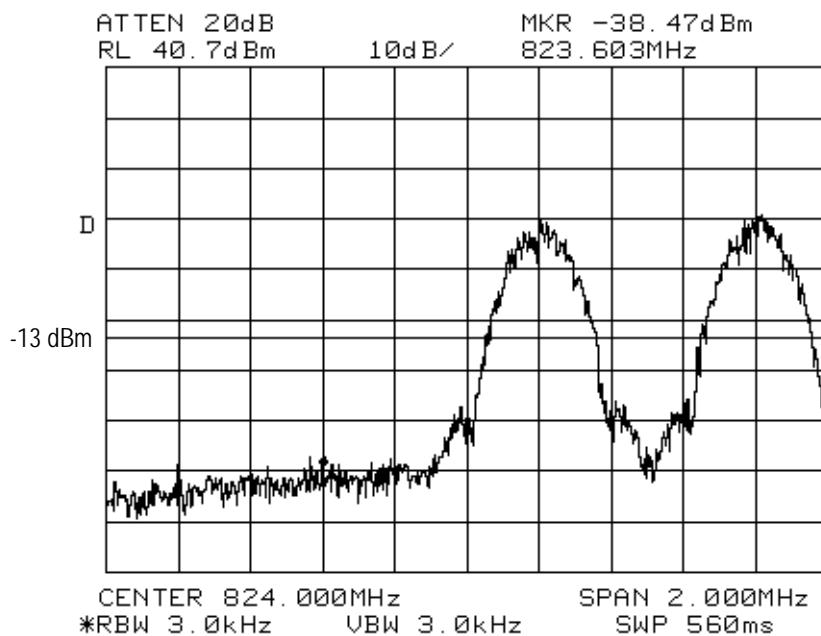
Modulation: GSM

Lower Band Edge (824 MHz)

$f_{TX1} = 824.20$ MHz

$f_{TX2} = 824.80$ MHz

21 dBm per carrier – 24 dBm composite



EQUIPMENT: MW-CSR-800AB-25W90

Spurious Emissions at Antenna Terminals

UpLink

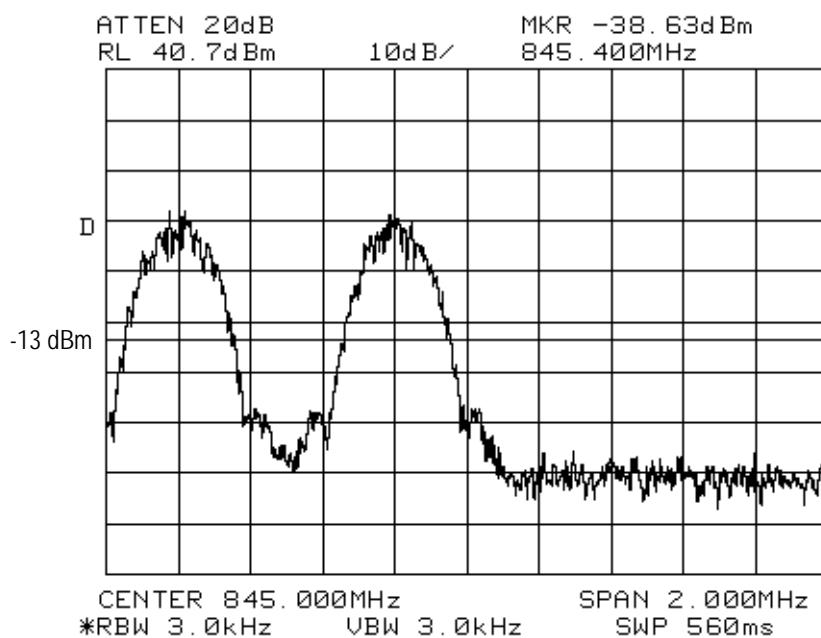
Modulation: GSM

Upper Band Edge (845 MHz)

$f_{TX1} = 844.20$ MHz

$f_{TX2} = 844.80$ MHz

21 dBm per carrier – 24 dBm composite



Spurious Emissions at Antenna Terminals

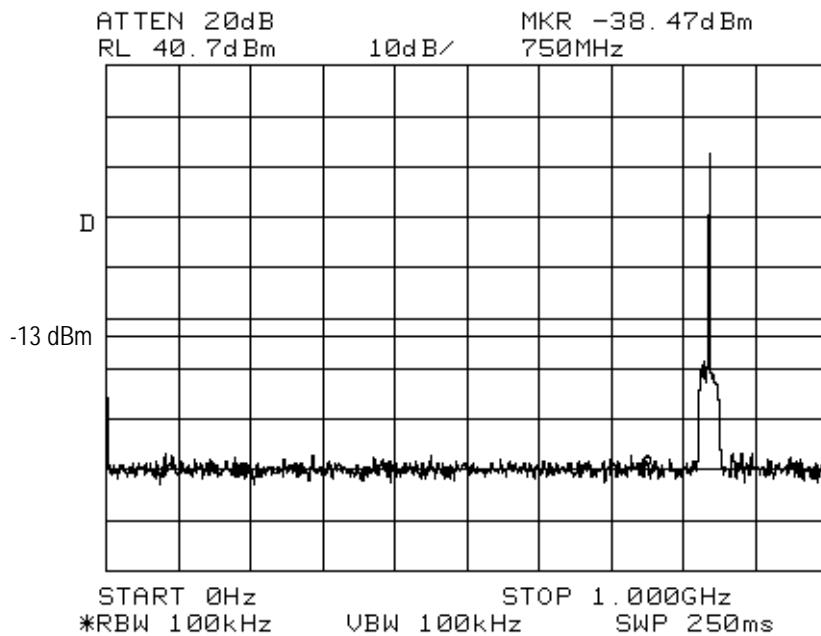
UpLink

Modulation: GSM

Frequency Range: 0 – 1000 MHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

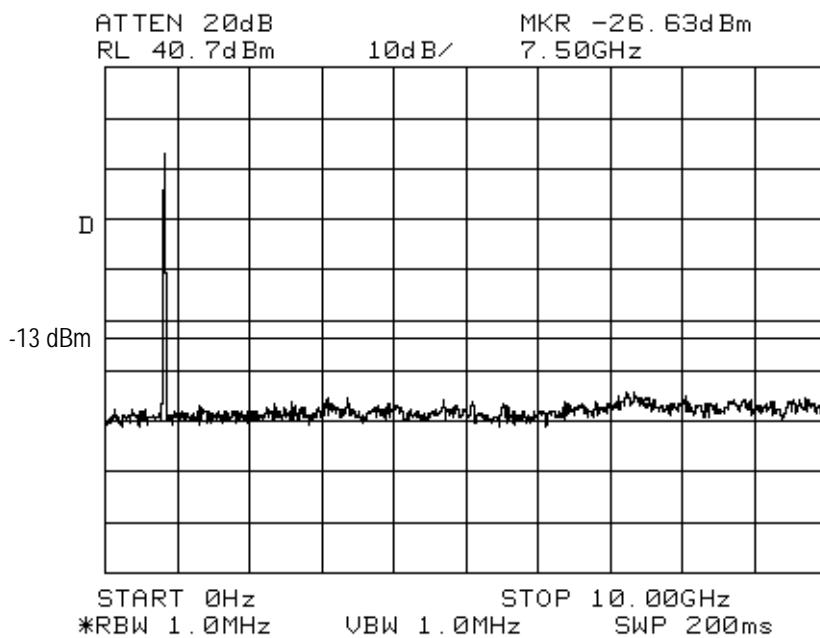
UpLink

Modulation: GSM

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

DownLink

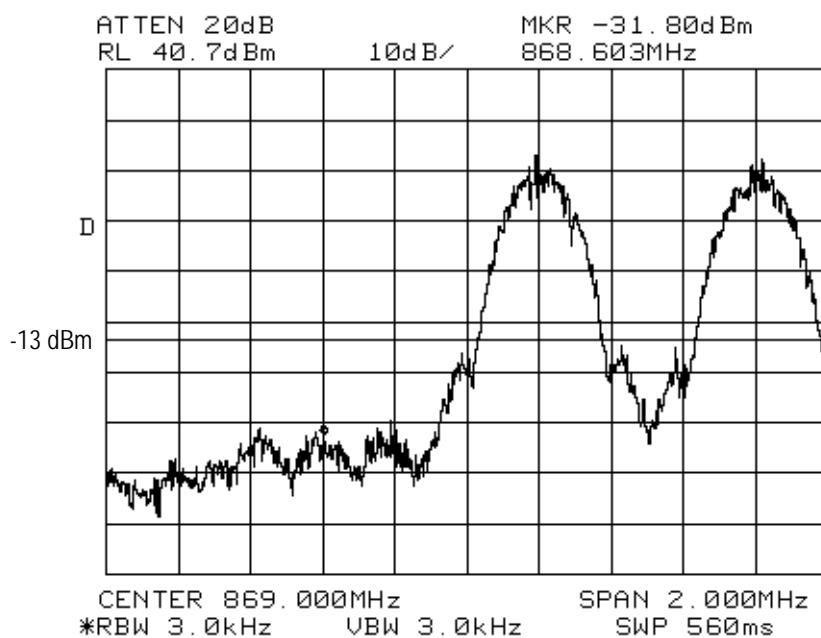
Modulation: GSM

Lower Band Edge (869 MHz)

$f_{TX1} = 869.20$ MHz

$f_{TX2} = 869.80$ MHz

33 dBm per carrier – 36 dBm composite



EQUIPMENT: MW-CSR-800AB-25W90

Spurious Emissions at Antenna Terminals

DownLink

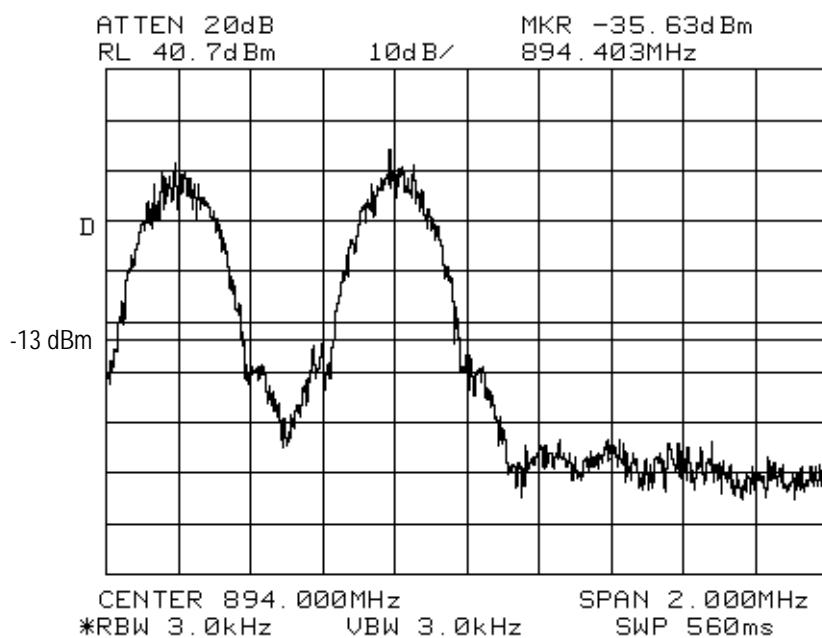
Modulation: GSM

Upper Band Edge (894 MHz)

$f_{TX1} = 893.20$ MHz

$f_{TX2} = 893.80$ MHz

33 dBm per carrier – 36 dBm composite



Spurious Emissions at Antenna Terminals

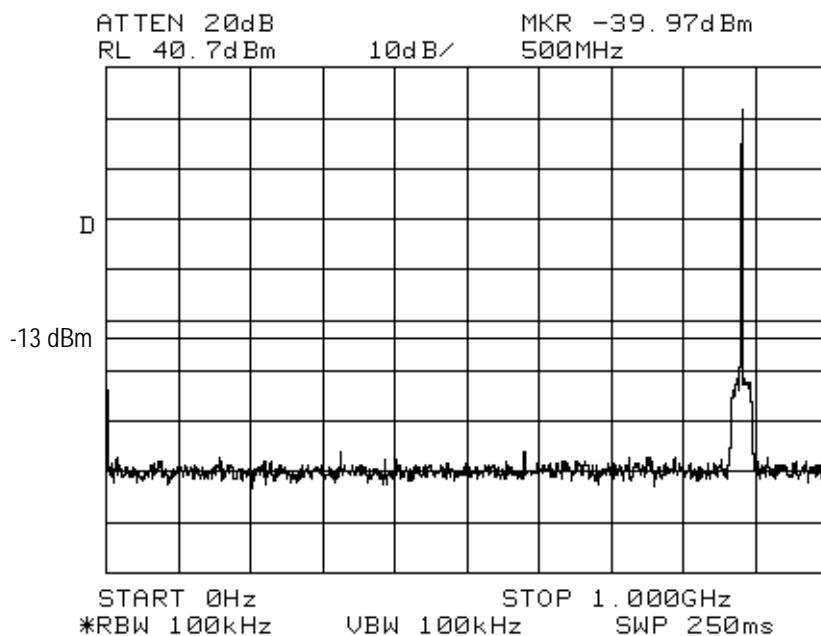
DownLink

Modulation: GSM

Frequency Range: 0 – 1000 MHz

Single Carrier:

$f_{TX} = 881.50$ MHz, $P_{TX} = 36$ dBm



Spurious Emissions at Antenna Terminals

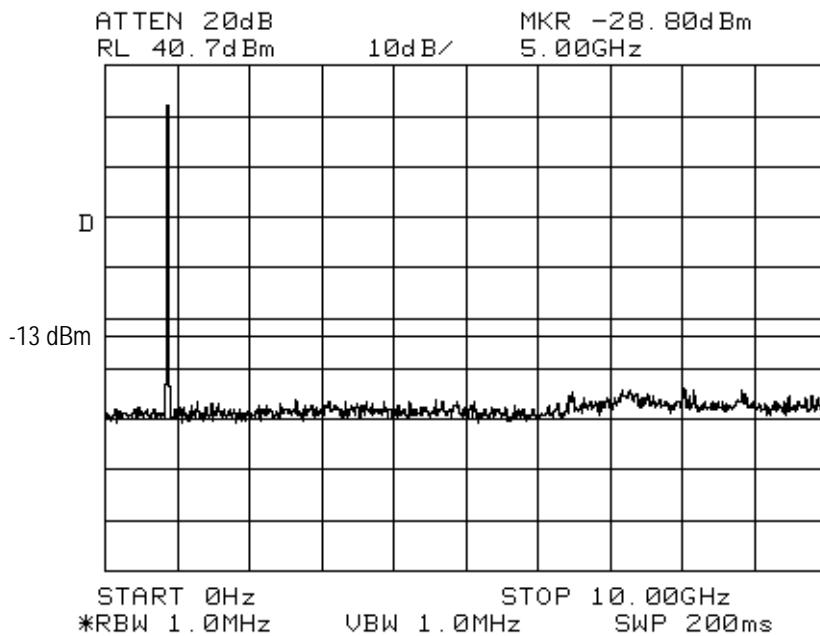
DownLink

Modulation: GSM

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 881.50$ MHz, $P_{TX} = 36$ dBm



Spurious Emissions at Antenna Terminals

UpLink

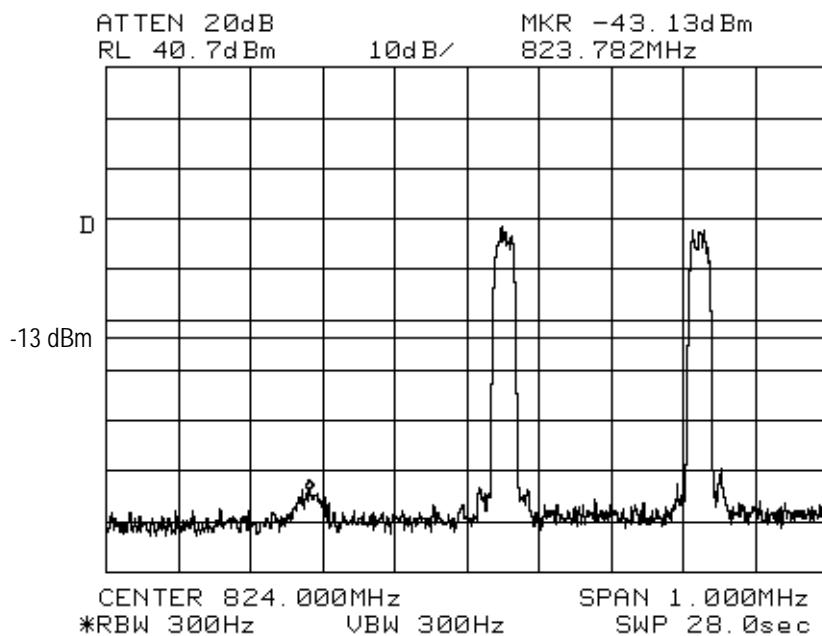
Modulation: TDMA

Lower Band Edge (824 MHz)

$f_{TX1} = 824.05$ MHz

$f_{TX2} = 824.32$ MHz

21 dBm per carrier – 24 dBm composite



Spurious Emissions at Antenna Terminals

UpLink

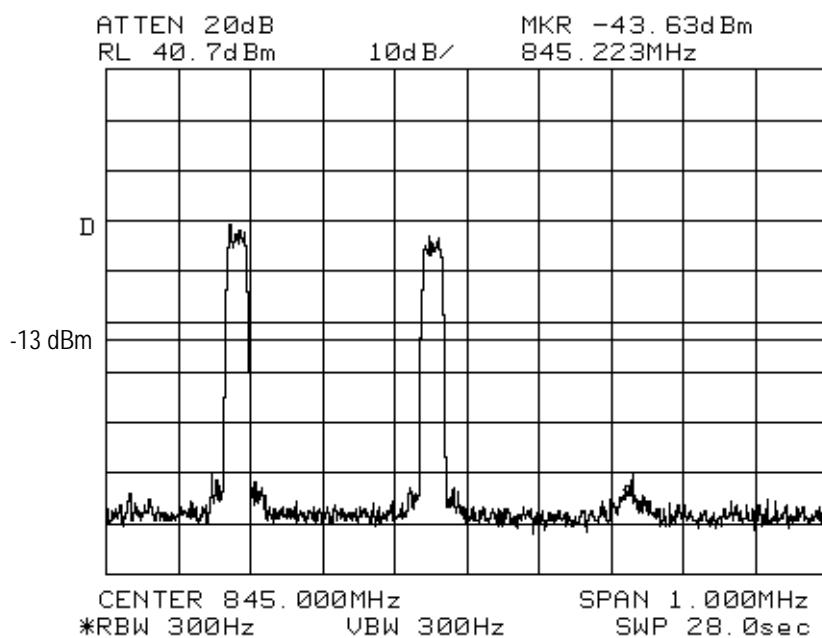
Modulation: TDMA

Upper Band Edge (845 MHz)

$f_{TX1} = 844.68$ MHz

$f_{TX2} = 844.95$ MHz

21 dBm per carrier – 24 dBm composite



Spurious Emissions at Antenna Terminals

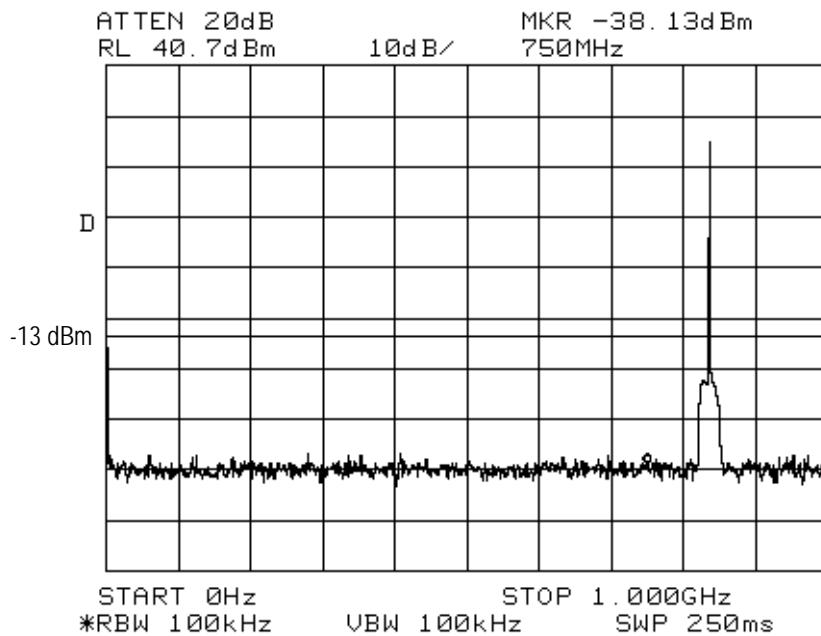
UpLink

Modulation: TDMA

Frequency Range: 0 – 1000 MHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

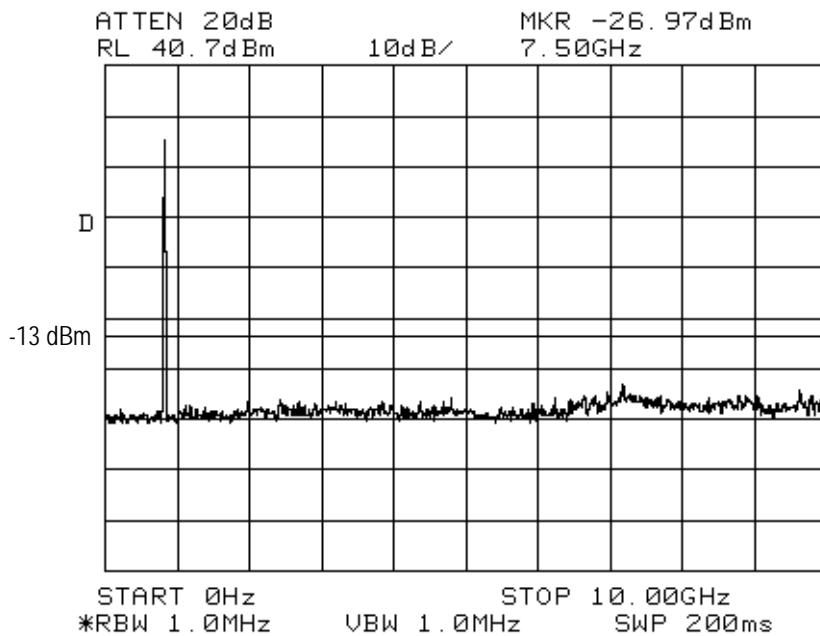
UpLink

Modulation: TDMA

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 836.50$ MHz, $P_{TX} = 24$ dBm



Spurious Emissions at Antenna Terminals

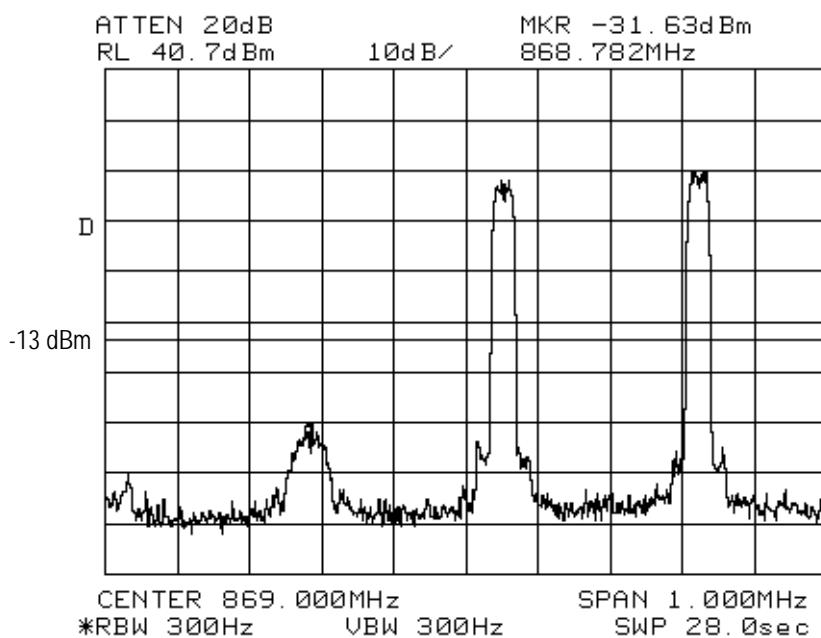
DownLink

Modulation: TDMA

Lower Band Edge (869 MHz)

 $f_{TX1} = 869.05$ MHz $f_{TX2} = 869.32$ MHz

33 dBm per carrier – 36 dBm composite



Spurious Emissions at Antenna Terminals

DownLink

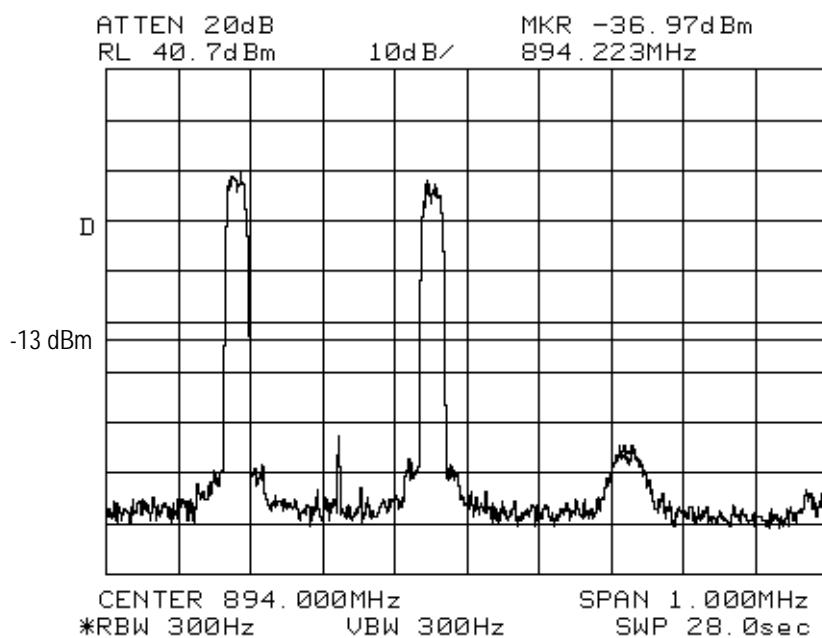
Modulation: TDMA

Upper Band Edge (894 MHz)

$f_{TX1} = 893.68$ MHz

$f_{TX2} = 893.95$ MHz

33 dBm per carrier – 36 dBm composite



Spurious Emissions at Antenna Terminals

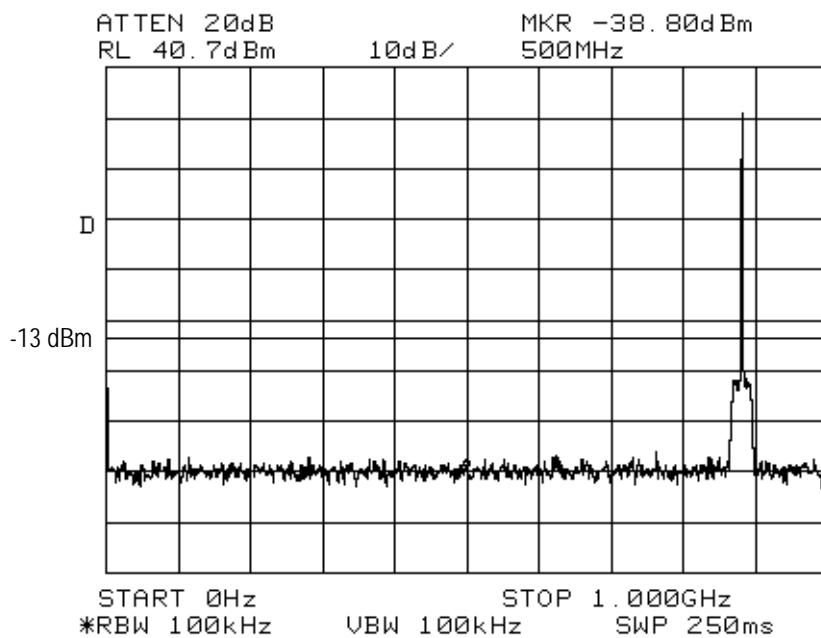
DownLink

Modulation: TDMA

Frequency Range: 0 – 1000 MHz

Single Carrier:

$f_{TX} = 881.50$ MHz, $P_{TX} = 36$ dBm



Spurious Emissions at Antenna Terminals

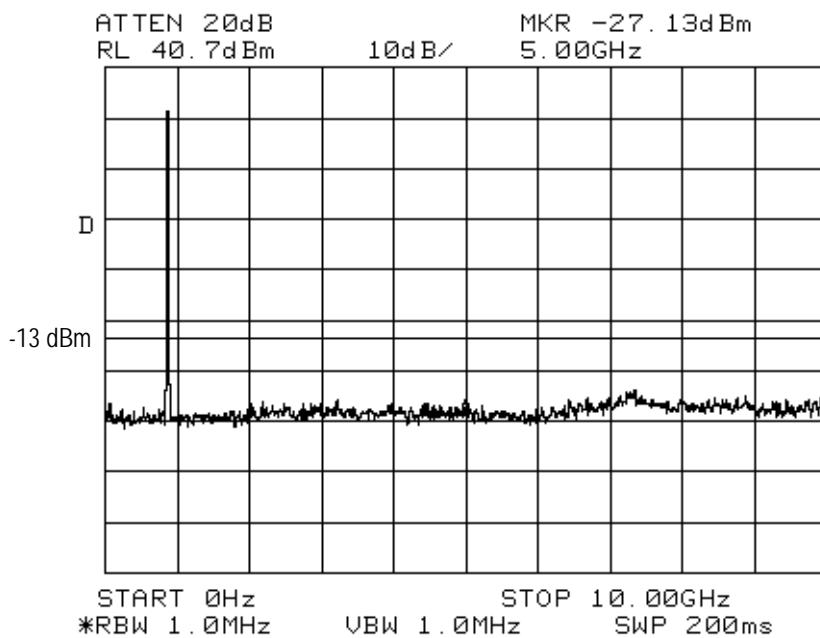
DownLink

Modulation: TDMA

Frequency Range: 0 – 10 GHz

Single Carrier:

$f_{TX} = 881.50$ MHz, $P_{TX} = 36$ dBm



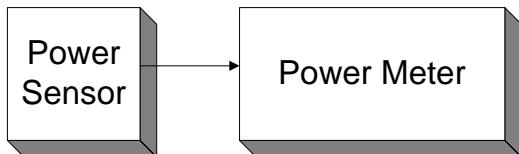
Section 6. Field Strength of Spurious Emissions**Para. No.: 2.1053**

Test Performed By:	Roman Kuleba	Date of Test: March 15, 2005
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Minimum Standard: 22.917(e): -13dBm**Test Results:** Complies.**Measurement Data:** Pre-scan test on the EUT for radiated emissions between 30 MHz and 18 GHz in both, vertical and horizontal polarization was performed in a shielded chamber. No signals above noise level were detected.**Detailed Setup Photos:****EUT - Front View:****EUT - Rear View:****Pre-scan in Shielded Chamber:**

Section 7. Block Diagrams

Para. No. 2.1046 - R.F. Power Output



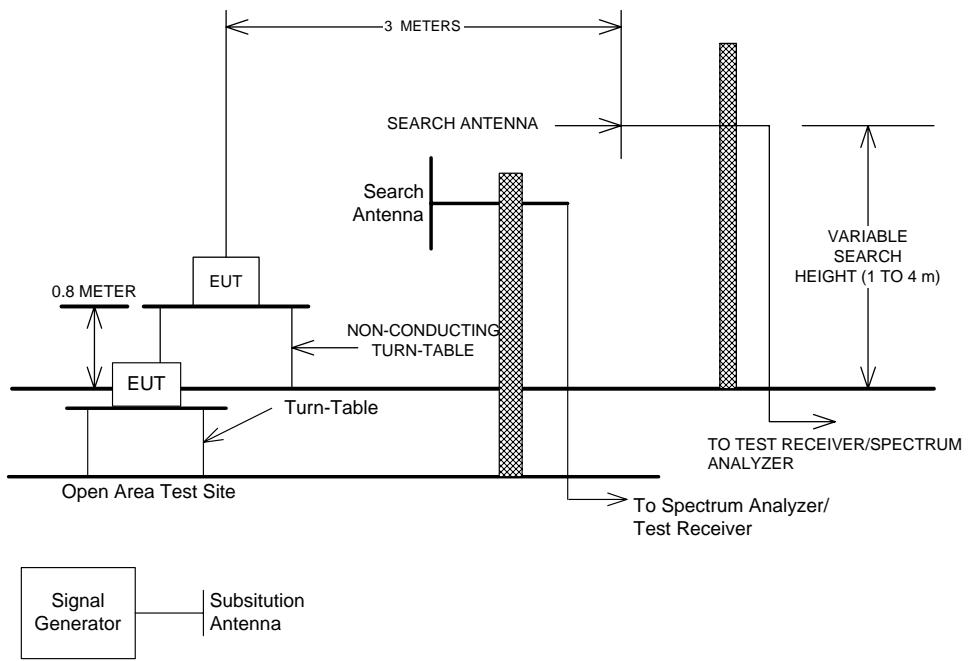
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Radiation



TIA/EIA 603
Effective Radiated Power
Spurious Emissions

*EQUIPMENT: MW-CSR-800AB-25W90***Section 8. Test Equipment List**

CAL Cycle	Equipment	Manufacturer	Model No.	Asset/Serial No.	Last Cal.	Next Cal.
1 Year	Spectrum Analyzer	Hewlett-Packard	8564E	3943A01798	Dec 22/04	Dec 22/05
1 Year	Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	May 26/04	May 26/05
1 Year	Horn Antenna #2	EMCO	3115	FA000825	Dec. 10/04	Dec. 10/05
1 Year	Biconical Antenna #1	EMCO	3109	FA000805	April 23/04	April 23//05
1 Year	Log Periodic Antenna #1	EMCO	LPA-25	FA000477	Aug 26/04	Aug. 26/05
1 Year	1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	June. 18/04	June. 18/05
1 Year	2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	June. 18/04	June. 18/05
1 Year	4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	June. 18/04	June. 18/05
3 Year	Signal Generator	Rohde & Schwarz	SMIQ03	FA001091	April 20/04	Sept. 25/05
1 Year	Signal Generator	Rohde & Schwarz	SMIQ06B	FA001878	May 18/04	May 18/05
1 Year	Power Meter	Hewlett-Packard	E4418B	FA001413	May 25/04	May 25/05
1 Year	Power Sensor	Hewlett-Packard	8487A	FA001908	Mar 11/04	Mar 11/05
COU	Attn	Narda.	769-20	FA001349	COU	COU
COU	Attn	Narda	776B-20	FA001153	COU	COU

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use, OUT = Out For CAL/Repair