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Certification Test Report

CFR 47 FCC Part 2 and Part 22, Subpart C

Model: Node C837, Node M837

FCC ID # BCR-RPT-NCM837

Project Code: W6337

Revision: 0

Prepared for:	Andrew Corporation 108 Rand Park Drive Garner, North Carolina 27529
Author:	Tom Tidwell, Manager of Wireless Services
Issued:	3 November, 2006

Report Summary

NTS Plano

Accreditation Numbers: FCC: 101741
IC: 46405-4319 File # IC-4319A

Applicant: Andrew Corporation
108 Rand Park Drive
Garner, North Carolina 27529

Customer Representative: Michael Williamson

EUT Description:

EUT Description	Manufacturer	Model	Revision	Serial Number
The EUT is an in-building repeater system designed to repeat both IS-95 CDMA and W-CDMA signals in the North American Cellular band (824-869 MHz, 869-894 MHz)	Andrew Wireless Systems Gmbh	Node C 837 IS-95 Node M 837 W-CDMA	2	11

Variations in models: The Node C837 and Node M837 are electrically identical devices. The software mode options for channel filter settings are reduced to two 5 MHz channels on the Node M837 model to accommodate up to two W-CDMA carriers, while the Node C837 allows additional channel filter settings for single 1.23 MHz channels for IS-95 CDMA.

Test Summary

Appendix	Test/Requirement Description	Deviations from:			Pass / Fail	Applicable Rule Parts
		Base Standard	Test Basis	NTS Procedure		
A	RF Power Output	No	No	No	PASS	CFR 47, Part 2, Para. 2.1046 CFR 47, Part 90, Para. 90.205
B	Modulation Characteristics	No	No	No	PASS	CFR 47, Part 2, Para. 2.1047 CFR 47, Part 90, Para. 90.207
C	Occupied Bandwidth	No	No	No	PASS	CFR 47, Part 2, Para. 2.1049 CFR 47, Part 90, Para. 90.210
D	Spurious Emissions at Antenna Terminals	No	No	No	PASS	CFR 47, Part 2, Para. 2.1051 CFR 47, Part 90, Para. 90.210
E	Field Strength of Spurious Radiation	No	No	No	PASS	CFR 47, Part 2, Para. 2.1053 CFR 47, Part 90, Para. 90.210
F	Frequency Stability	No	No	No	PASS	CFR 47, Part 2, Para. 2.1055 CFR 47, Part 90, Para. 90.213

Test Result: The product presented for testing complied with test requirements as shown above.

This is to certify that the preceding report is true and correct to the best of my knowledge.

Robert Stevens,
Quality Assurance Manager

Tom Tidwell,
Wireless Test Engineer

Table of Contents

Register of revisions

Revision	Reason for Revision	Release Date
0	Original	11/3/06

INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Plano to demonstrate compliance of the Node C837 and Node M837 to FCC Part 22 Subpart C and Subpart H for Cellular Radiotelephone Service in accordance with the certification requirements of CFR 47, Part 2.

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	Node C / Node M	C837 / M837	2	11
RF Exposure Classification	Fixed. The antenna is mounted using a wall or pole mounting kit provided by the manufacturer. See page 8 of this report for a description of the 3 applications for this device. In applications A and B, a separately approved indoor distributed antenna system is used on the coverage side of the system.			
Channels/Frequency Range	824 – 849 MHz, 869 – 894 MHz			
Power	**Downlink:** +37 dBm (5 watts) at antenna port **Uplink:** +23 dBm (0.2 watts at antenna port.			
Emission Designator:	**F9W** F9W is the emission designator for both IS-95 CDMA and W-CDMA. The necessary bandwidth for IS-95 CDMA is 1.23 MHz while the necessary bandwidth for W-CDMA is 4.10 MHz (4.096 MHz).			
TX antenna details	Maximum antenna directional gain 17 dBi per Install Manual			
Functional Description	The Node C / Node M is used to enhance coverage of a cellular network within a building. Node C is designed to repeat IS-95 CDMA (CDMA800) signals while M837 is designed to repeat W-CDMA (UMTS800) signals.			

2.1.1 EUT POWER

Voltage	120 Vac, 60 Hz
Number of Feeds	Single phase (L1 and Neutral)

2.2 EUT CABLES

Quantity	Model/Type	Routing		Shielded / Unshielded	Description	Cable Length (m)
		From	To			
1		EUT	AC power main	Unshielded	Power cord	1.25
1	Gore	IQ Signal Generator	EUT	Shielded (coaxial)	Coaxial cable	1.5
1	Gore	EUT	50 ohm load	Shielded (coaxial)	Coaxial cable	2

2.3 MODE OF OPERATION DURING TESTS

The device was tested in two basic operating modes:

- Downlink, maximum rf output power (+37 dBm, 5 watts)
- Uplink, maximum rf output power (+23 dBm, 0.2 watts)

While operating in these modes, the device was tested with variations in the following parameters:

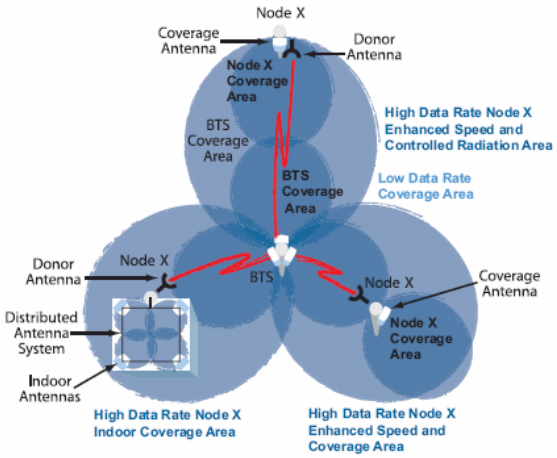
- RF filter configurations
  - Normal and High Attenuation settings
  - Single channel and multiple channel filter settings
- Gain configurations
  - Lowest gain setting
  - Highest gain setting

The rf power output of the device can be set in two different ways:

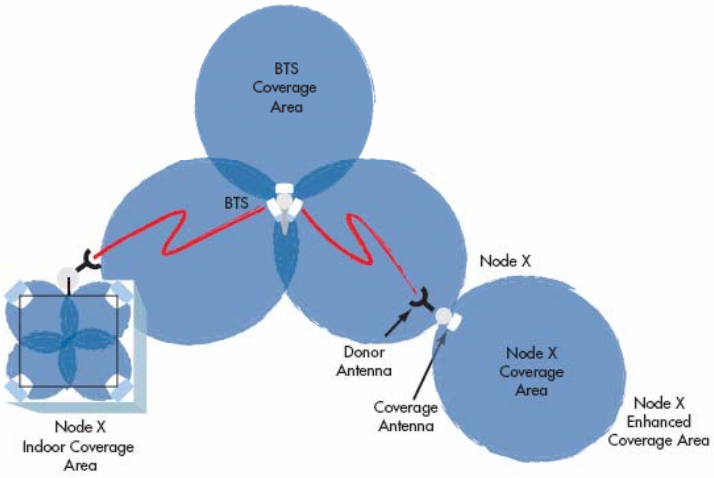
- RF power
  - In this mode a fixed rf output power target is set. The device uses the detected power of the rf pilot channel within the received waveform and adjusts the amplifier gain automatically to maintain the selected rf output power.
- Fixed gain
  - In this mode, a fixed rf gain is chosen. The rf gain is adjusted by the device only if the rf input level continues to increase after the maximum rated rf output power has been reached (AGC). In this way, the device prevents non-linear operation of the rf amplifiers.

The device was operated in the fixed gain mode for the purposes of this testing since it allows for various input level/gain variations to be tested. It was determined that the worst-case spurious levels occurred with the gain set to 90 dB and rf input level adjusted to obtain maximum rf output power.

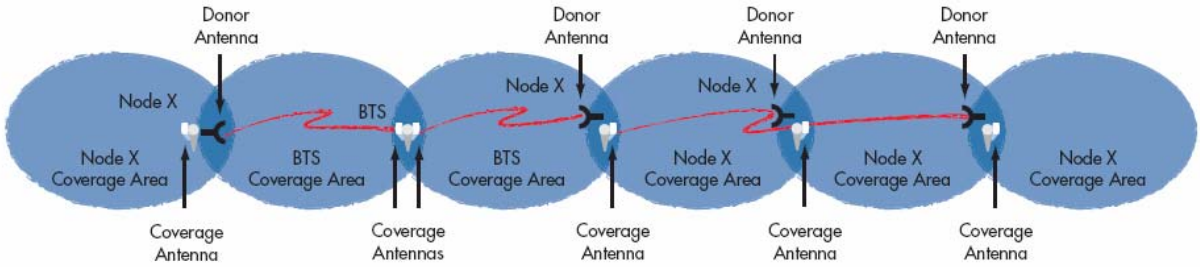
A) Urban hole filling and speed enhancement



B) Extending coverage for buildings and towns



C) Rural highway coverage (UMTS/CDMA)



3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

The radio was activated using customer-supplied test software. The software allowed the test engineer to change modulation modes and data rates as well as transmit. channel.

3.2 TEST BED/PERIPHERAL CABLES

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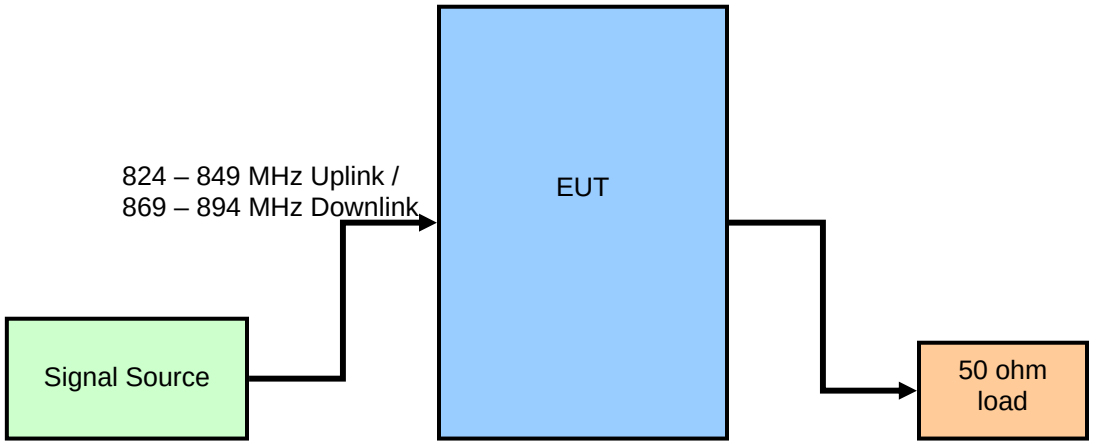


APPENDICES

APPENDIX A: 2.1046 RF POWER OUTPUT

A.1. Base Standard & Test Basis

Base Standard	FCC PART 2.1046
Test Basis	TIA 603-C, 2004
Test Method	TIA 603-C, 2004

A.2. Specifications

(a) *Maximum ERP*. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

(1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Applicable RF Power Limit from Above: 500 watts

A.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
None						

A.4. Test Procedure

TIA 603-C, 2004

A.5. Test Results

The EUT is in compliance with the limits as specified above. The maximum rf output power at the antenna terminals is 5 watts (downlink) and 0.201 watts (uplink).

A.6. Operating Mode During Test

The transmitter was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel in both the downlink (base to mobile) and uplink (mobile to base) directions. In the course of this testing, it was found that operating the device with a fixed rf gain and adjusting rf input signal to obtain maximum rf output power produced the worst-case results.

A.7. Sample Calculation

Rf power(watts) = $10^{(\text{rf power(dBm)}/10)}$ x 1000

A.8. Test Data

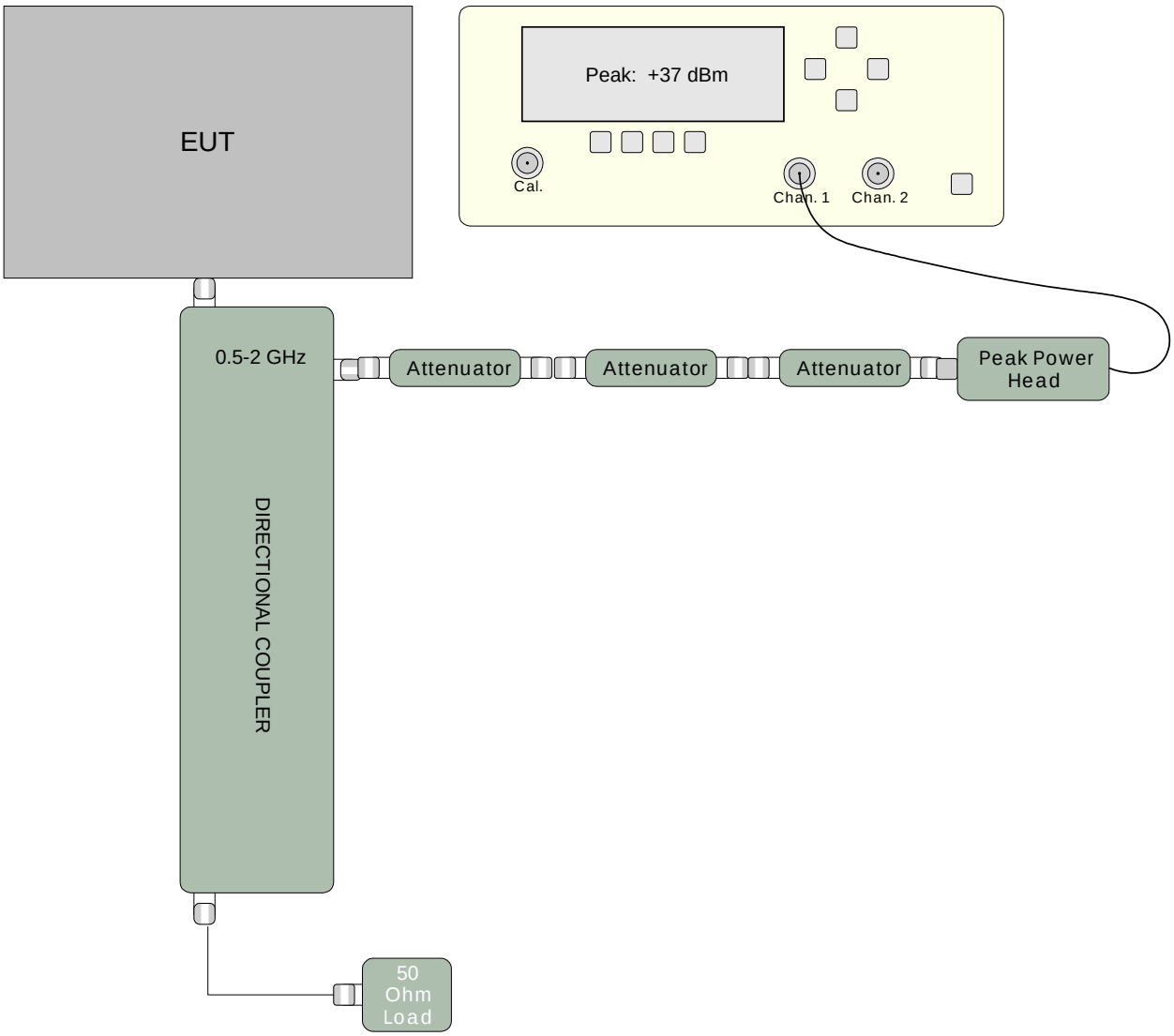
Channel	Signal Path	Modulation Mode	RF Power Output at Antenna Terminals (dBm)
1013	DL	F9W (IS-95 CDMA)	37.23
384	DL	F9W (IS-95 CDMA)	37.02
777	DL	F9W (IS-95 CDMA)	37.05
54	DL	F9W (W-CDMA)	37.07
384	DL	F9W (W-CDMA)	37.01
715	DL	F9W (W-CDMA)	37.03
1013	UL	F9W (IS-95 CDMA)	23.03
384	UL	F9W (IS-95 CDMA)	23.06
777	UL	F9W (IS-95 CDMA)	23.03
54	UL	F9W (W-CDMA)	23.04
384	UL	F9W (W-CDMA)	23.04
715	UL	F9W (W-CDMA)	22.74

Note: RF power output was measured using a peak rf power meter designed to quantify the true peak power using a high number of samples.

*DL = Downlink (BTS to Mobile) path, UL = Uplink (Mobile to BTS) path

Test Date: November 27, 2006

A.9. Test Diagram



A.10. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX B: 2.1047 MODULATION CHARACTERISTICS

B.1. Base Standard & Test Basis

Base Standard	FCC 2.1047
Test Basis	FCC 2.1047 Modulation Characteristics
Test Method	TIA 603-C, 2004

B.2. Specifications

2.1047 – Modulation Characteristics

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
(c) *Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power.* A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
(d) *Other types of equipment.* A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

B.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

B.4. Test Method

This device does not generate any modulation signals but only repeats a modulated rf waveform.

B.5. Test Results

Not applicable – The device does not produce a baseband signal but simply repeats a modulated rf waveform.

Test Data Summary

Emission Designators

IS-95 CDMA: F9W
W-CDMA: F9W

B.6. Test Diagram

N/A

B.7. Tested By

Name: Tom Tidwell
Function: Manager of Wireless Services

APPENDIX C: 2.10.49 OCCUPIED BANDWIDTH

C.1. Base Standard & Test Basis

Base Standard	FCC 2.1049
Test Basis	FCC 2.1049 Occupied Bandwidth
Test Method	TIA 603-C, 2004

C.2. Specifications

22.917

(b) The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

C.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

C.4. Test Method

TIA 603-C, 2004

The modulated rf carrier fed to the device during testing is described below:

IS-95 CDMA carrier:

Downlink

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: QPSK 2 b/sym
Symbol Rate: 1.2288 Msym/sec
Filter: IS-95 + Equalizer
Coding: None

Channel Mapping

Chan. No.	Walsh Code	Power (dB)	Data	Chan. No.	Walsh Code	Power (dB)	Data	Chan. No.	Walsh Code	Power (dB)	Data
0	0	-7	0000	**22**	22	-19	PRBS	**44**	44	-19	PRBS
1	1	-19	PRBS	**23**	23	-19	PRBS	**45**	45	-19	PRBS
2	2	-19	PRBS	**24**	24	-19	PRBS	**46**	46	-19	PRBS
3	3	-19	PRBS	**25**	25	-19	PRBS	**47**	47	-19	PRBS
4	4	-19	PRBS	**26**	26	-19	PRBS	**48**	48	-19	PRBS
5	5	-19	PRBS	**27**	27	-19	PRBS	**49**	49	-19	PRBS
6	6	-19	PRBS	**28**	28	-19	PRBS	**50**	50	-19	PRBS
7	7	-19	PRBS	**29**	29	-19	PRBS	**51**	51	-19	PRBS
8	8	-19	PRBS	**30**	30	-19	PRBS	**52**	52	-19	PRBS
9	9	-19	PRBS	**31**	31	-19	PRBS	**53**	53	-19	PRBS
10	10	-19	PRBS	**32**	32	-19	PRBS	**54**	54	-19	PRBS
11	11	-19	PRBS	**33**	33	-19	PRBS	**55**	55	-19	PRBS
12	12	-19	PRBS	**34**	34	-19	PRBS	**56**	56	-19	PRBS
13	13	-19	PRBS	**35**	35	-19	PRBS	**57**	57	-19	PRBS
14	14	-19	PRBS	**36**	36	-19	PRBS	**58**	58	-19	PRBS
15	15	-19	PRBS	**37**	37	-19	PRBS	**59**	59	-19	PRBS
16	16	-19	PRBS	**38**	38	-19	PRBS	**60**	60	-19	PRBS
17	17	-19	PRBS	**39**	39	-19	PRBS	**61**	61	-19	PRBS
18	18	-19	PRBS	**40**	40	-19	PRBS	**62**	62	-19	PRBS
19	19	-19	PRBS	**41**	41	-19	PRBS	**63**	63	-19	PRBS
20	20	-19	PRBS	**42**	42	-19	PRBS				
21	21	-19	PRBS	**43**	43	-19	PRBS				

Uplink

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: OQPSK 2 b/sym
Symbol Rate: 1.2288 Msym/sec
Filter: IS-95
Coding: None
Channel Type: Traffic
Data Rate: 14, 400 b/sec
Convolution Encoder: On
Block Interleaver: On
Erasure Bit: 1

W-CDMA carrier: .

Data source: PRBS(Pseudo-Random Bit Sequence)
Modulation: OQPSK
Symbol Rate: 4.096 MHz
Sequence Length: 65536 sym
Filter: Root Cosine
Roll Off: 0.1
Window Function: Hanning

C.5. Test Results

Compliant. The rf input and output of the device was plotted to demonstrate that the modulated carrier is not degraded as a result of processing by the device under test.

C.6. Deviations from Normal Operating Mode During Test

None.

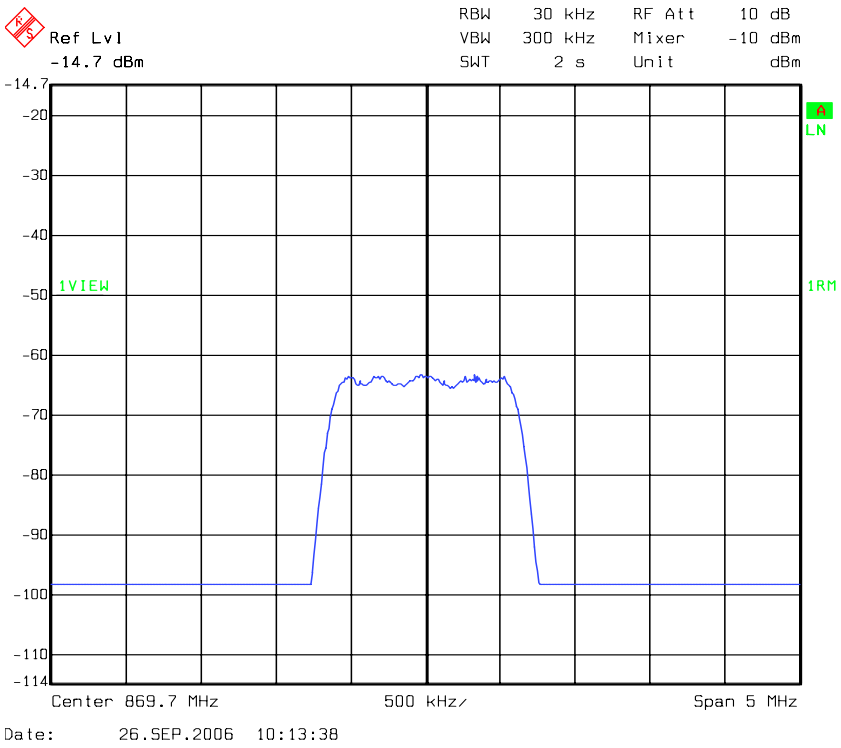
C.7. Sample Calculation

None.

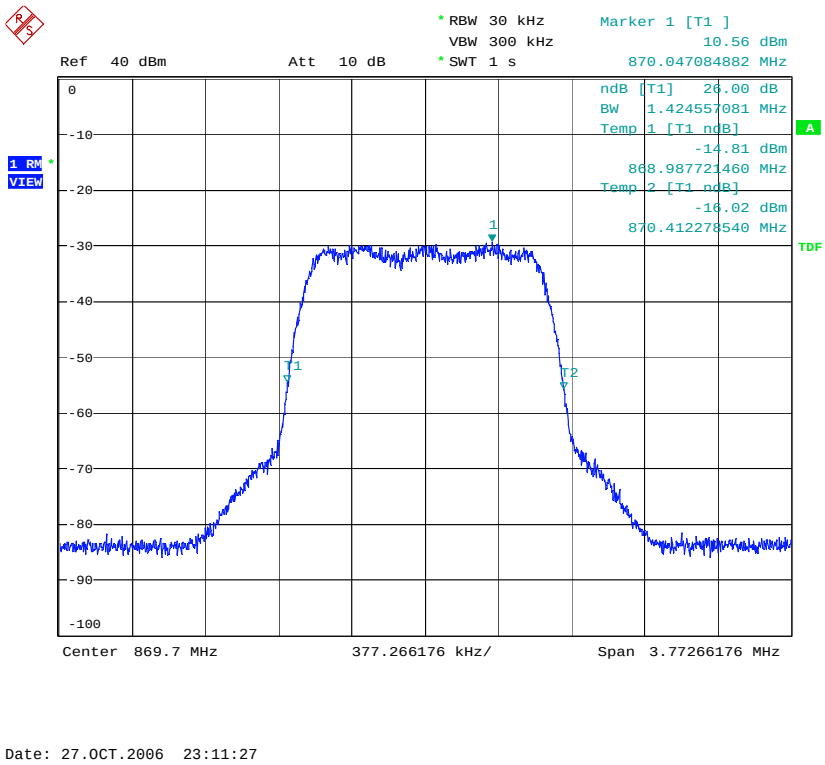
C.8. Test Data

See plots following.

Figure 1 IS-95 CDMA Occupied Bandwidth – Downlink Low Channel

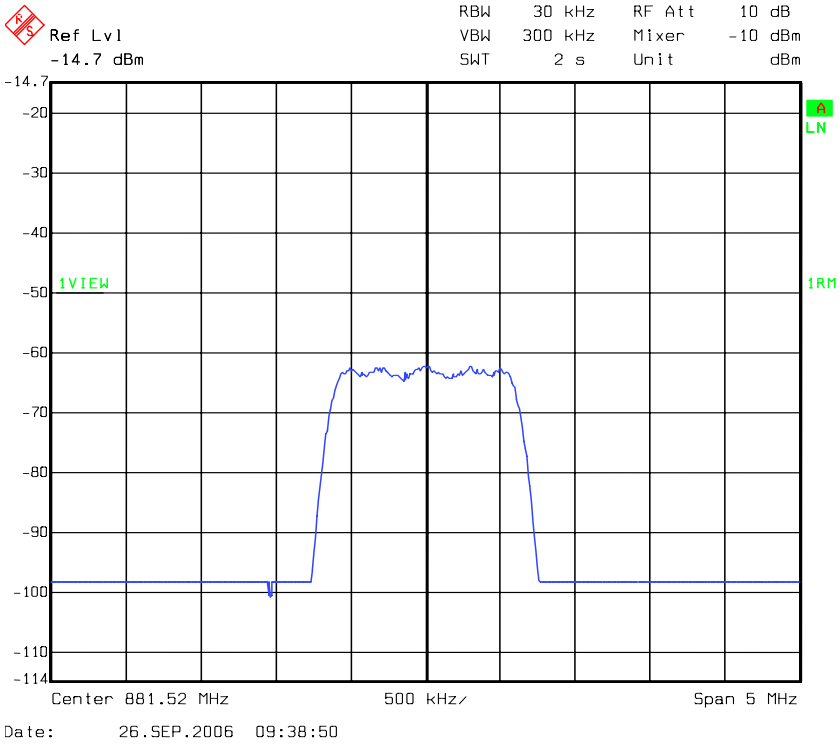


Input: IS-95, Chan. 1013

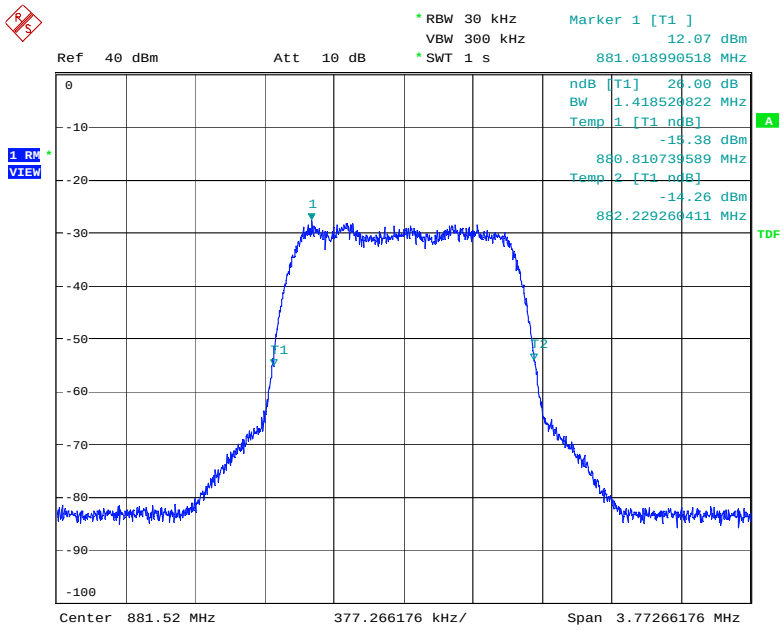


Output: IS-95, Chan. 1013

Figure 2 IS-95 CDMA Occupied Bandwidth – Downlink Mid Channel

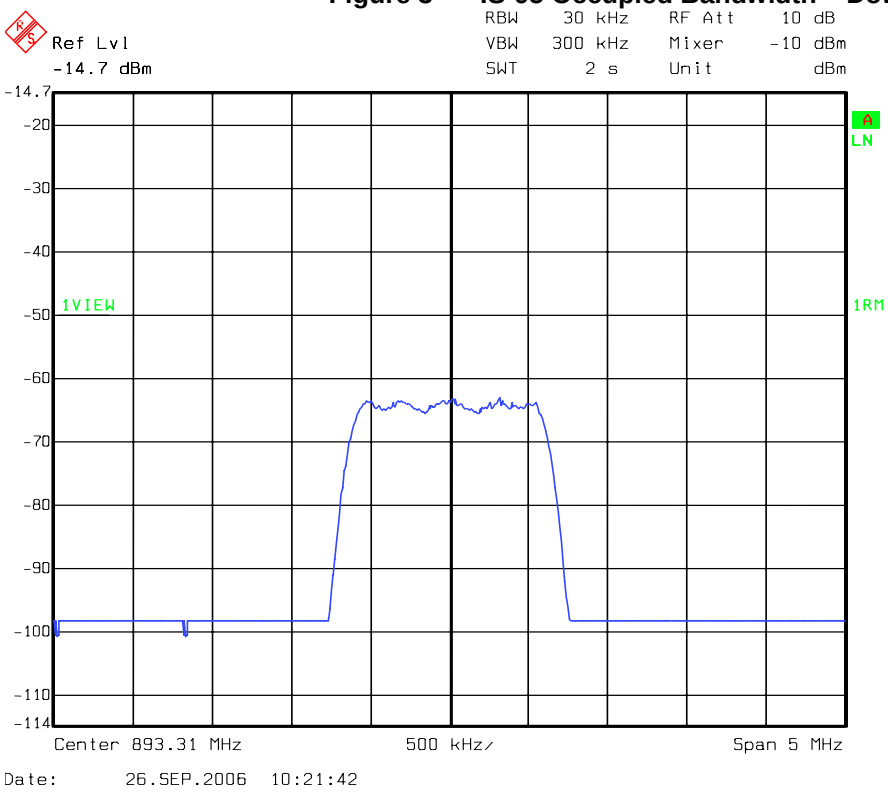


Input: IS-95, Chan. 384

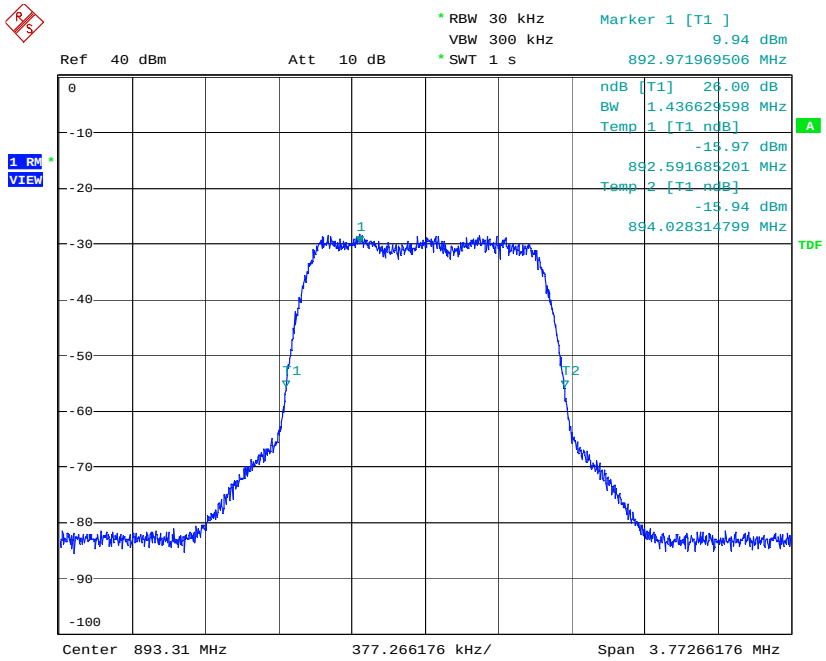


Output: IS-95, Chan. 384

Figure 3 IS-95 Occupied Bandwidth – Downlink High Channel

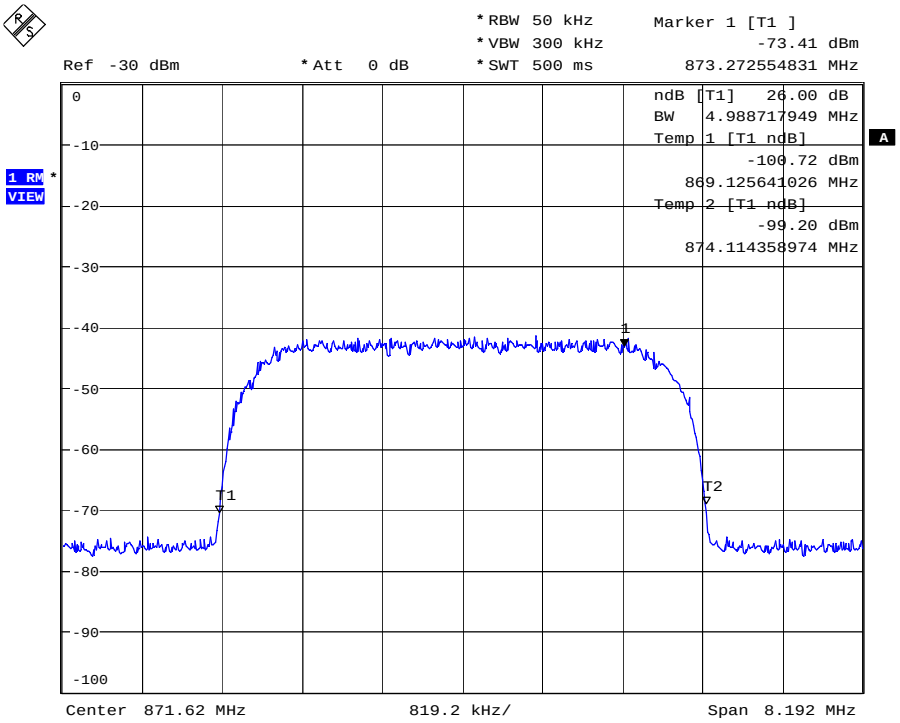


Input: IS-95, Chan. 777

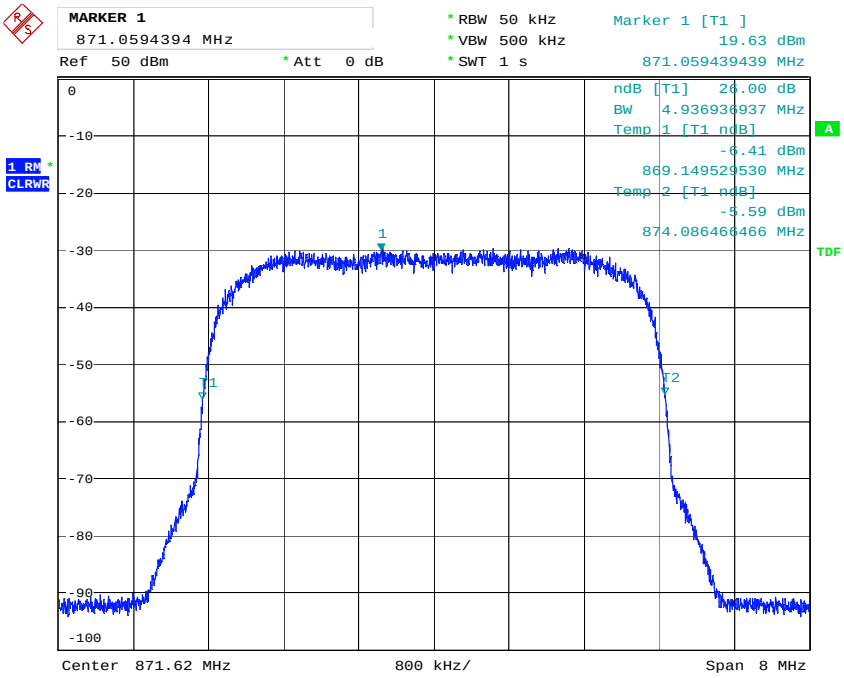


Output: IS-95, Chan. 777

Figure 4 W-CDMA Occupied Bandwidth – Downlink Low Channel



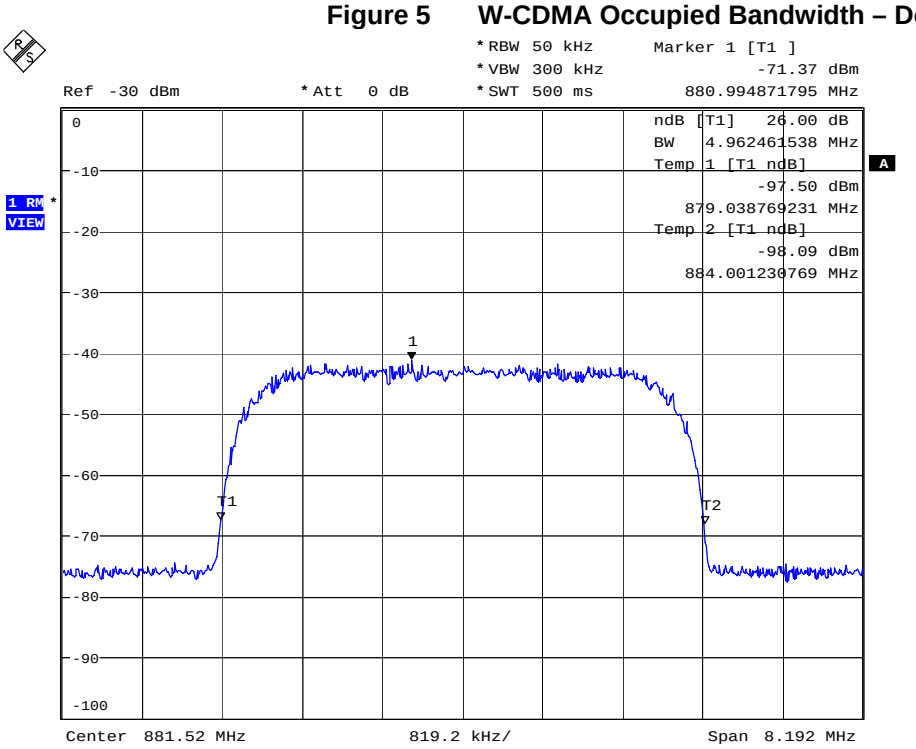
Input, W-CDMA, Low Channel



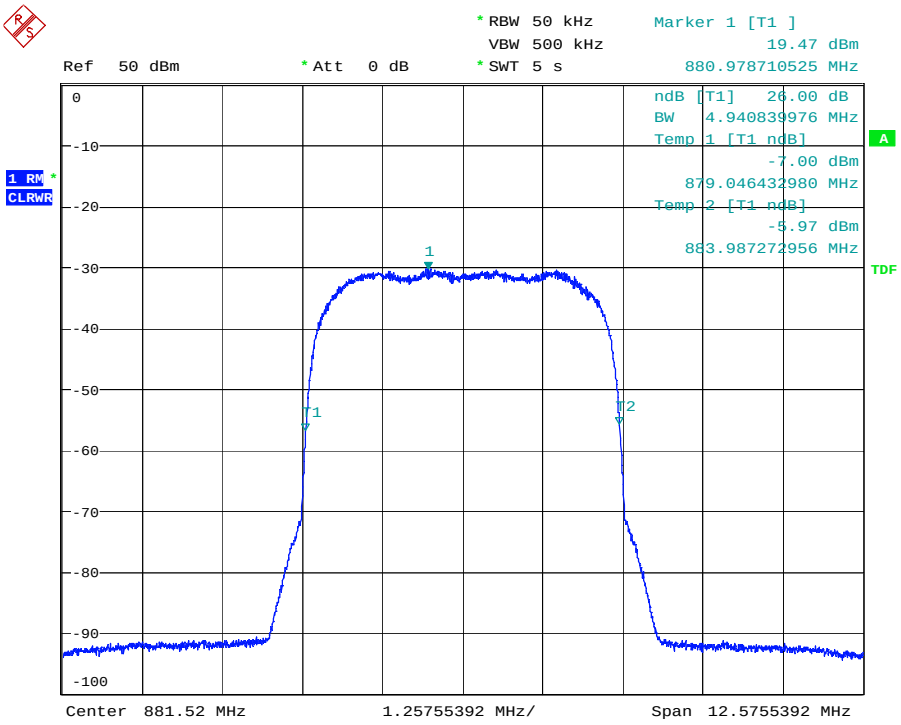
Output, W-CDMA, Low Channel

Date: 31.OCT.2006 21:51:52

Figure 5 W-CDMA Occupied Bandwidth – Downlink Mid Channel



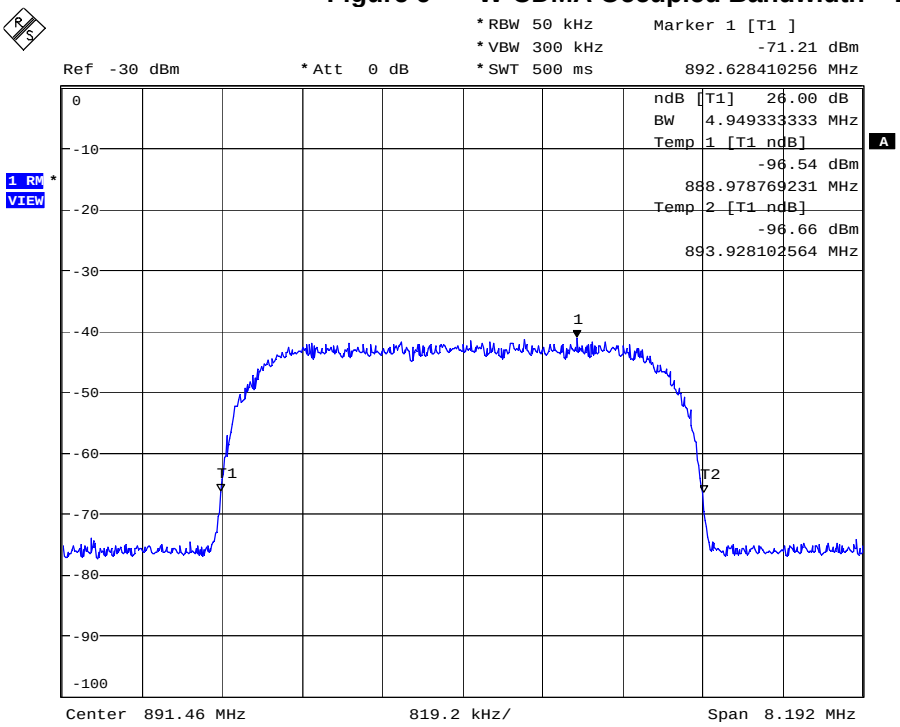
Input, W-CDMA, Mid Channel



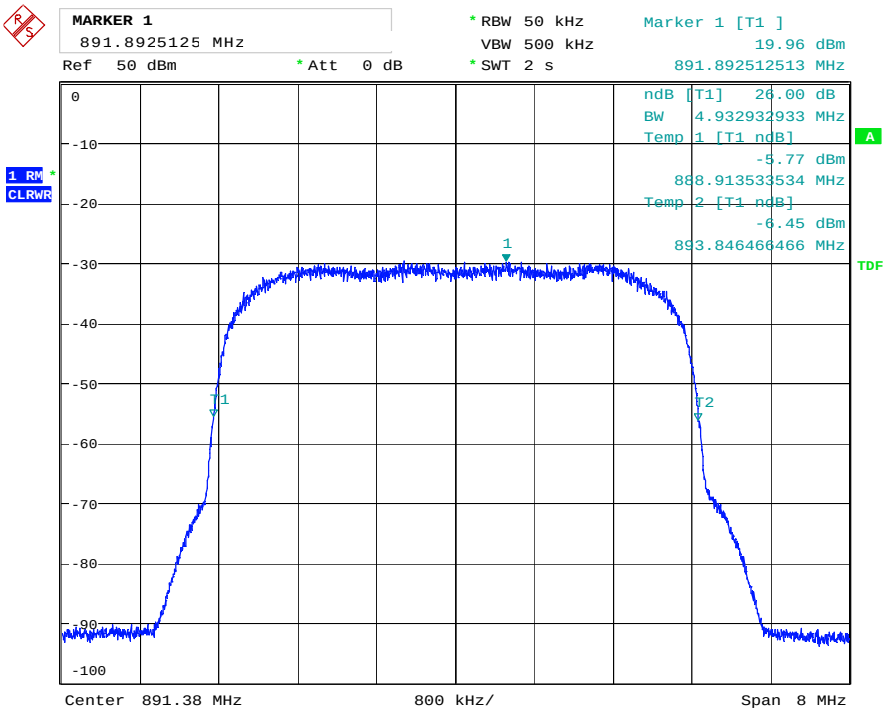
Output, W-CDMA, Mid Channel

Date: 31.OCT.2006 21:41:26

Figure 6 W-CDMA Occupied Bandwidth – Downlink High Channel



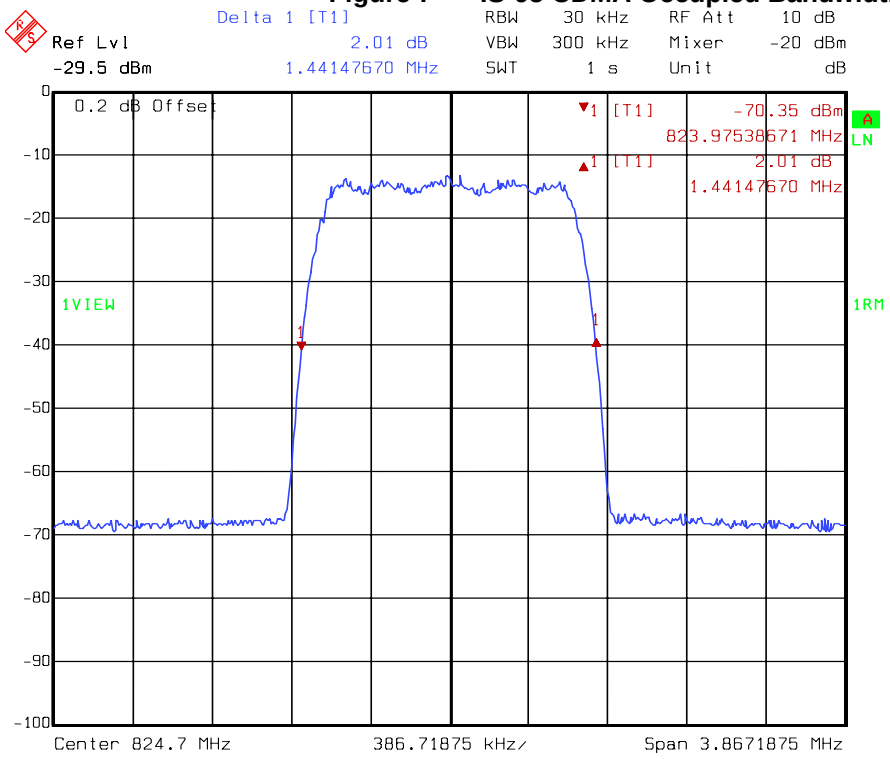
Input, W-CDMA, High Channel



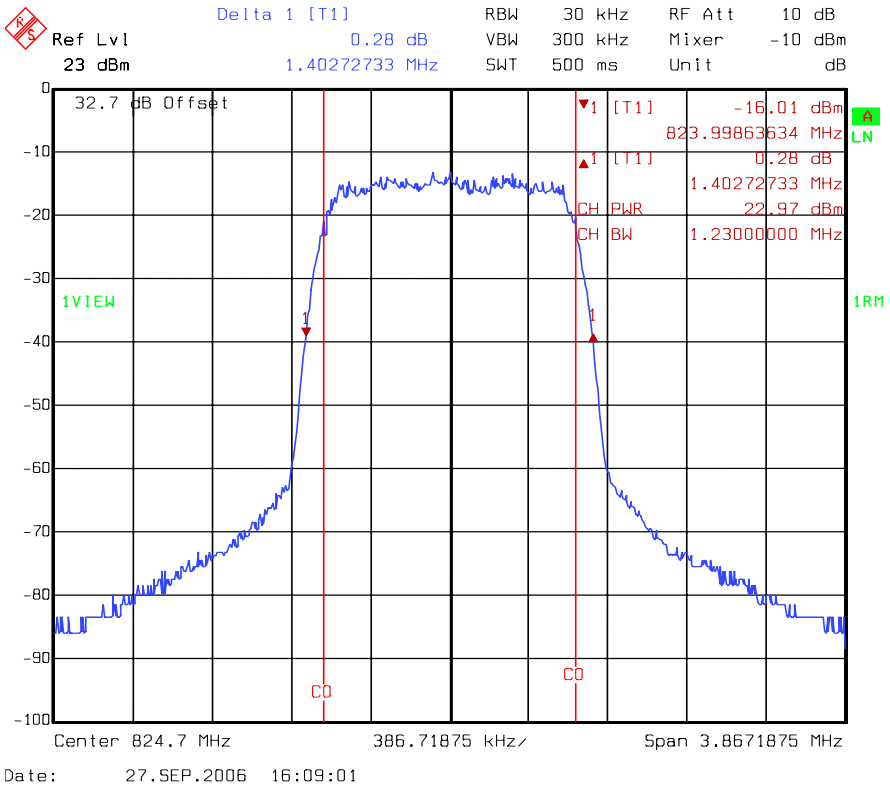
Output, W-CDMA, High Channel

Date: 31.OCT.2006 22:42:32

Figure 7 IS-95 CDMA Occupied Bandwidth – Uplink Low Channel

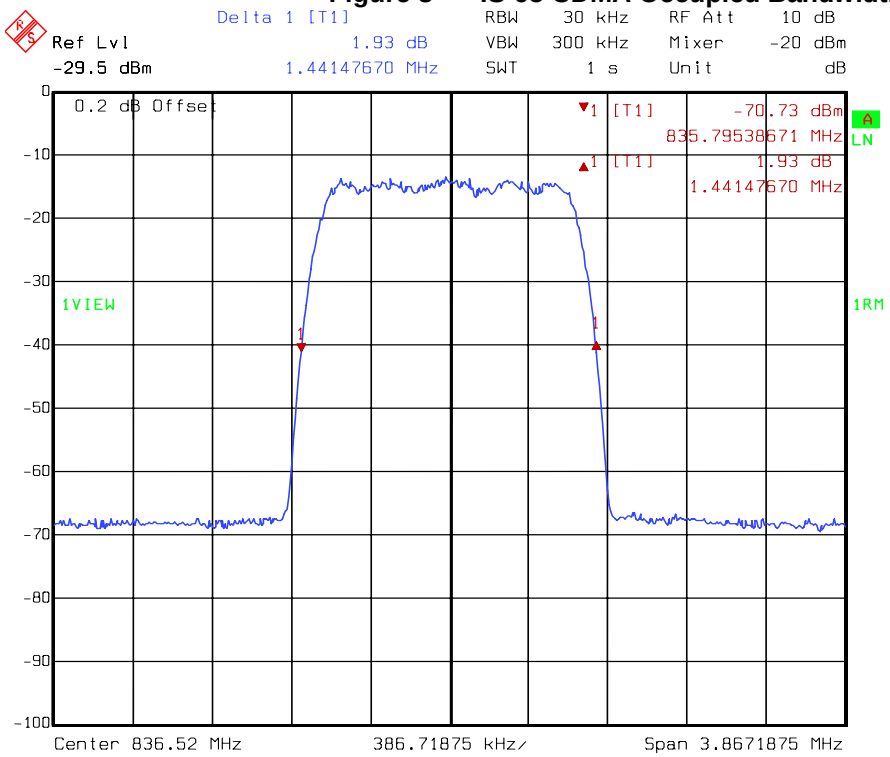


Input, IS-95 CDMA, Low Channel

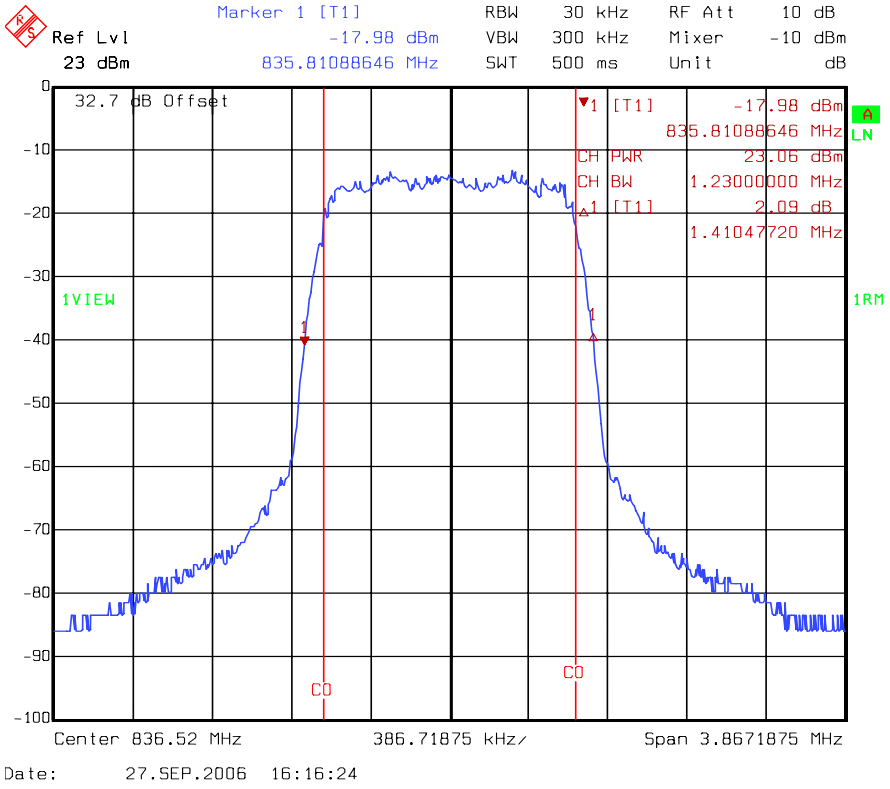


Output, IS-95 CDMA, Low Channel

Figure 8 IS-95 CDMA Occupied Bandwidth – Uplink Mid Channel

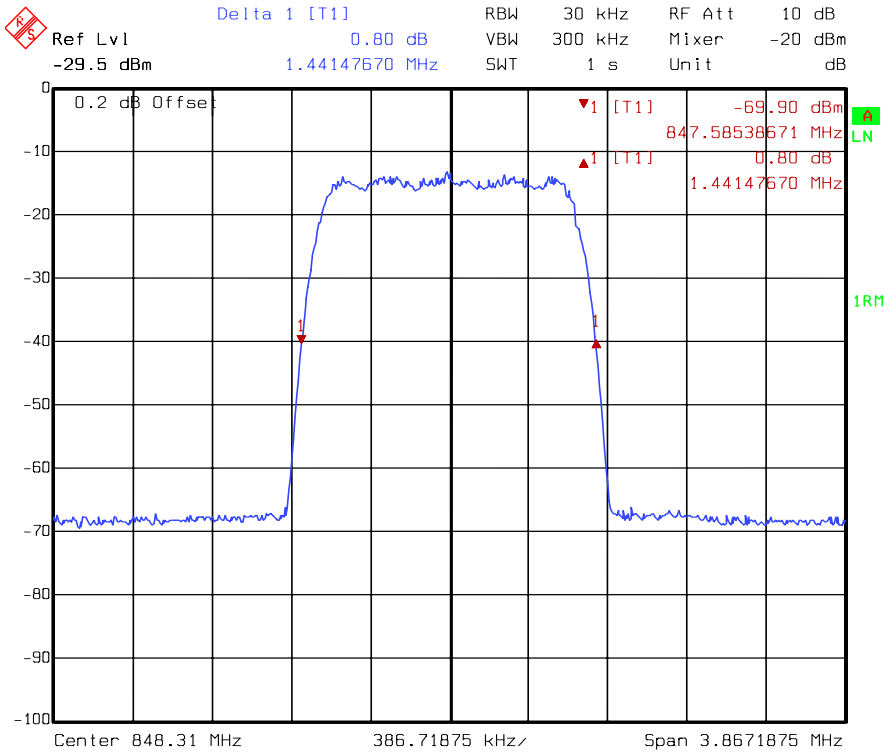


Input, IS-95 CDMA, Mid Channel

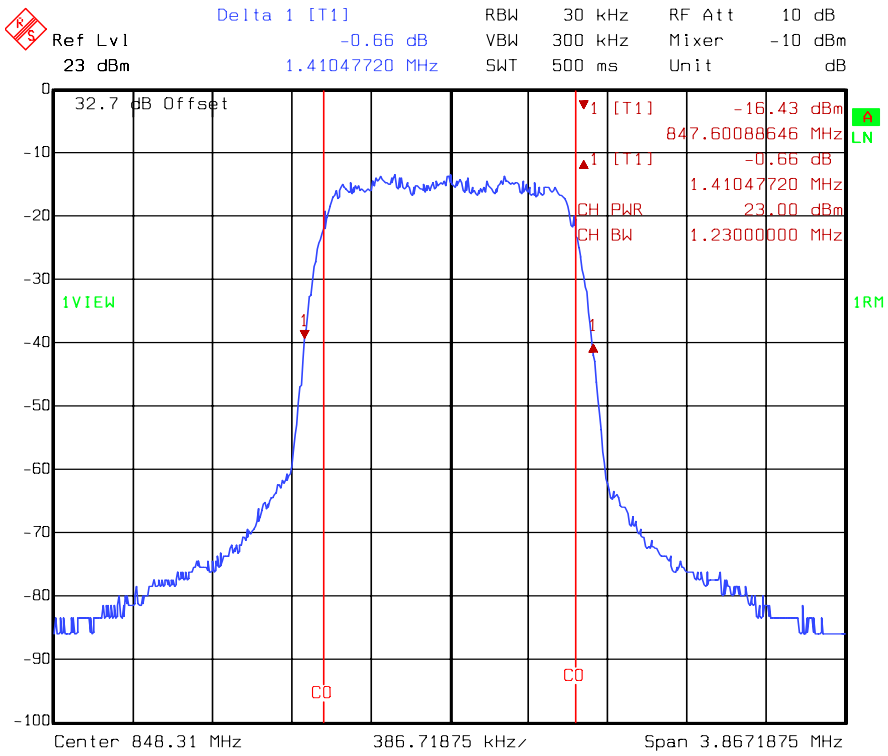


Output, IS-95 CDMA, Mid Channel

Figure 9 IS-95 CDMA Occupied Bandwidth – Uplink High Channel

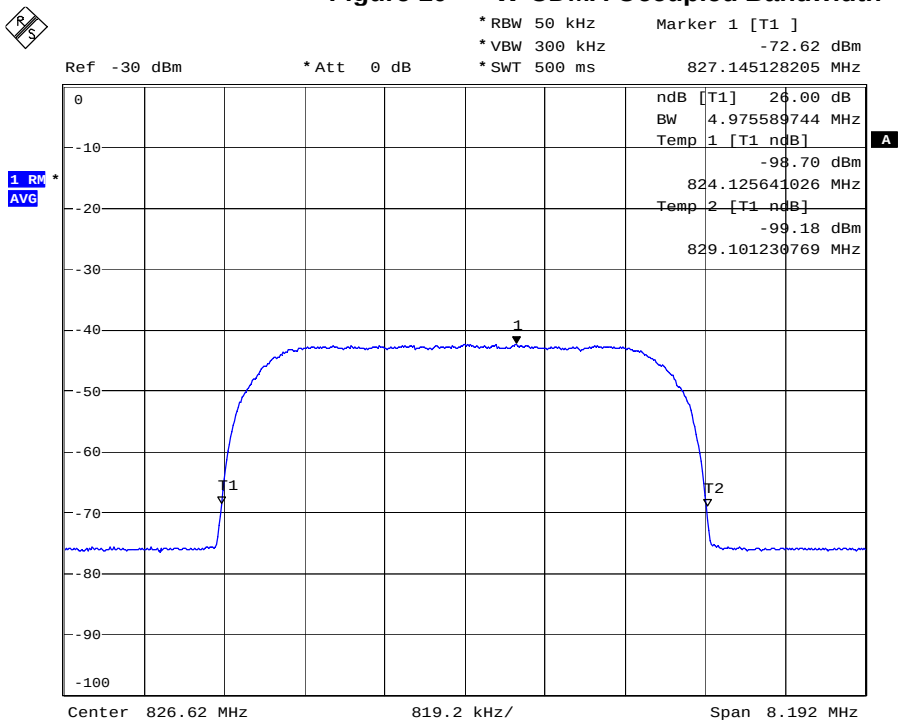


Input, IS-95 CDMA, High Channel

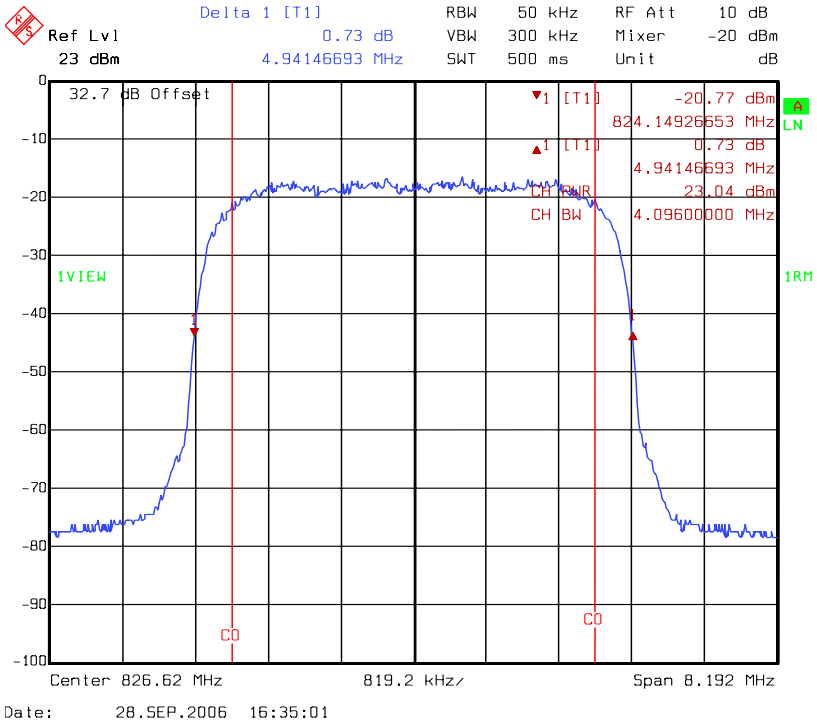


Output, IS-95 CDMA, High Channel

Figure 10 W-CDMA Occupied Bandwidth – Uplink Low Channel

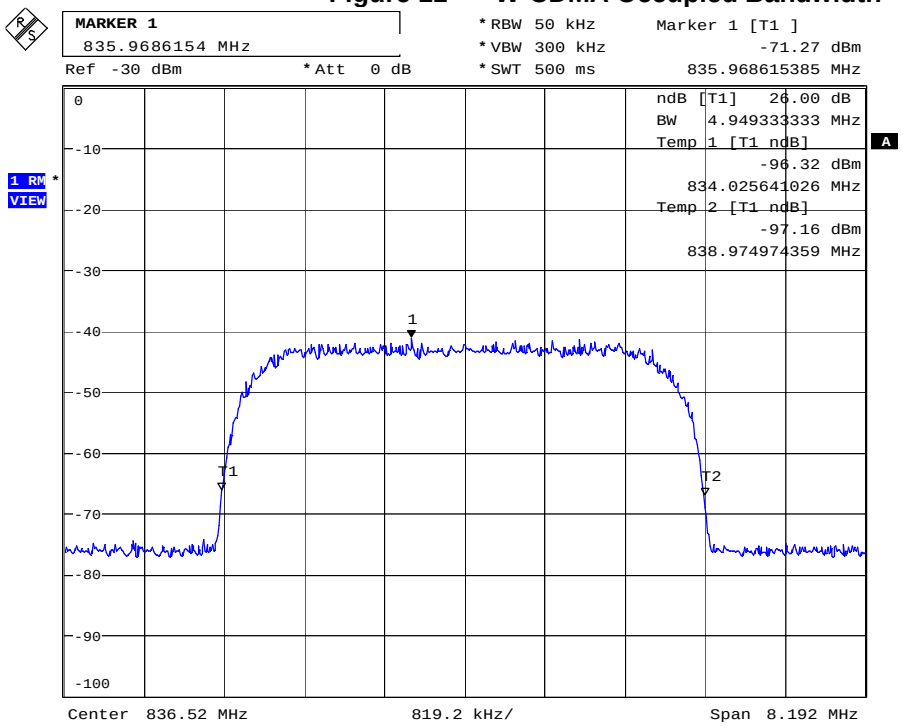


Input, W-CDMA, Low Channel

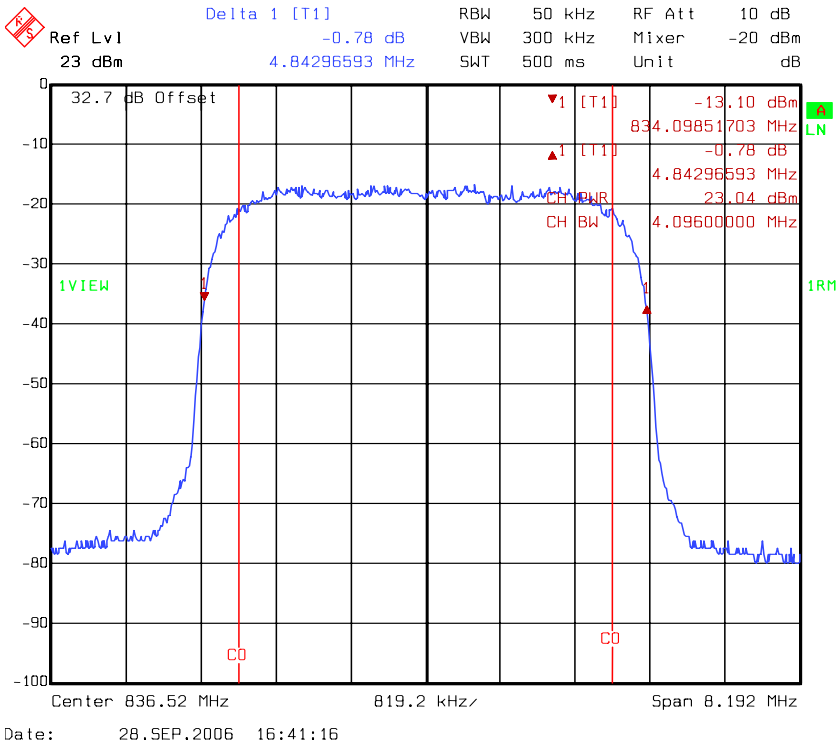


Output, W-CDMA, Low Channel

Figure 11 W-CDMA Occupied Bandwidth – Uplink Mid Channel

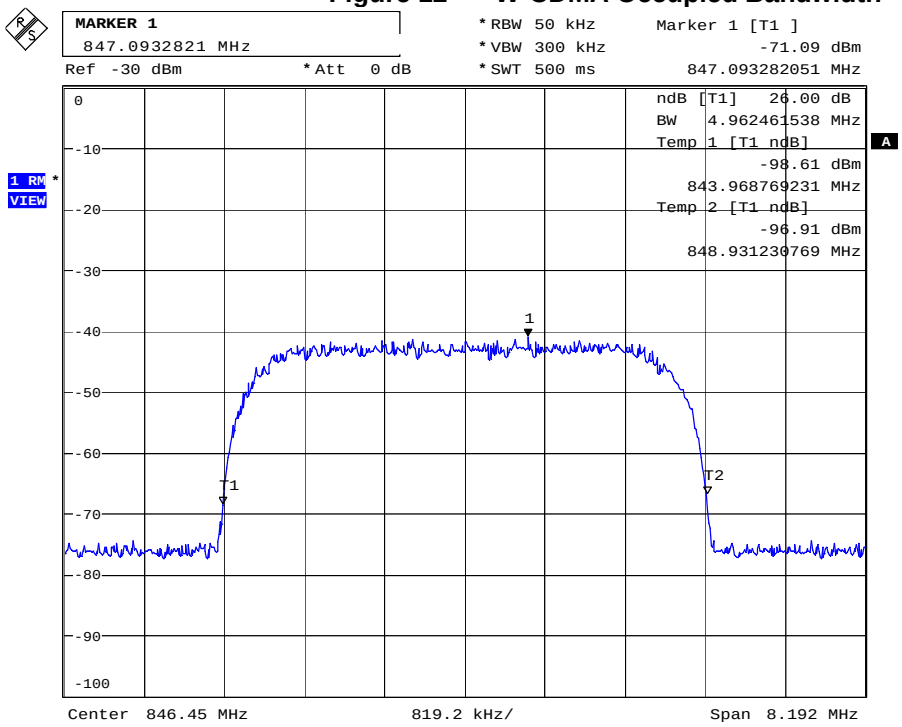


Input, W-CDMA, Mid Channel

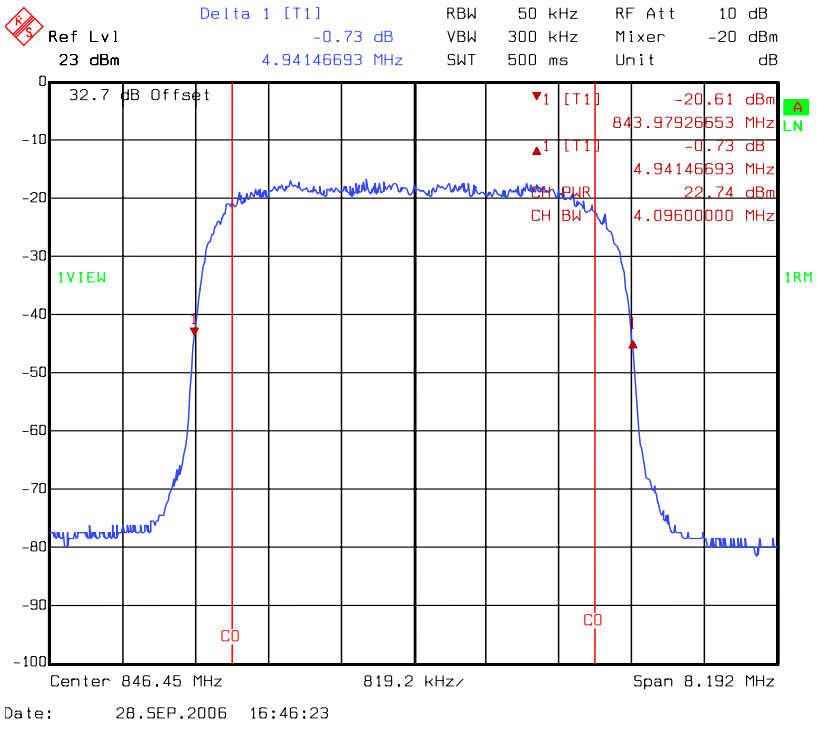


Output, W-CDMA, Mid Channel

Figure 12 W-CDMA Occupied Bandwidth – Uplink High Channel

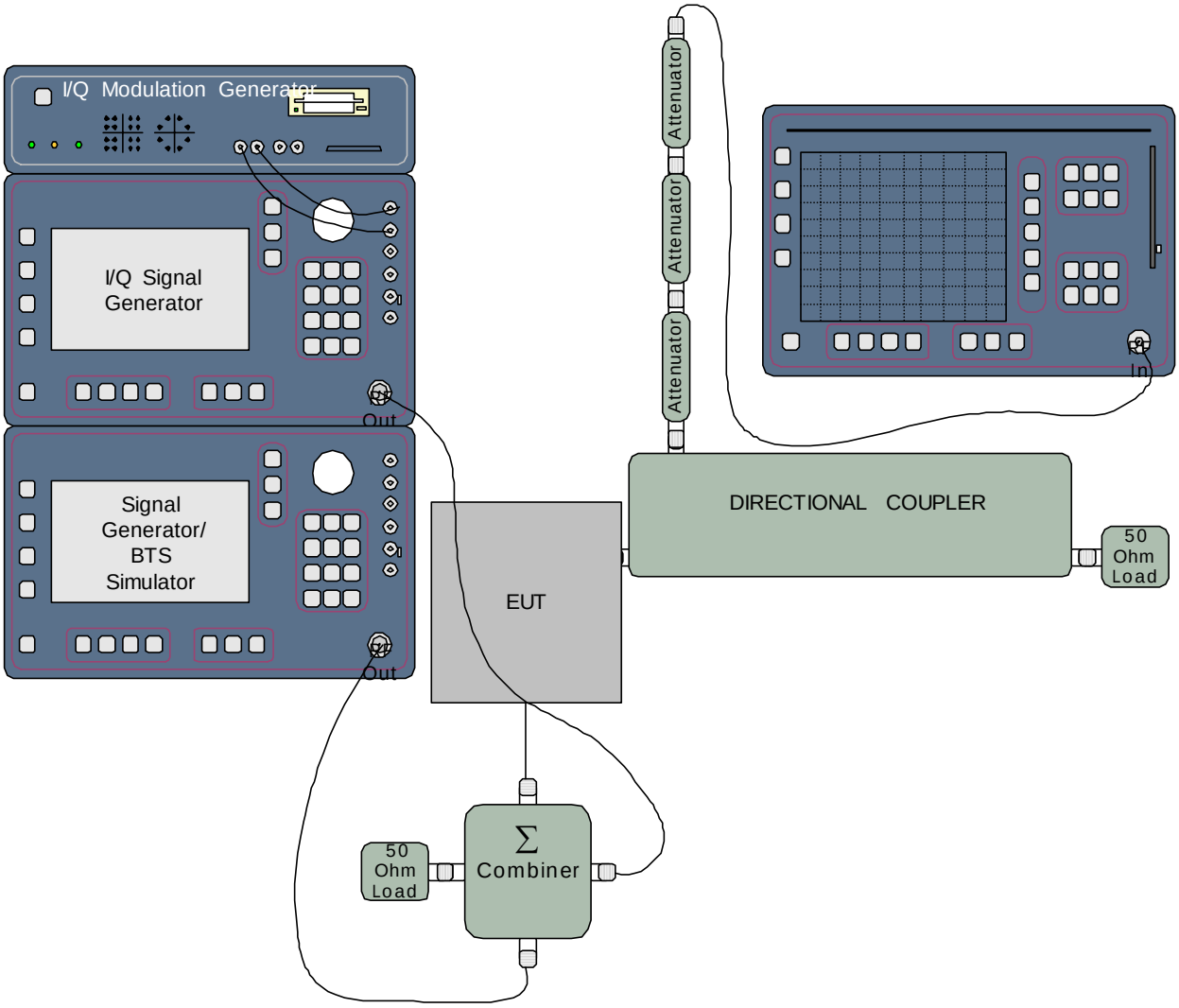


Input, W-CDMA, High Channel



Output, W-CDMA, High Channel

C.9. Test Diagram



C.10. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX D: 2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

D.1. Base Standard & Test Basis

Base Standard	FCC 2.1051
Test Basis	FCC 2.1051 Spurious Emissions at Antenna Terminals
Test Method	TIA 603-C, 2004

D.2. Specifications

22.917

(a) *Out of band emissions*. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

D.3. Measurement Uncertainty

Expanded Uncertainty (K=2)
+1.11/-1.22

D.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

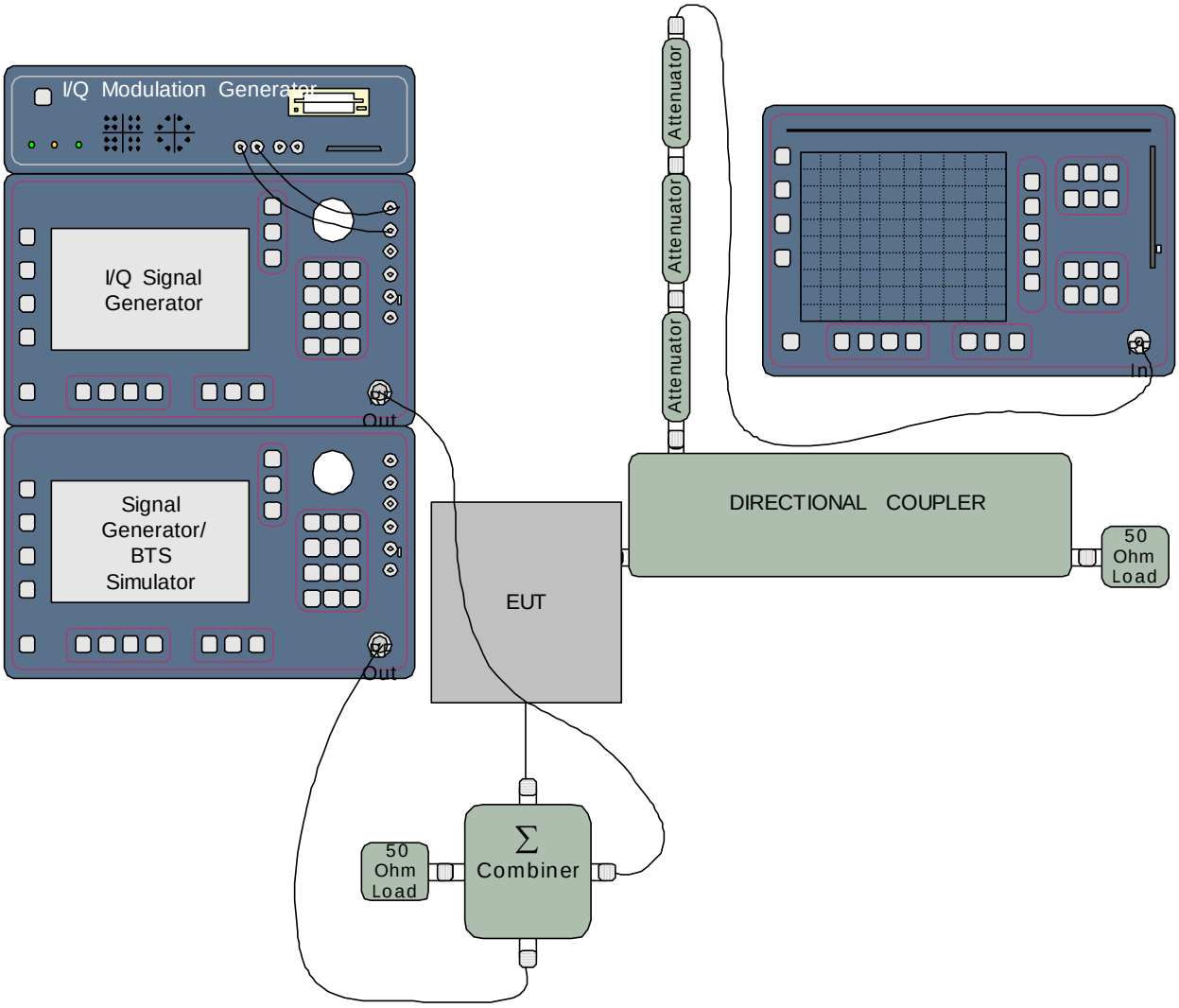
D.5. Test Results

Complies. All emissions meet the out of band limits.

Out-of-Band Emissions limit is 43 + 10 log(P) which relates to -13 dBm absolute power.

Attenuation limit = 43 + 10 log(5) = 50 dB

D.6. Test Diagram



D.7. Test Data

See following pages.

Figure 13 Antenna Conducted Spurious – IS-95 CDMA - Downlink – 10 MHz – 2 GHz

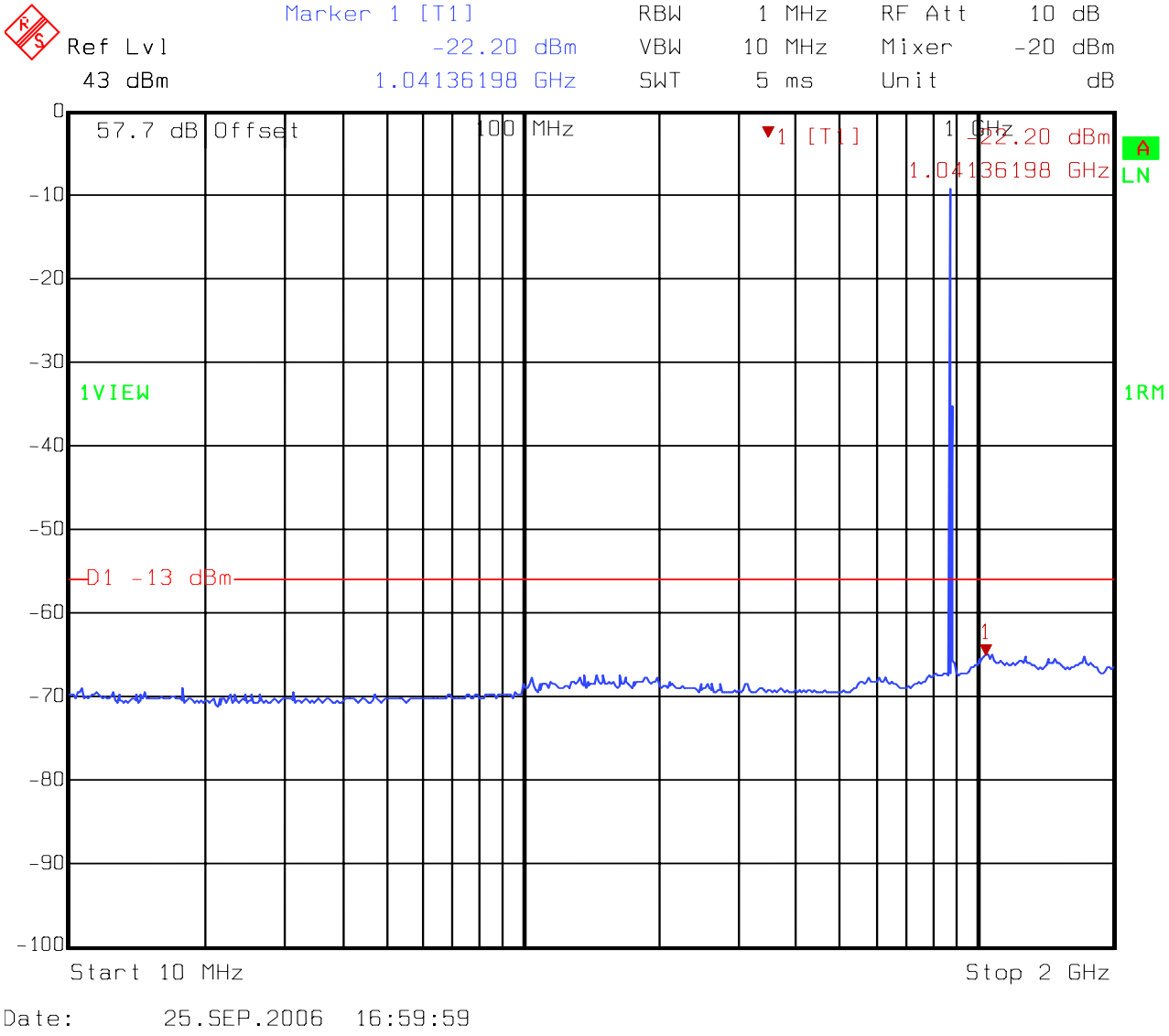
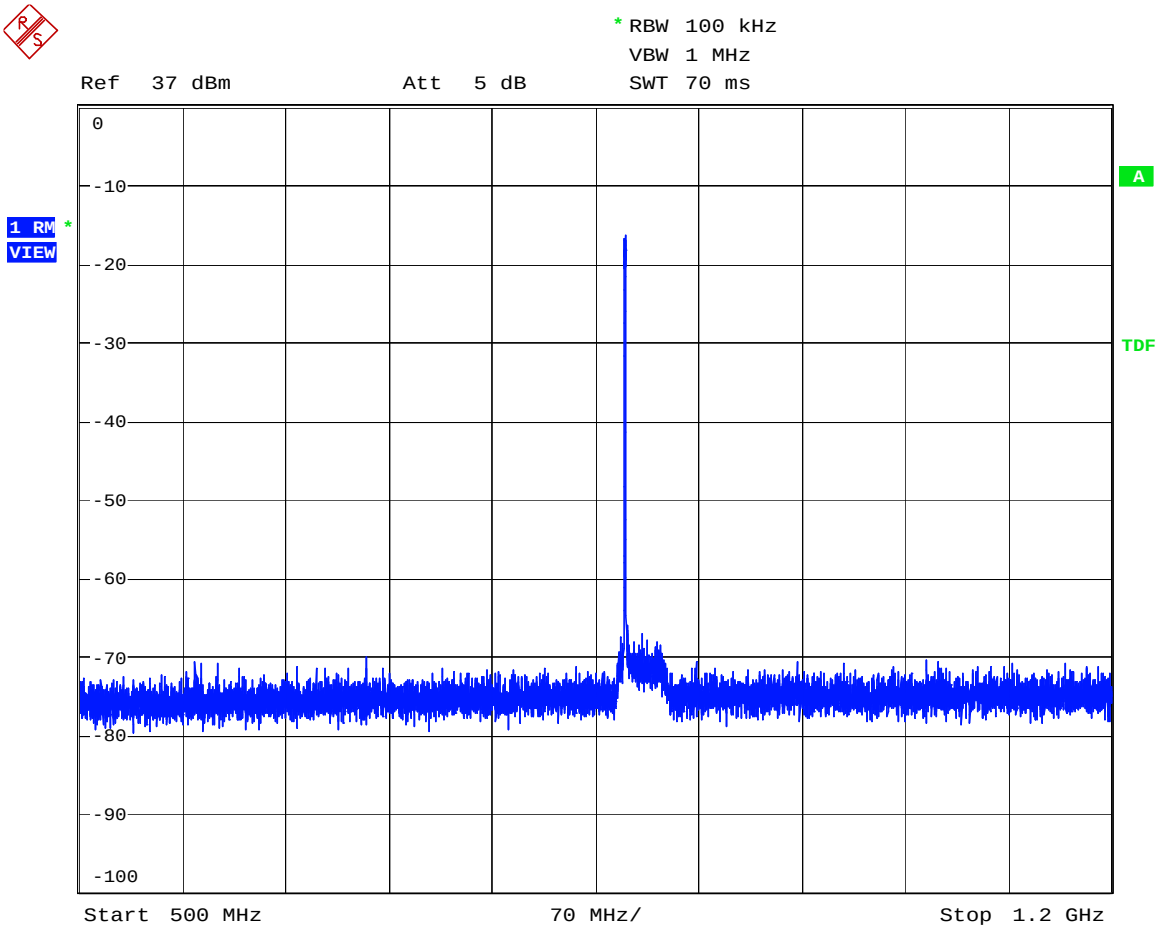
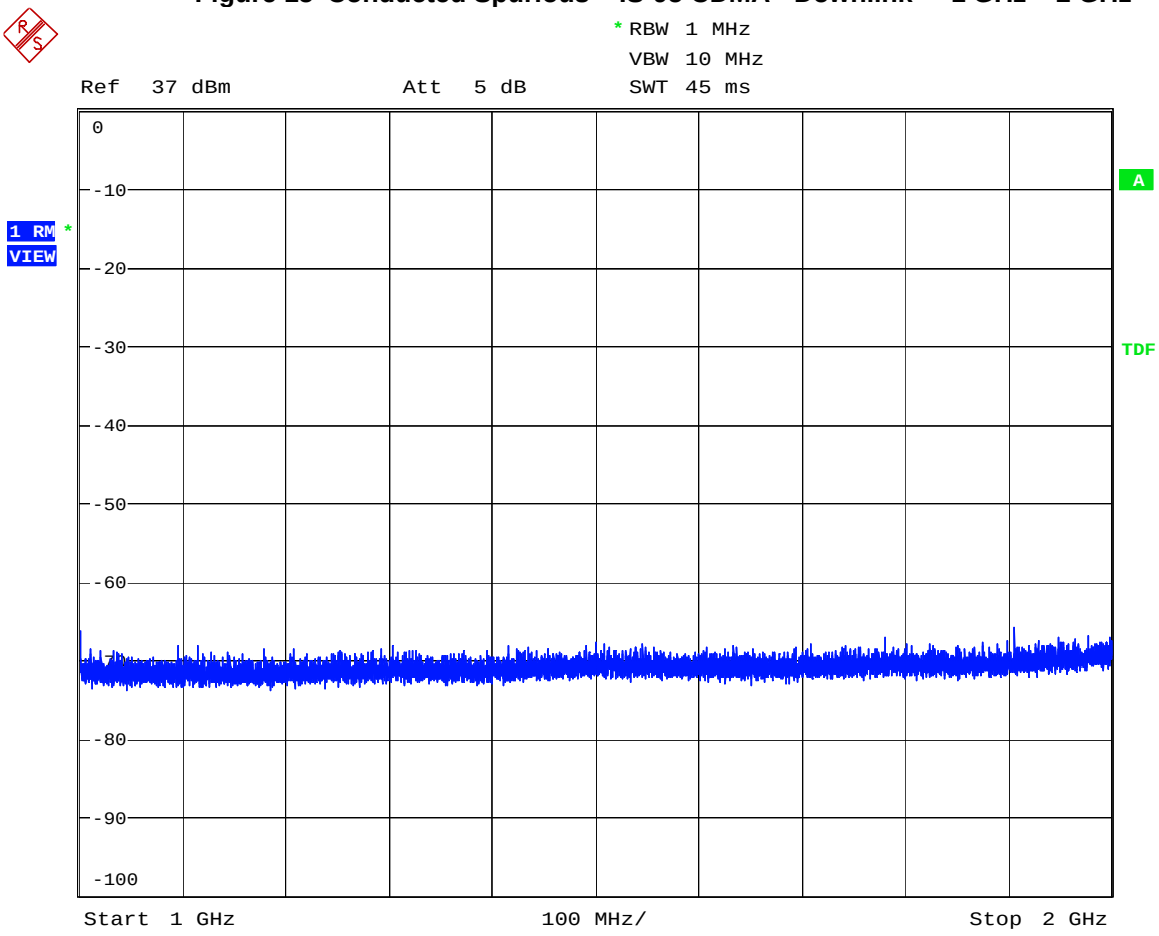


Figure 14 Antenna Conducted Spurious – IS-95 CDMA - Downlink - 500 MHz – 1 GHz



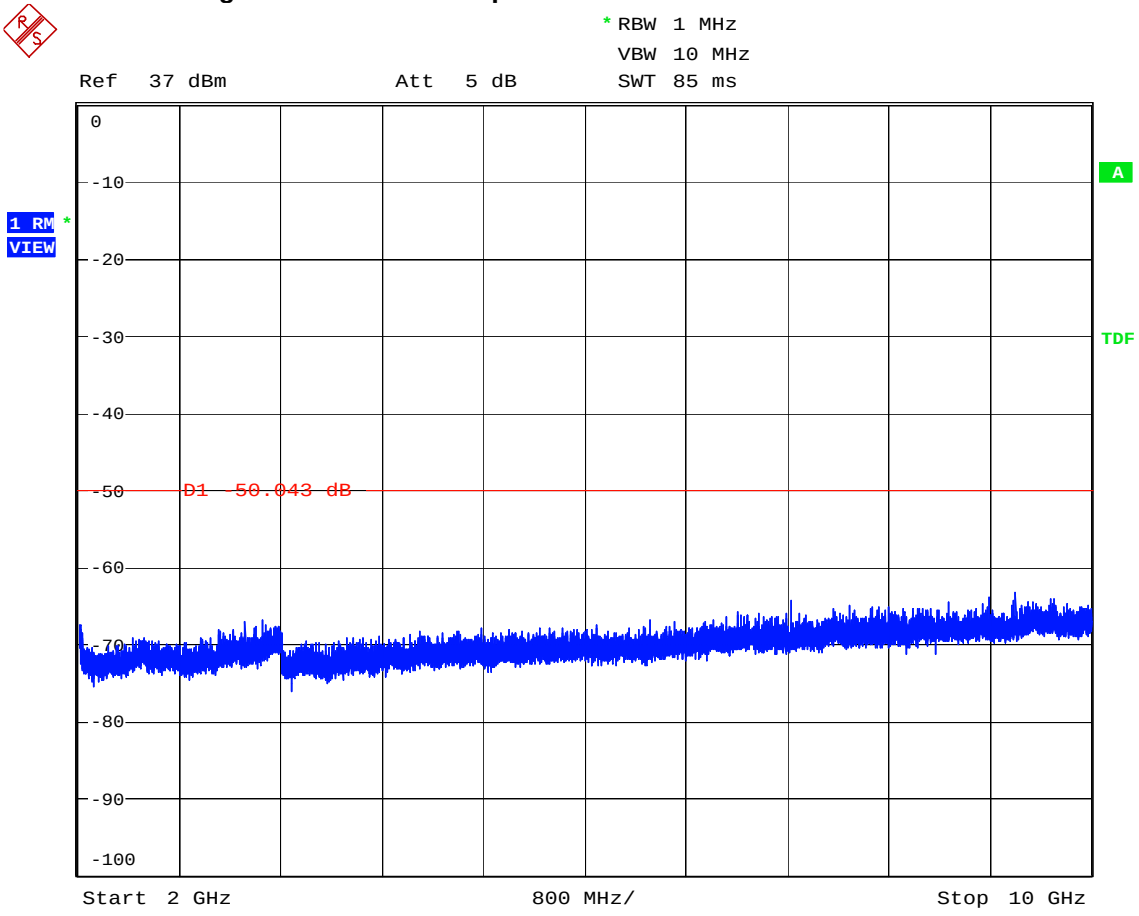
Date: 27.OCT.2006 23:30:08

Figure 15 Conducted Spurious – IS-95 CDMA - Downlink - 1 GHz – 2 GHz



Date: 27.OCT.2006 23:37:38

Figure 16 Conducted Spurious – IS-95 CDMA - Downlink - 2 GHz – 10 GHz



Date: 27.OCT.2006 23:52:27

Figure 17 Antenna Conducted Spurious - WCDMA - Downlink – 10 MHz – 500 MHz

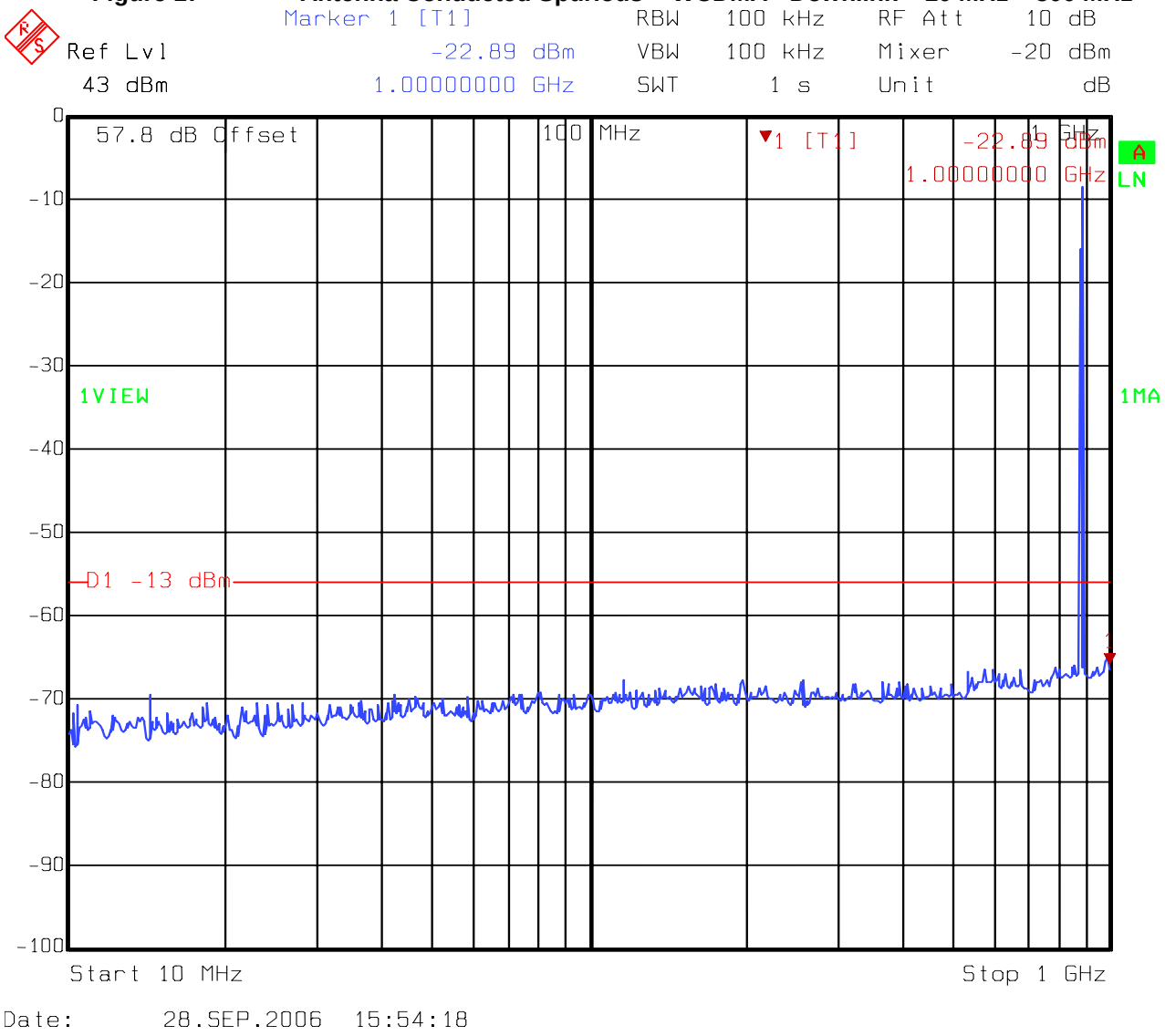
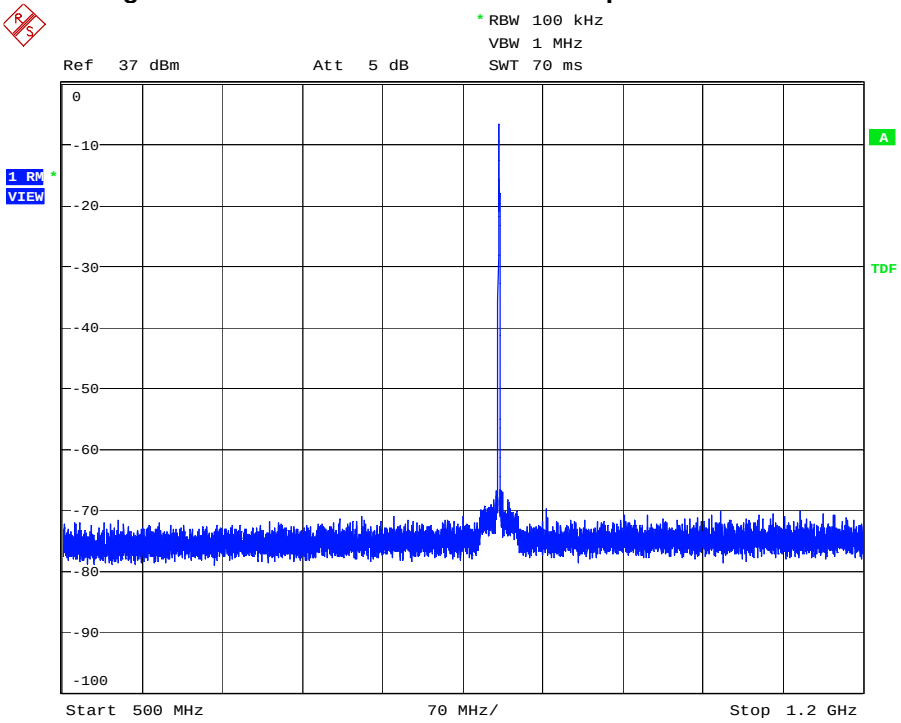
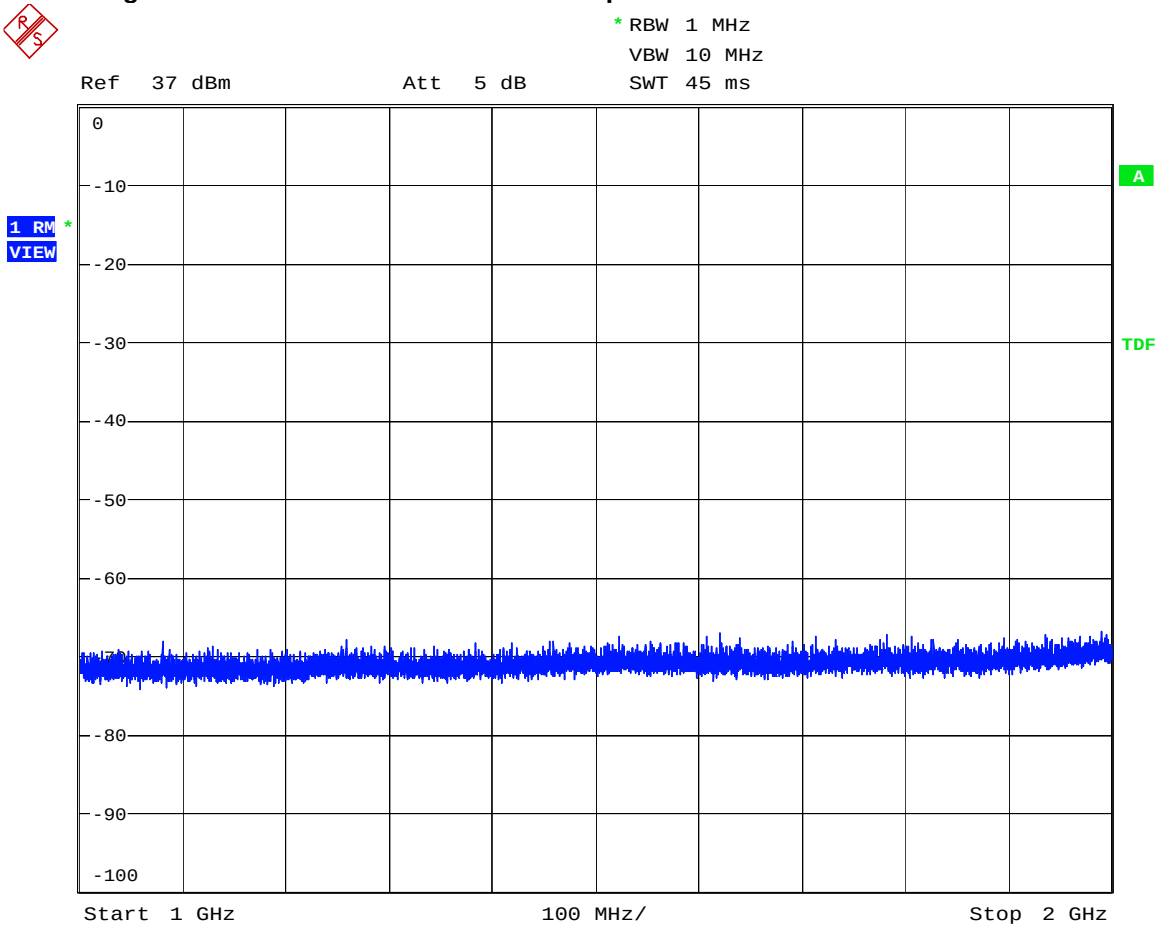


Figure 18 Antenna Conducted Spurious - WCDMA - Downlink – 500 MHz – 1 GHz



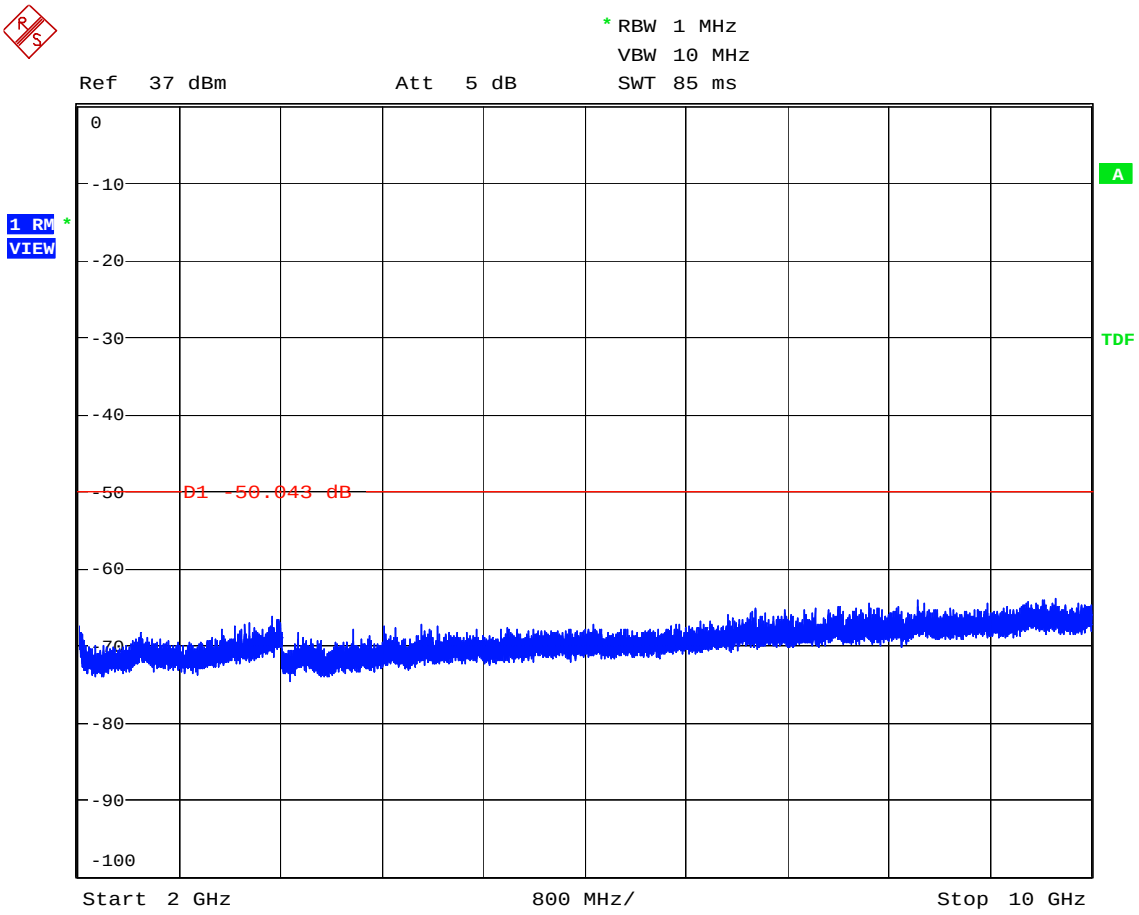
Date: 27.OCT.2006 23:32:13

Figure 19 Antenna Conducted Spurious - WCDMA - Downlink – 1 GHz – 2 GHz



Date: 27.OCT.2006 23:37:04

Figure 20 Antenna Conducted Spurious - WCDMA - Downlink – 1 GHz – 2 GHz



Date: 27.OCT.2006 23:50:58

Figure 21 Antenna Conducted Spurious - IS-95 CDMA - Uplink – 10 MHz – 1 GHz

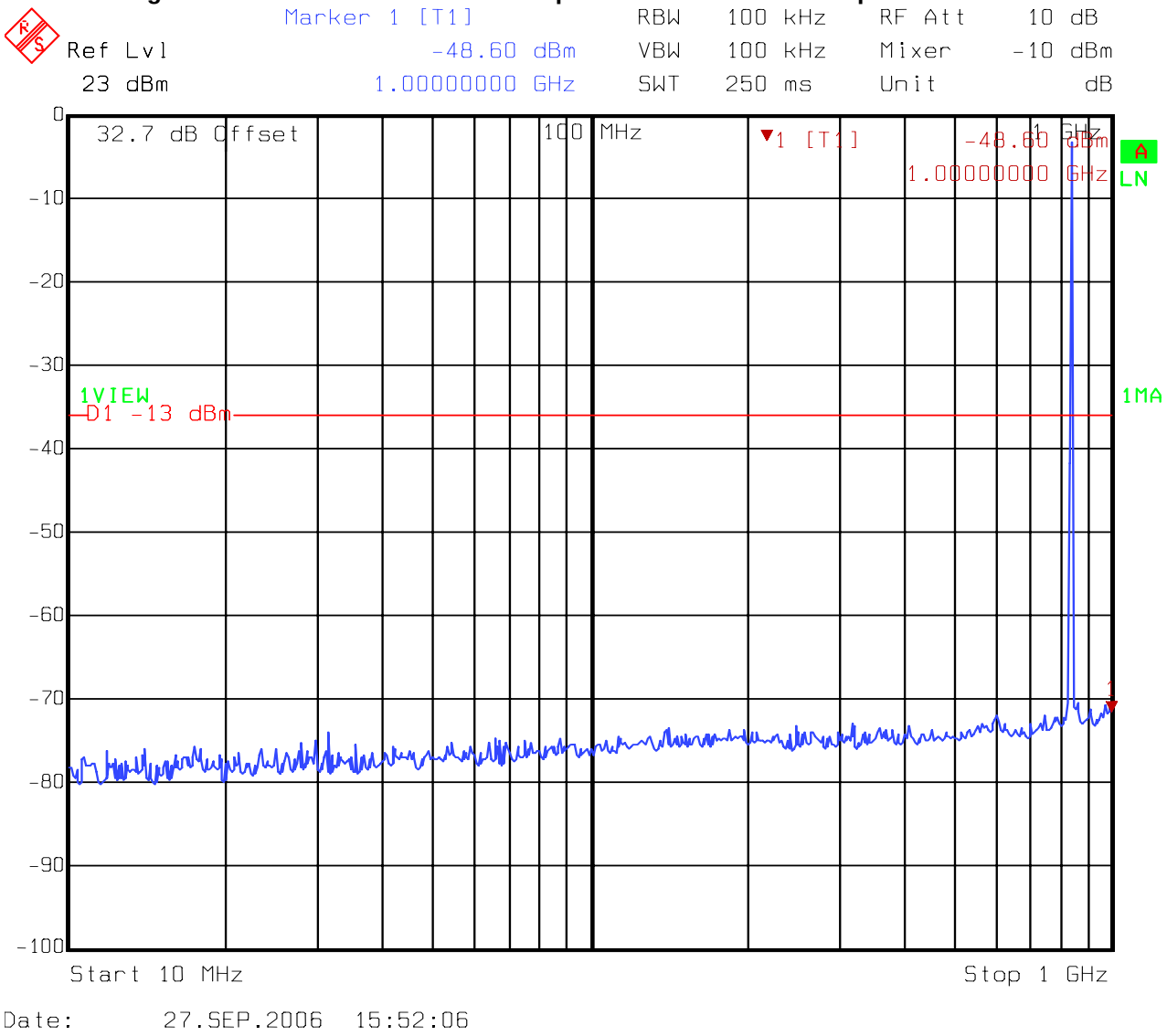


Figure 22 Antenna Conducted Spurious - IS-95 CDMA - Uplink – 1 GHz – 20 GHz

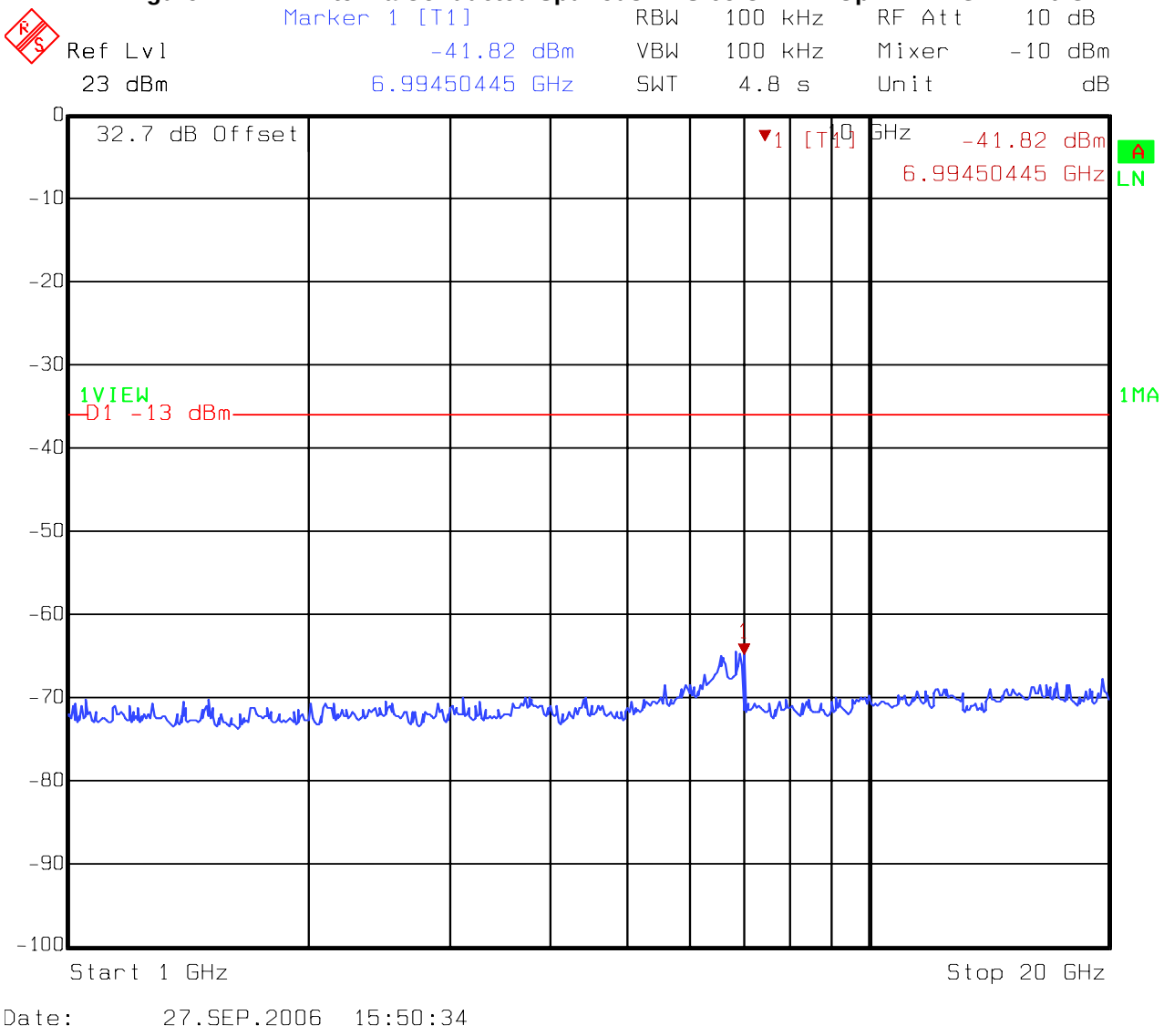


Figure 23 Antenna Conducted Spurious - WCDMA - Uplink – 10 MHz – 20 GHz

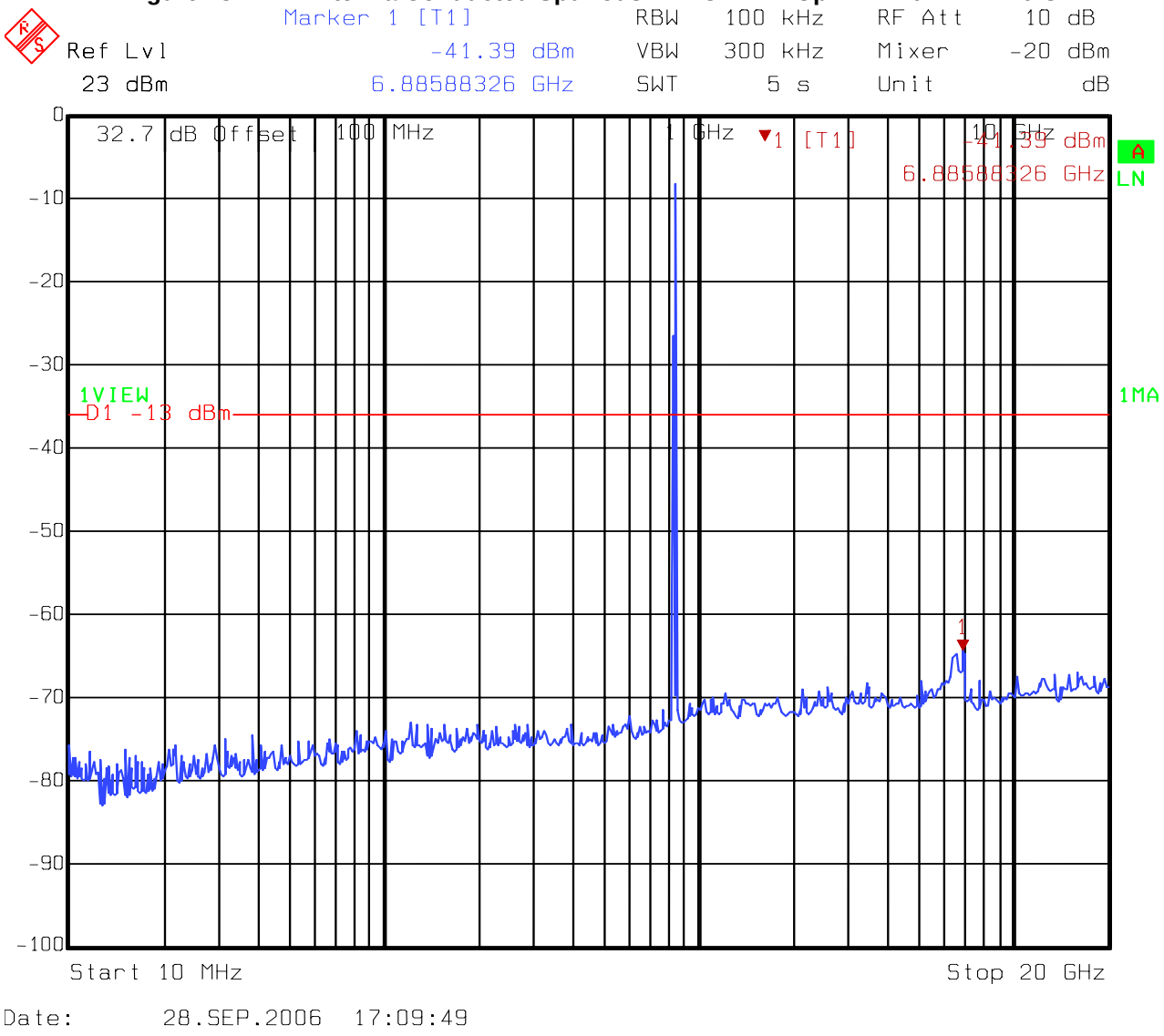
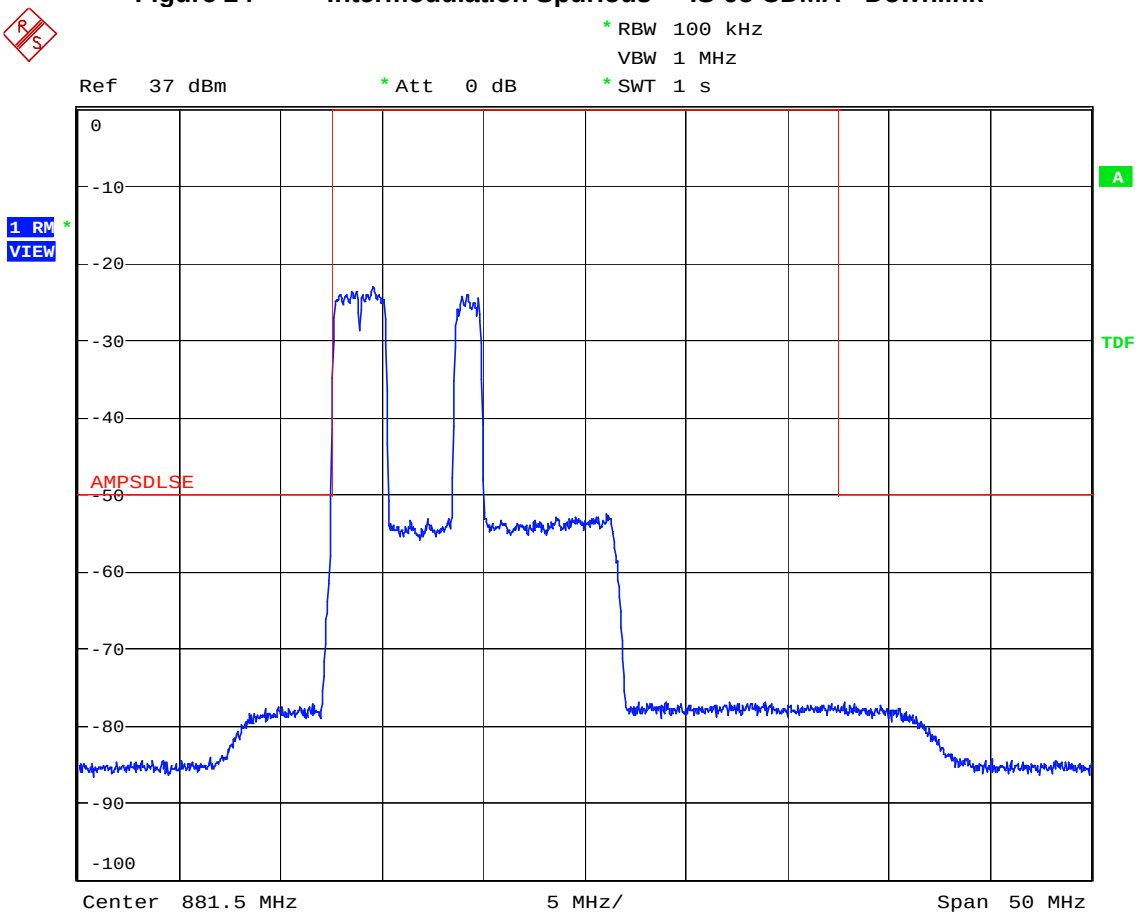


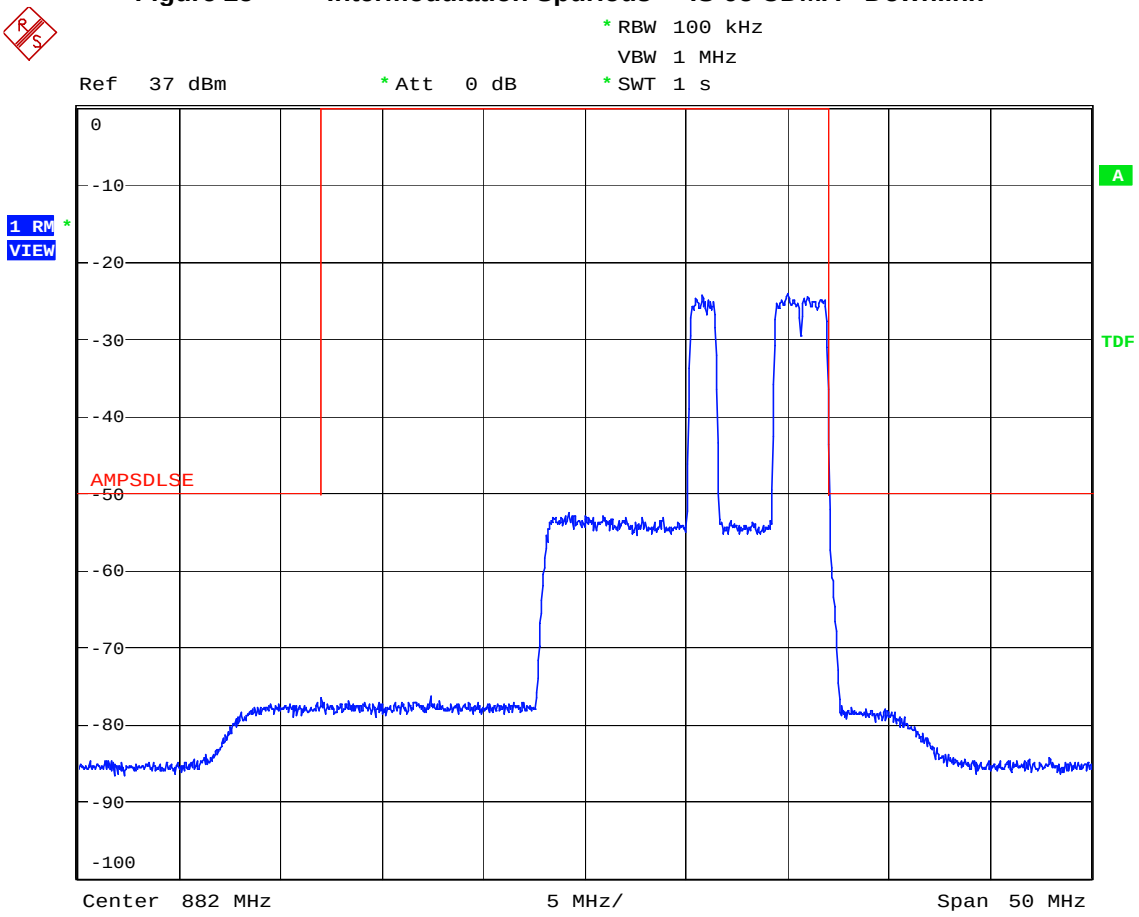
Figure 24 Intermodulation Spurious - IS-95 CDMA - Downlink



Date: 31.OCT.2006 17:56:43

3 signal Intermodulation - Ch. 1013, Ch. 31, Ch. 190
+32.2 dBm/carrier

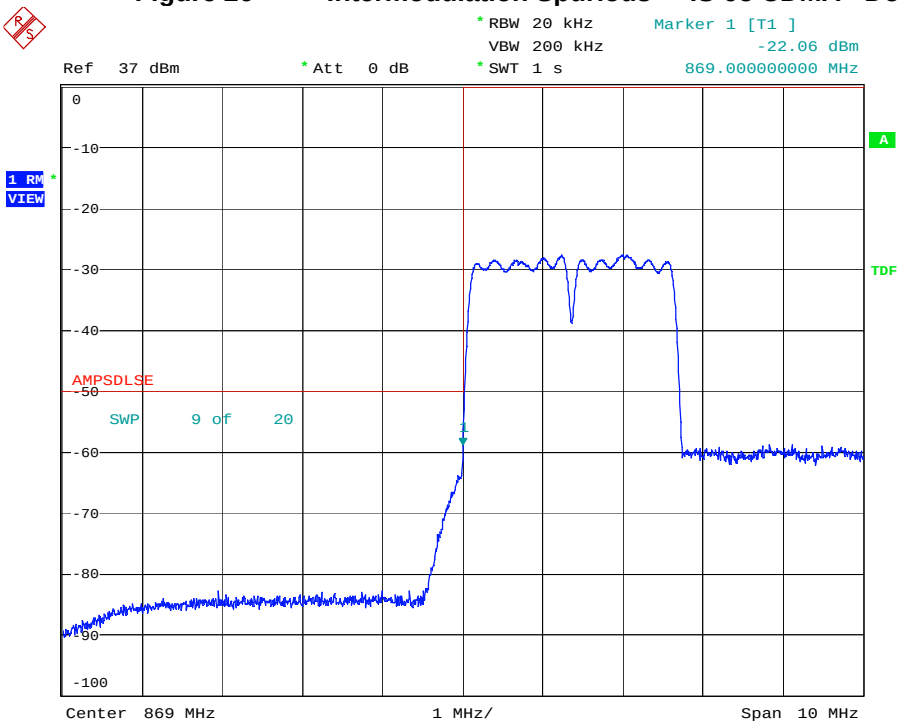
Figure 25 Intermodulation Spurious - IS-95 CDMA - Downlink



Date: 31.OCT.2006 17:24:14

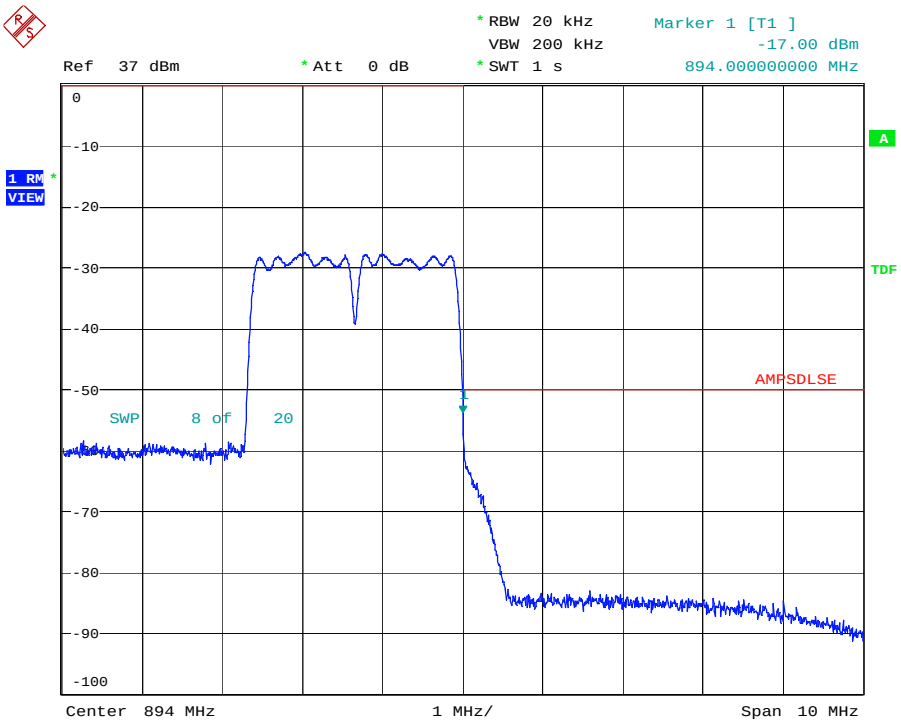
3 signal intermodulation - Ch. 594, 736, and 777
+32.2 dBm/carrier

Figure 26 Intermodulation Spurious - IS-95 CDMA - Downlink



Band Edge Intermodulation: Two IS-95 CDMA carriers at 869.7 MHz and 870.93 MHz, +34 dBm/carrier

Date: 31.OCT.2006 17:46:24



Band Edge Intermodulation: Two IS-95 CDMA carriers at 890.88 MHz and 892.11 MHz, +34 dBm/carrier

Date: 31.OCT.2006 17:37:45

Figure 27 Intermodulation Spurious - IS-95 CDMA - Uplink

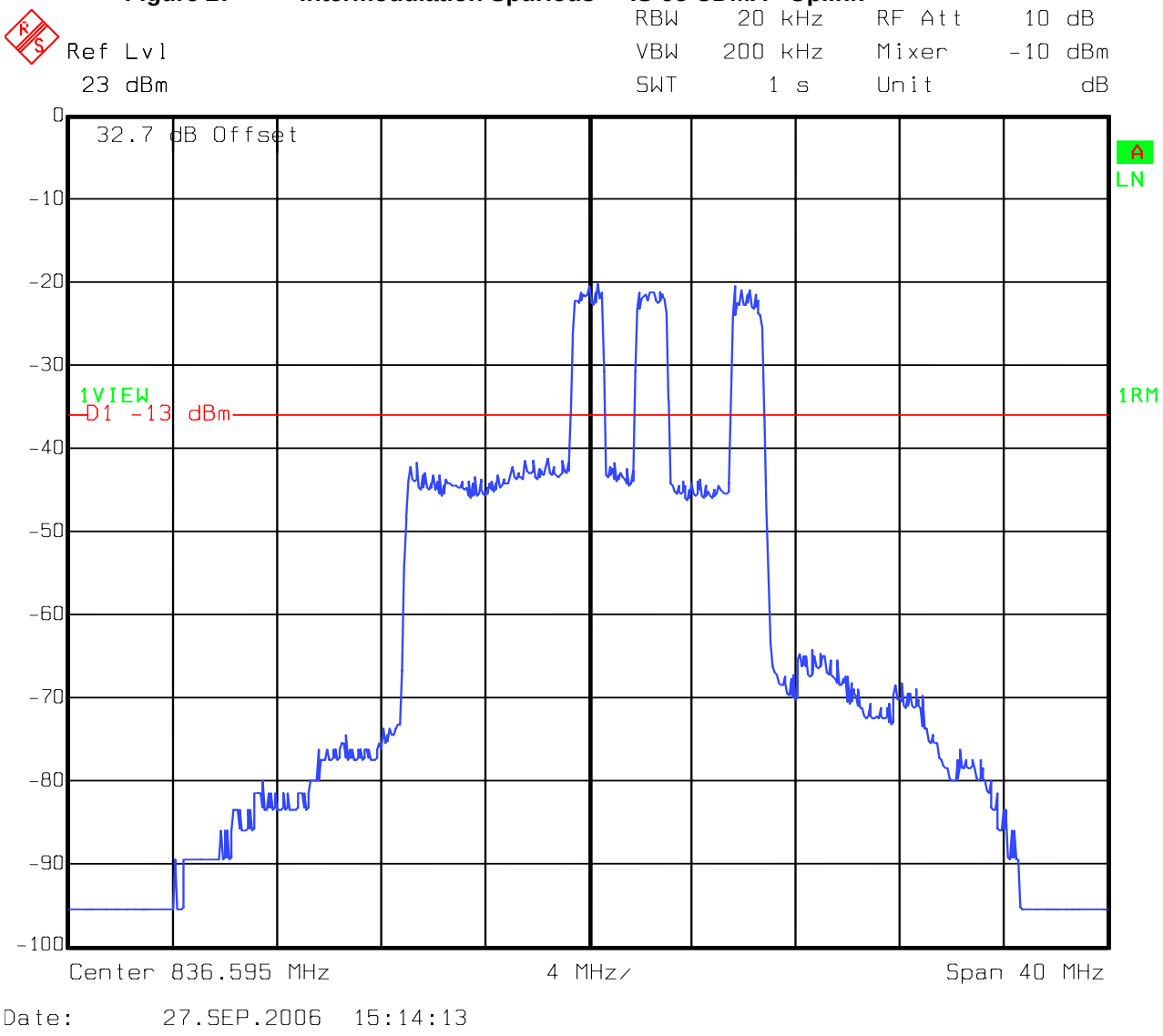
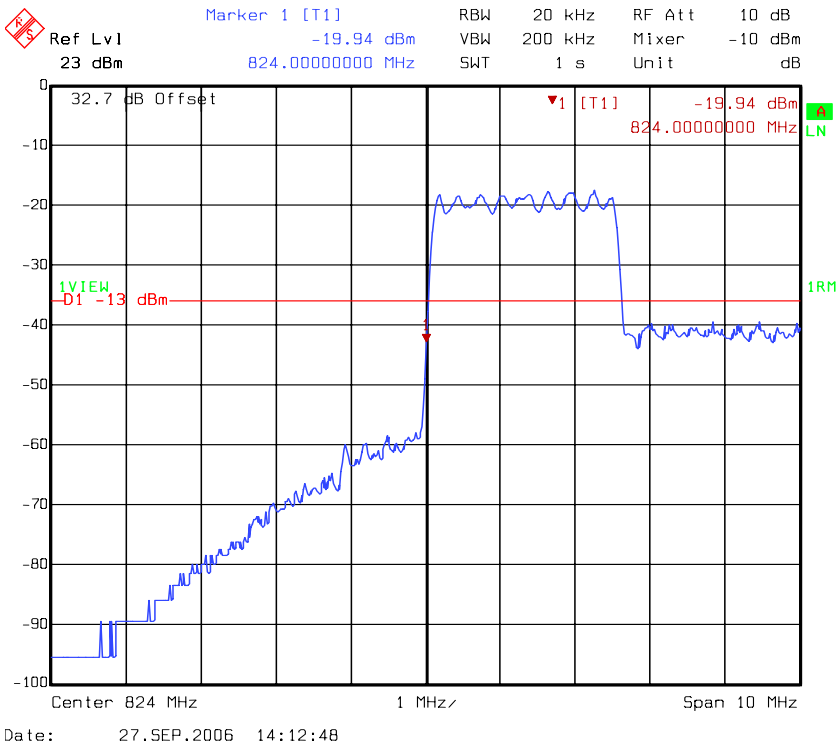
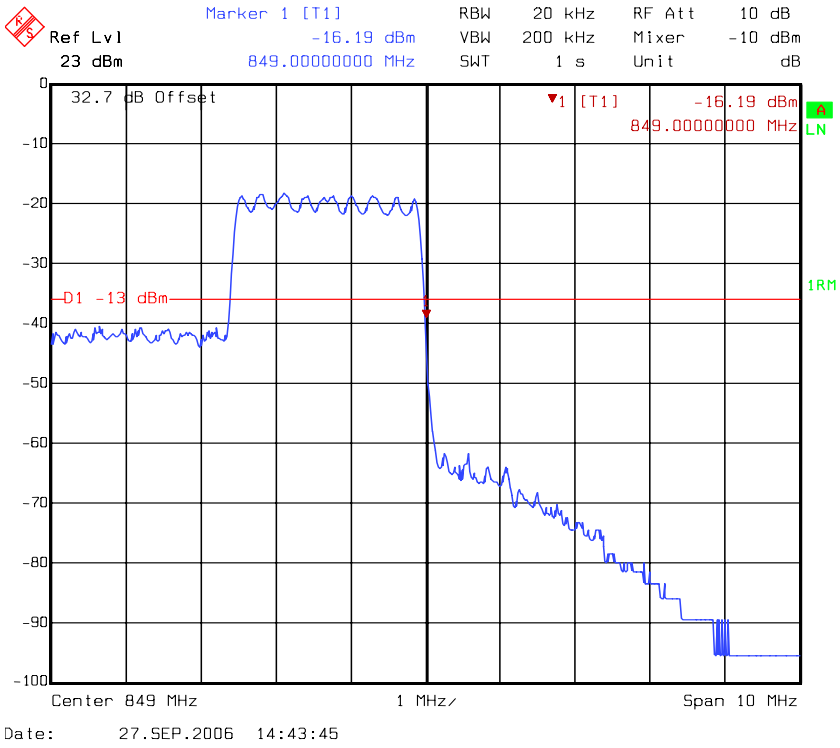


Figure 28 Intermodulation Spurious - IS-95 CDMA - Uplink

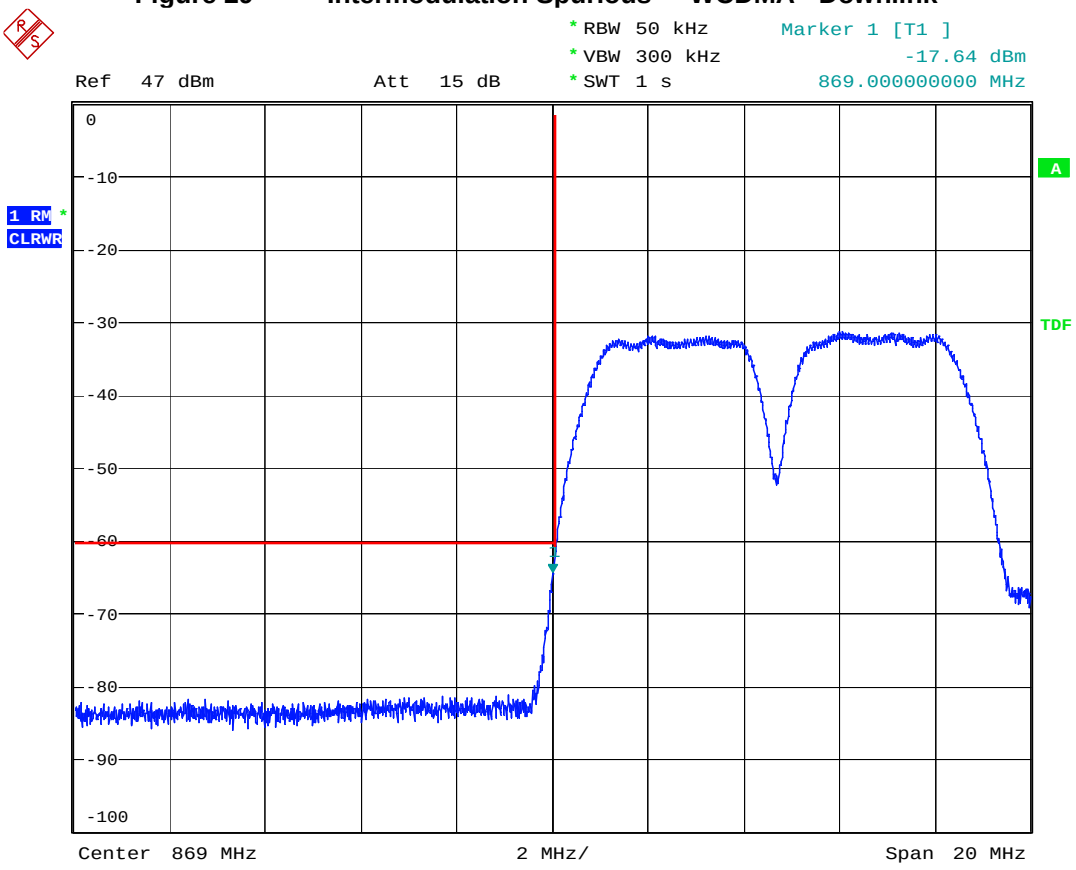


Band Edge Intermodulation: Two IS-95 CDMA carriers at 824.7 MHz and 825.93 MHz, +20 dBm/carrier



Band Edge Intermodulation: Two IS-95 CDMA carriers at 847.07 MHz and 848. 3 MHz, +20 dBm/carrier

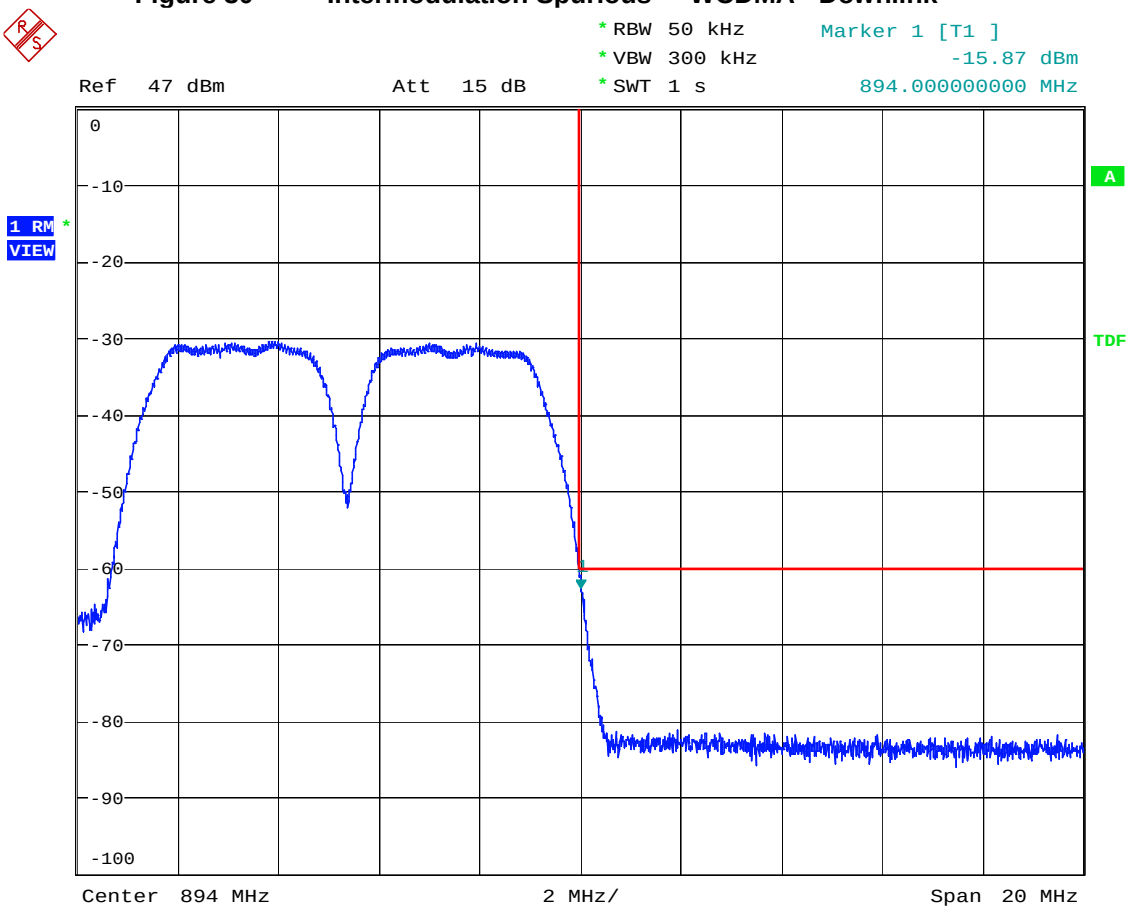
Figure 29 Intermodulation Spurious - WCDMA - Downlink



Date: 31.OCT.2006 22:32:30

Two WCDMA carriers at +34 dBm/carrier, Lower Edge of Authorized Band

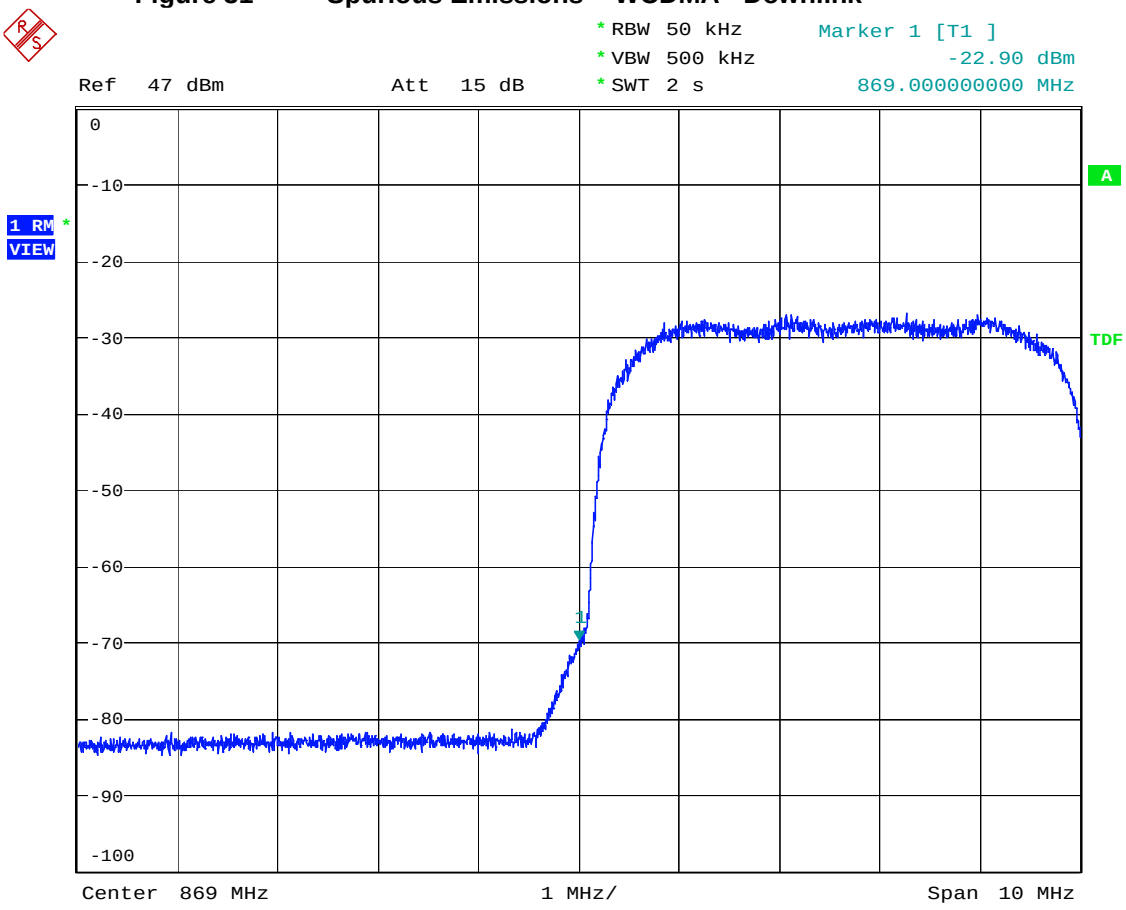
Figure 30 Intermodulation Spurious - WCDMA - Downlink



Date: 31.OCT.2006 22:28:11

Two WCDMA carriers at +34 dBm/carrier, Upper Edge of Authorized Band

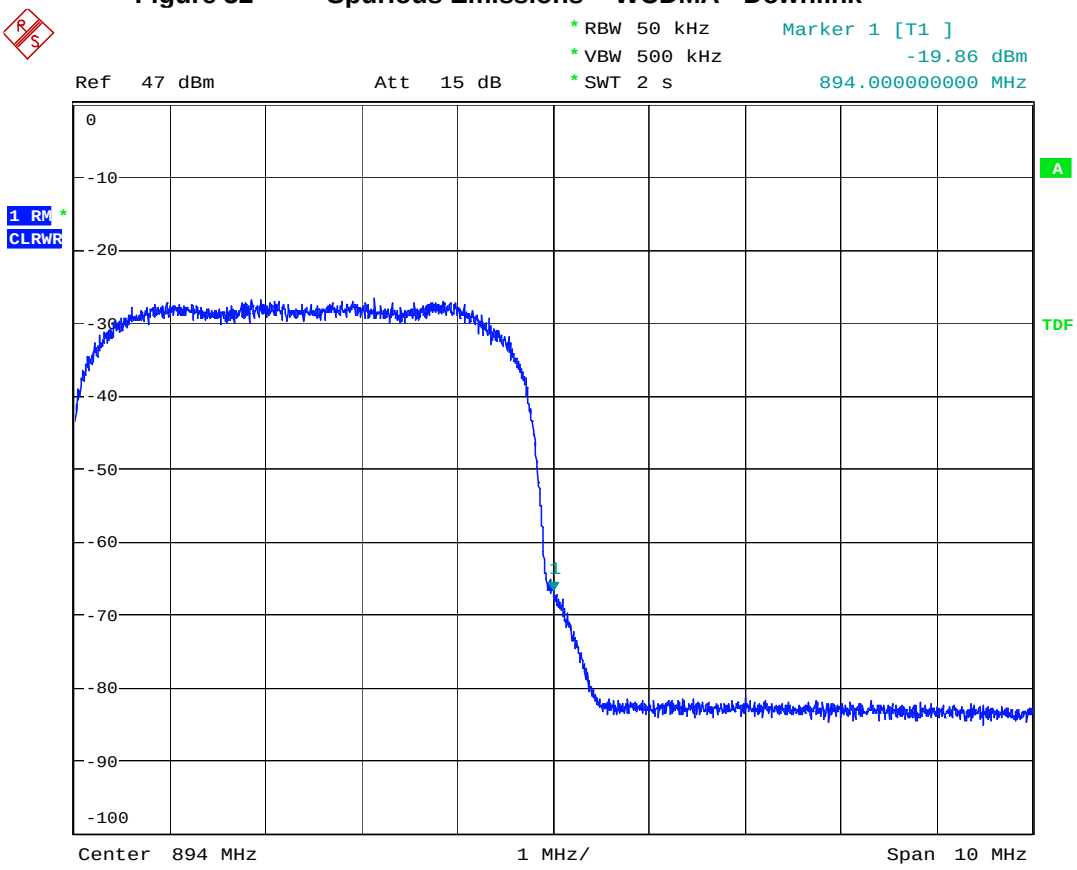
Figure 31 Spurious Emissions - WCDMA - Downlink



Date: 31.OCT.2006 21:58:41

One W-CDMA channel at 871.62 MHz (lowest channel), +37 dBm

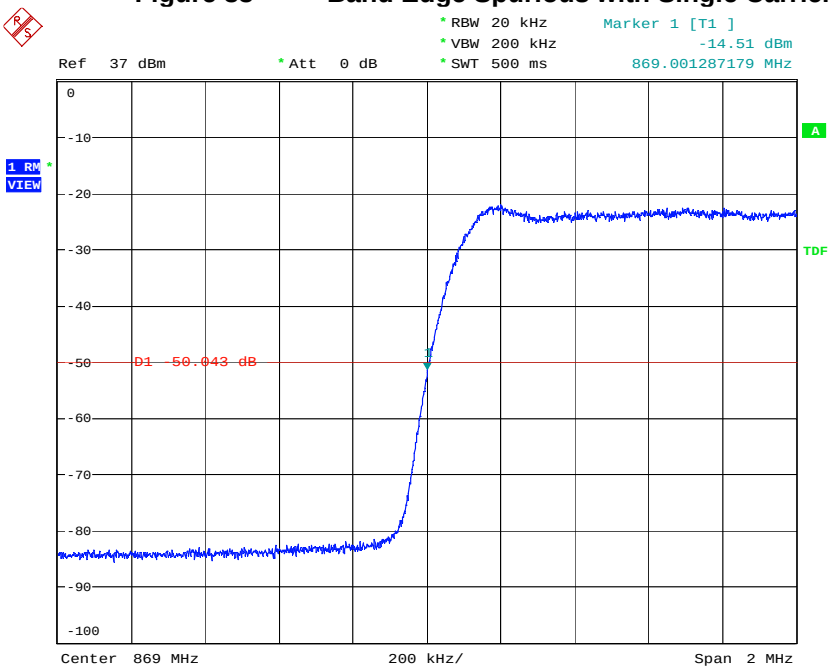
Figure 32 Spurious Emissions - WCDMA - Downlink



Date: 31.OCT.2006 22:05:37

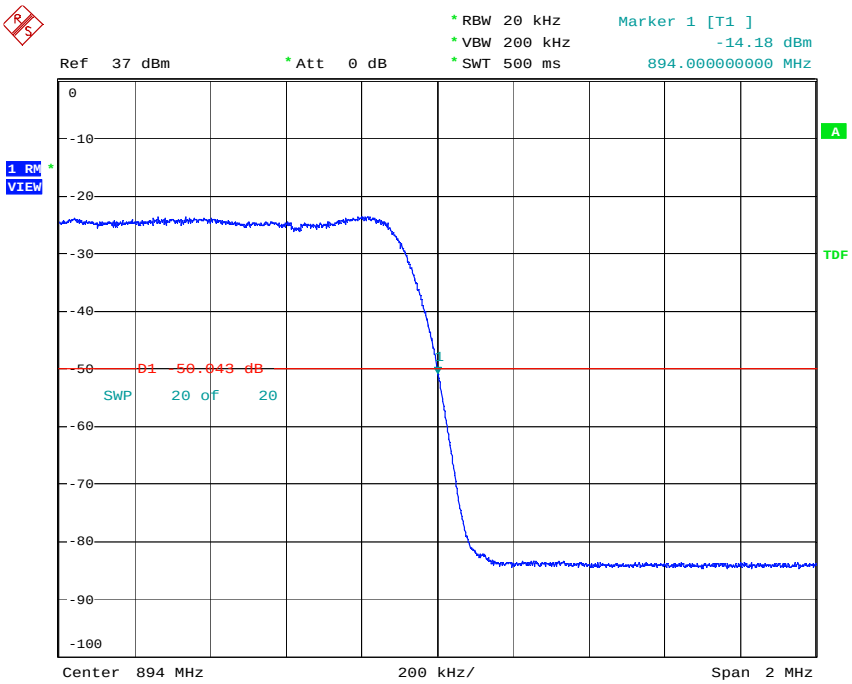
One W-CDMA channel at 891.38 MHz (highest channel), +37 dBm

Figure 33 Band Edge Spurious with Single Carrier - IS-95 CDMA - Downlink



One IS-95 CDMA carrier at 869.7 MHz, +37 dBm

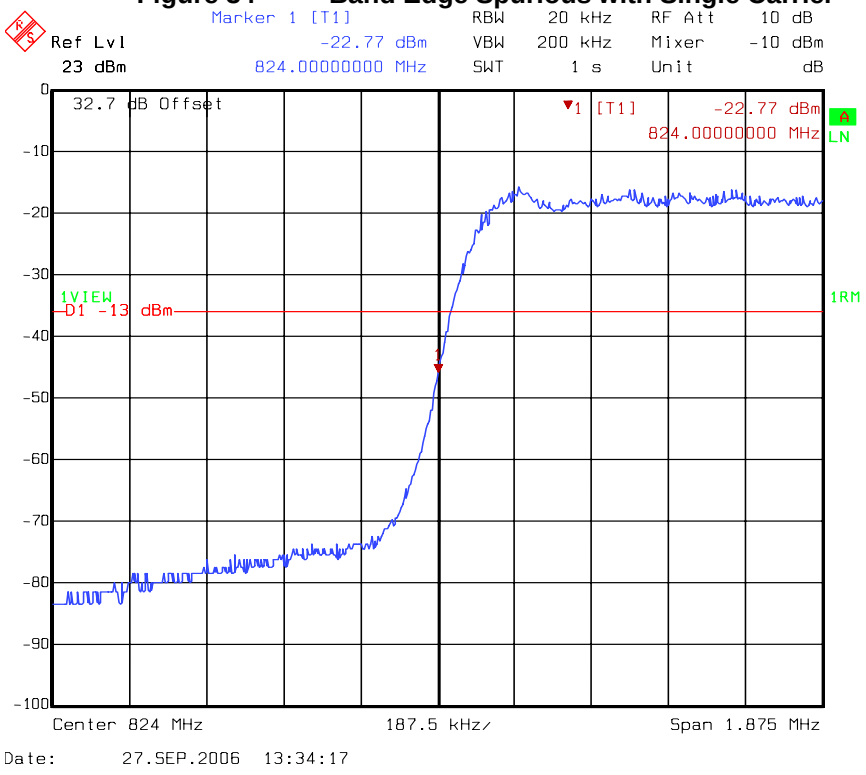
Date: 31.OCT.2006 15:41:28



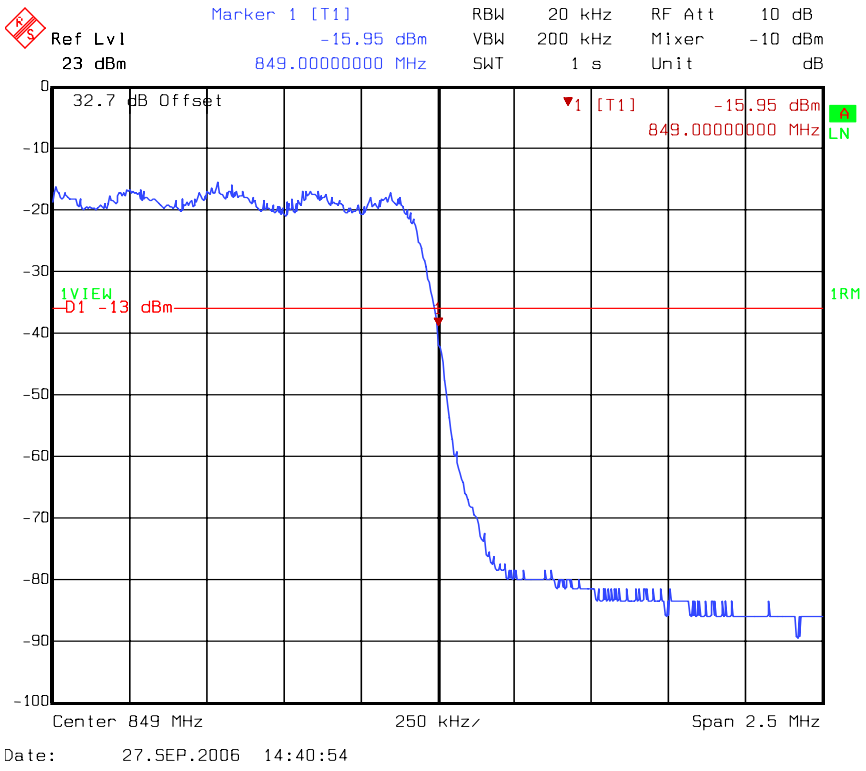
One IS-95 CDMA carrier at 893.3 MHz, +37 dBm

Date: 31.OCT.2006 15:53:51

Figure 34 Band Edge Spurious with Single Carrier - IS-95 CDMA - Uplink

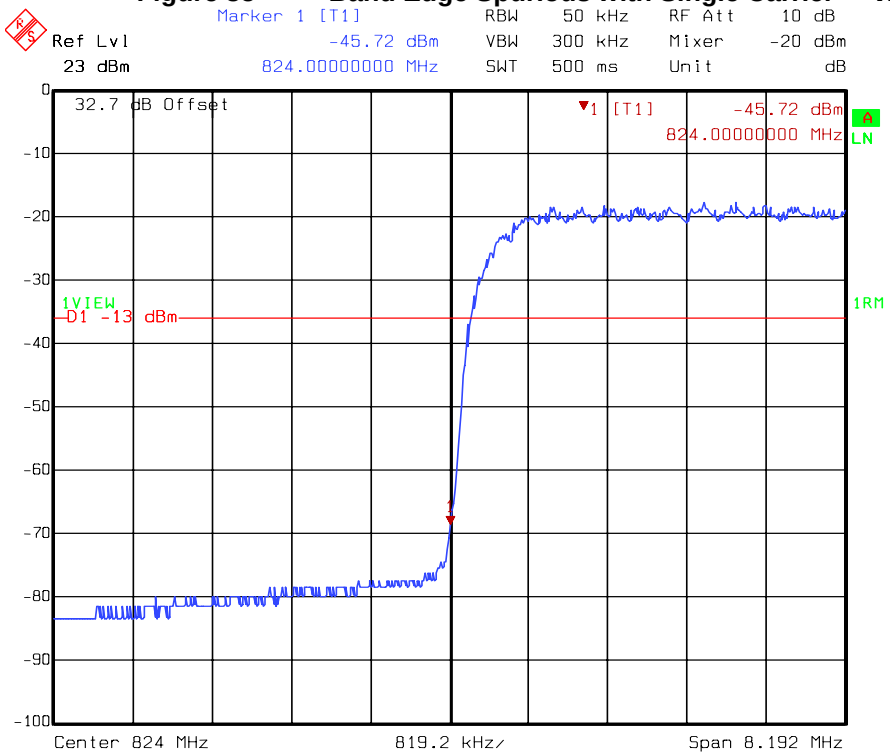


One IS-95 CDMA carrier at 824.7 MHz, +23 dBm

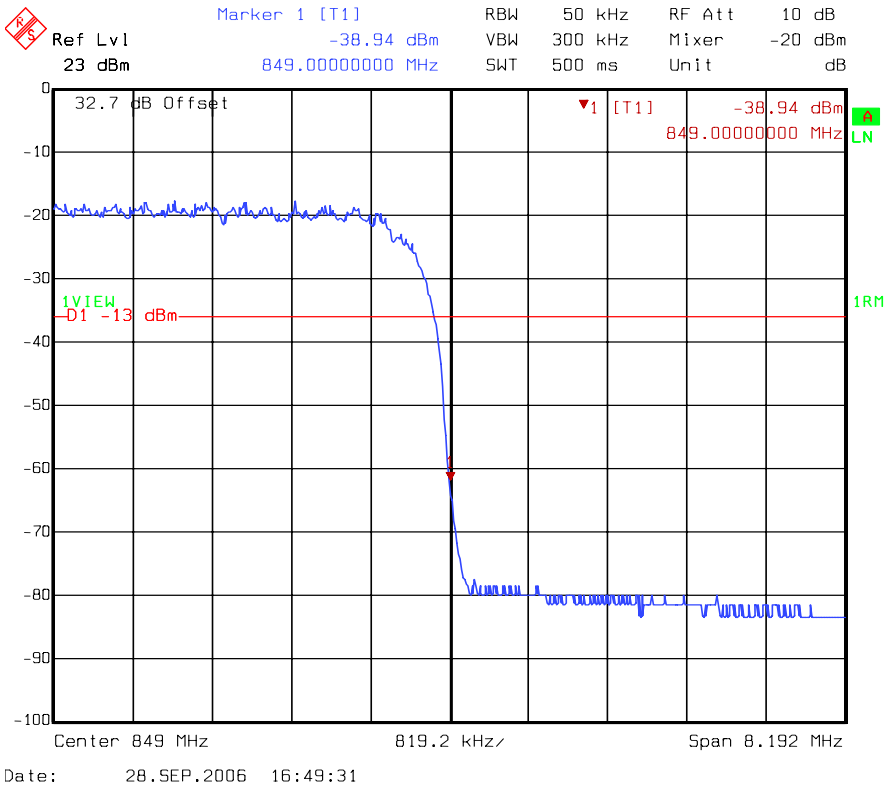


One IS-95 CDMA carrier at 848.3 MHz, +23 dBm

Figure 35 Band Edge Spurious with Single Carrier - WCDMA - Uplink



One WCDMA carrier at +23 dBm



One WCDMA carrier at +23 dBm

D.8. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX E: 2.1053 FIELD STRENGTH OF SPURIOUS RADIATION

E.1. Base Standard & Test Basis

Base Standard	FCC 2.1053
Test Basis	FCC 2.1053 Field Strength of Spurious Radiation
Test Method	TIA 603-C, 2004 Substitution Antenna Method

E.2. Limits

22.917
(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

E.3. Test Results

Compliant. The worst-case spurious emission level was -62 dBm at 1766.64 MHz. This level is 49 dB below the specification limit of -13 dBm. The spectrum was searched up to 10 GHz with the device operating on three channels in the Uplink direction and three channels in the Downlink direction. The worst-case emission reported above was measured in Downlink mode while repeating a signal at 881.52 MHz (channel 384).

E.4. Deviations from Normal Operating Mode During Test

None.

E.5. Sample Calculation

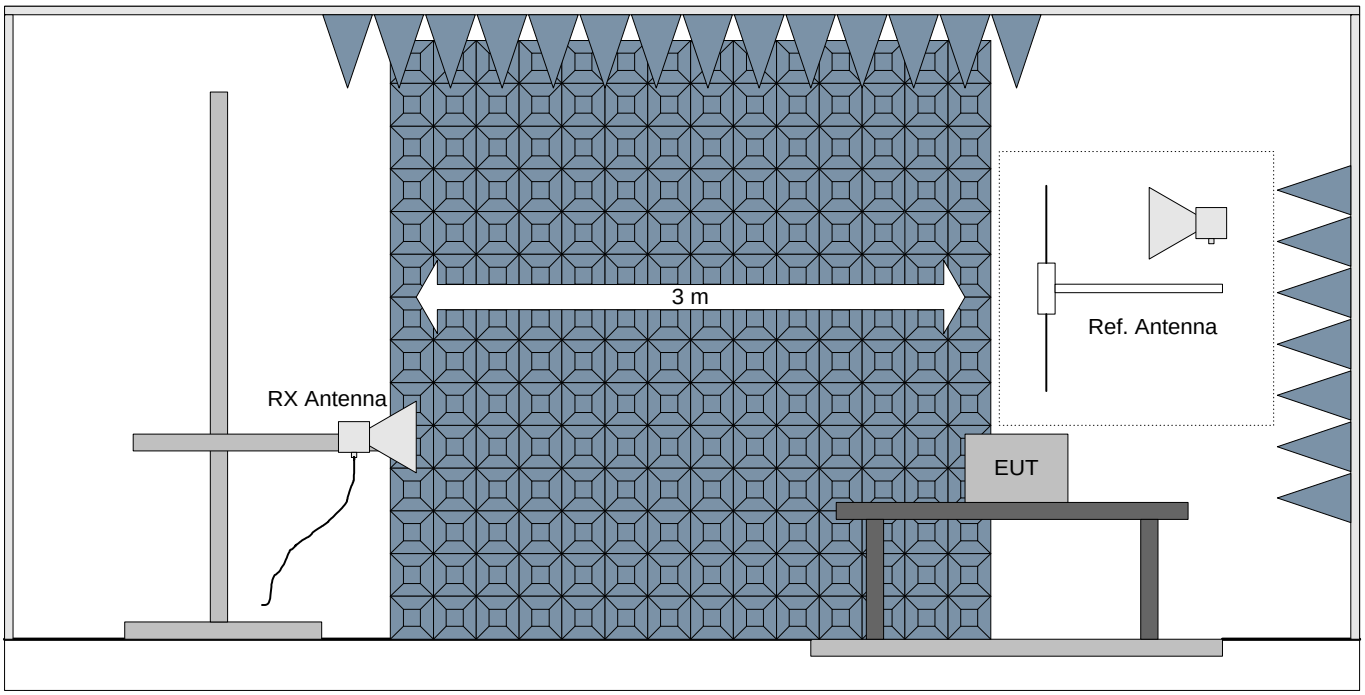
Final measured value (dBm) = Substitution level (dBm) + Antenna Gain (dBd)

Minimum attenuation limit (dB) = 43 + 10 log(P) where P = Peak power of the carrier in watts.

Min. Atten. Limit dB) = 43 + 10 * log(5 watts)
= 43 + 10 * 0.69897
= 43 + 7
= 50 dB

37 dBm – 50 dB = -13 dBm

E.6. Test Diagram



Note: The EUT is set to repeat a signal at maximum rf output power into a coaxial load for this testing.

E.7. Test Data

Project No:	Andrew Corporation W6337
Model:	Node C/M 837
Comments:	Transmit at full rf output power (5 watts), Ch. 384 (881.52 MHz)

Distance:	3 m	Standard:	CFR 47, Part 2.1043

RBW: (unless noted) < 1 GHz = 120 kHz; 1 GHz = 1 MHz > VBW: (unless noted) Peak = RBW Avg. = RBW

Antenna	Polarization	Frequency	Measured	Substitution Level	Substitution Antenna Gain	Final Measured Value		Peak Carrier Power		Minimum Attenuation Limit	Margin
	(V/H)	(MHz)	(dBm)	(dBm)	(dBd)	(dBm)	(watts)	(dBm)	(watts)	(dBc)	(dB)
Ref. E1019	V	1766.64	-84.3	-83.1	6.2	-76.9	2.04174E-11	37	5	49.99	63.9
Ref. E1019	H	1766.64	-87.7	-97.6	6.2	-91.4	7.24436E-13	37	5	49.99	78.4
Ref. E1019	V	2644.56	-75.0	-97.5	9.2	-88.3	1.47911E-12	37	5	49.99	75.3
Ref. E1019	H	2644.56	-75.0	-97.5	9.2	-88.3	1.47911E-12	37	5	49.99	75.3
Ref. E1019	V	3526.08	-68.0	-97.3	9.2	-88.1	1.54882E-12	37	5	49.99	75.1
Ref. E1019	H	3526.08	-68.0	-97.5	9.2	-88.3	1.47911E-12	37	5	49.99	75.3
Ref. E1019	V	4407.60	-70.0	-94.4	10.4	-84.0	3.98107E-12	37	5	49.99	71.0
Ref. E1019	H	4407.60	-70.0	-94.0	10.4	-83.6	4.36516E-12	37	5	49.99	70.6
Ref. E1019	V	5289.12	-65.0	-89.9	10.1	-79.8	1.04713E-11	37	5	49.99	66.8
Ref. E1019	H	5289.12	-65.0	-90.0	10.1	-79.9	1.02329E-11	37	5	49.99	66.9
Ref. E1019	V	8815.20	-60.0	-87.7	11.2	-76.5	2.23872E-11	37	5	49.99	63.5
Ref. E1019	H	8815.20	-60.0	-87.8	11.2	-76.6	2.18776E-11	37	5	49.99	63.6

Notes:
(1) A positive margin indicates a passing result
(2) If duty cycle correction is indicated, plots are included in the test report to validate the factor used.
(3) The minimum threshold of sensitivity was sufficient to detect signals within 20 dB of the -13 dBm limit over the frequency range 30 MHz - 10 GHz.

NOTE: The values measured above are noise floor measurements. There were no detectable emissions.

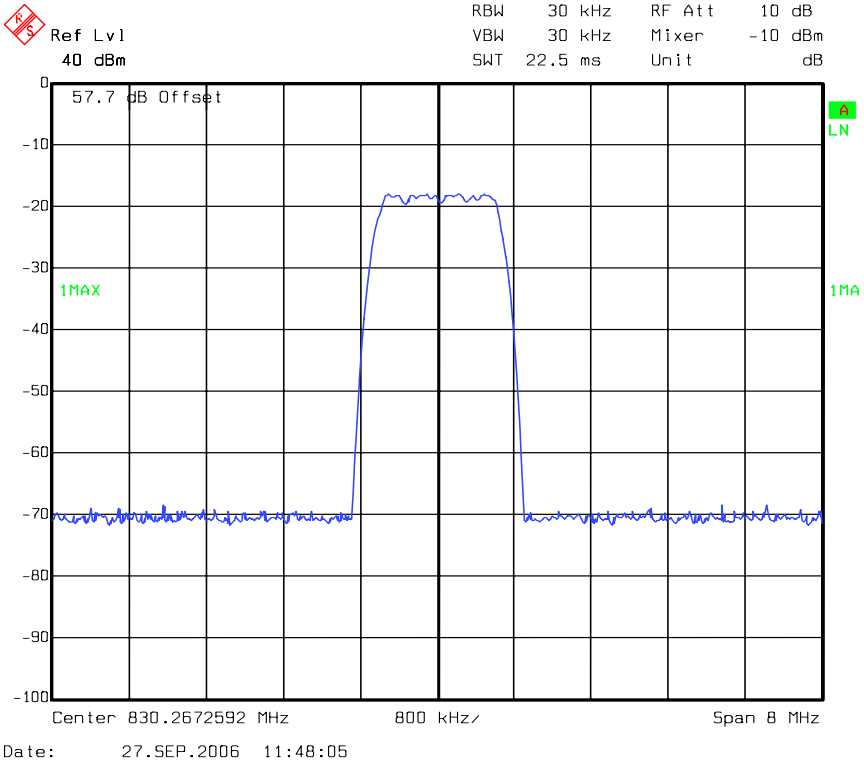
E.8. Test Photo

E.9. Tested By

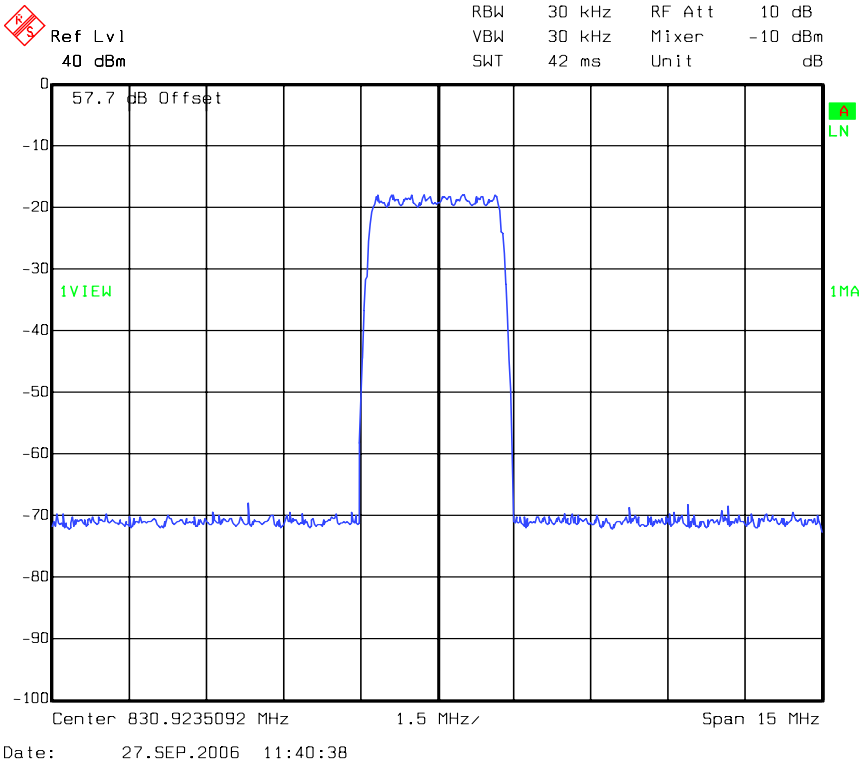
Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX F: 2.1053 FILTER PLOTS

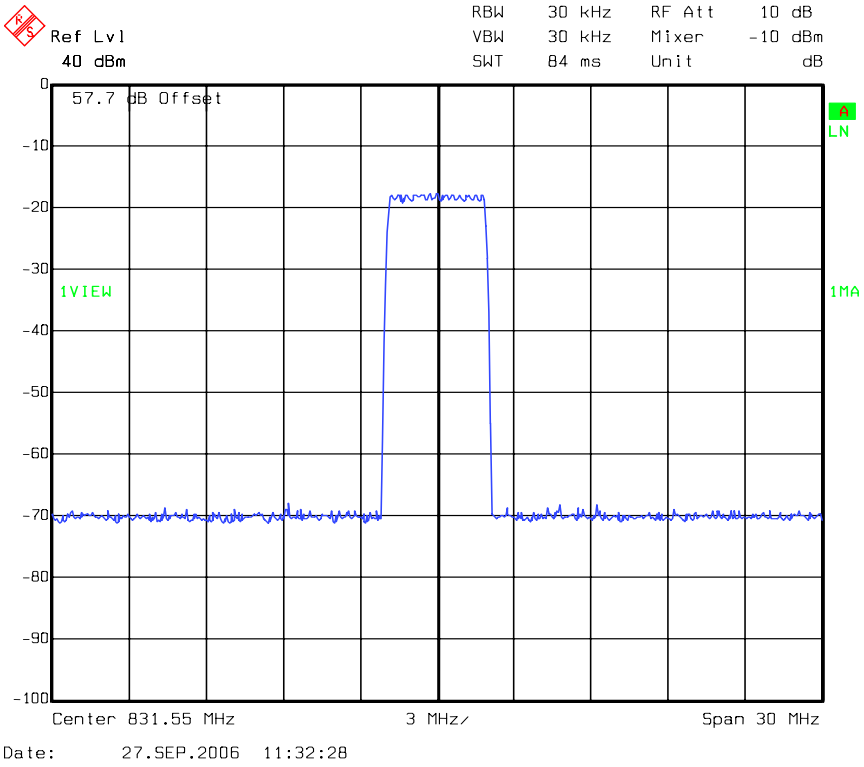
These plots demonstrate the filter band pass characteristics of the device.



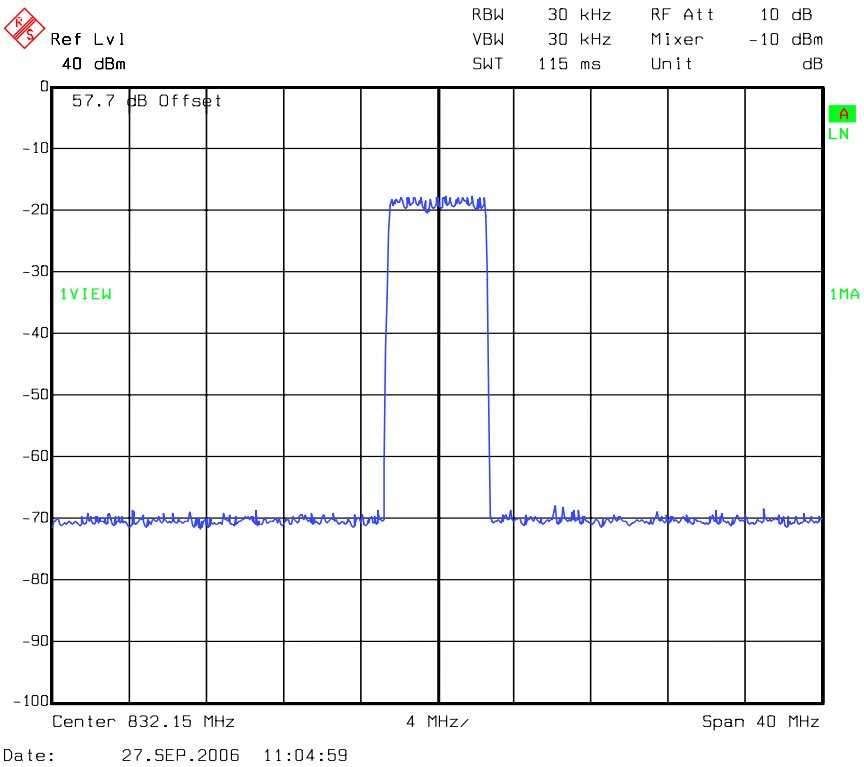
1 Channel Filter Width



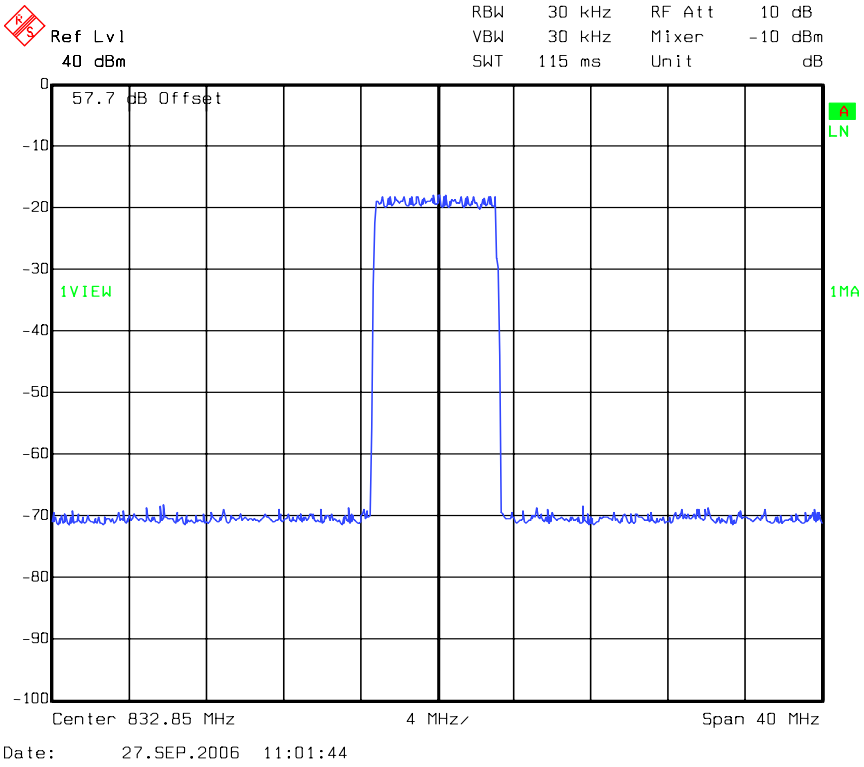
2 Channel Filter Width



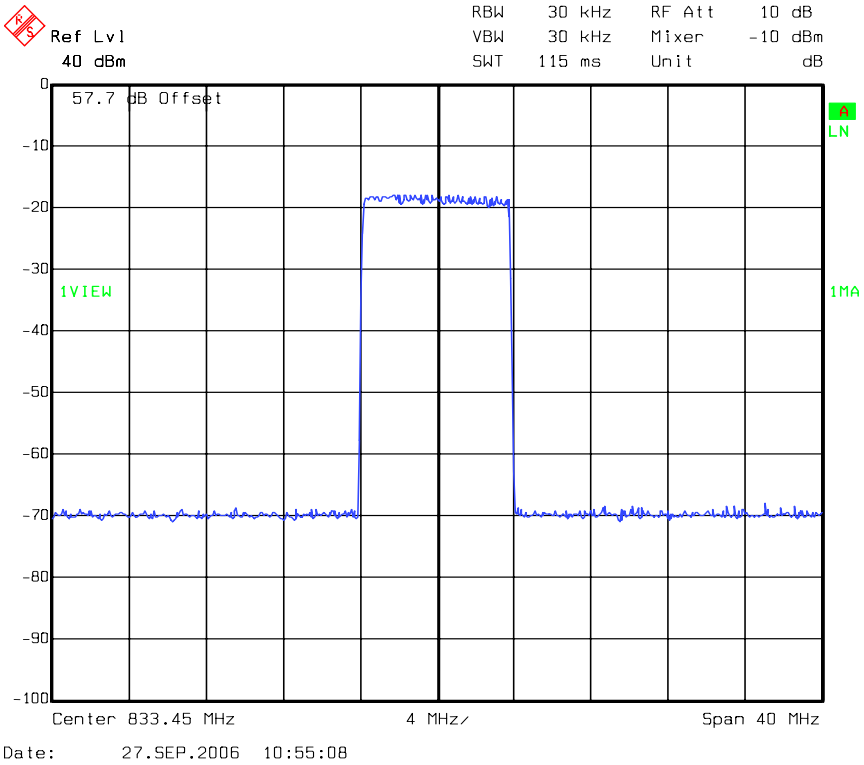
3 Channel Filter Width



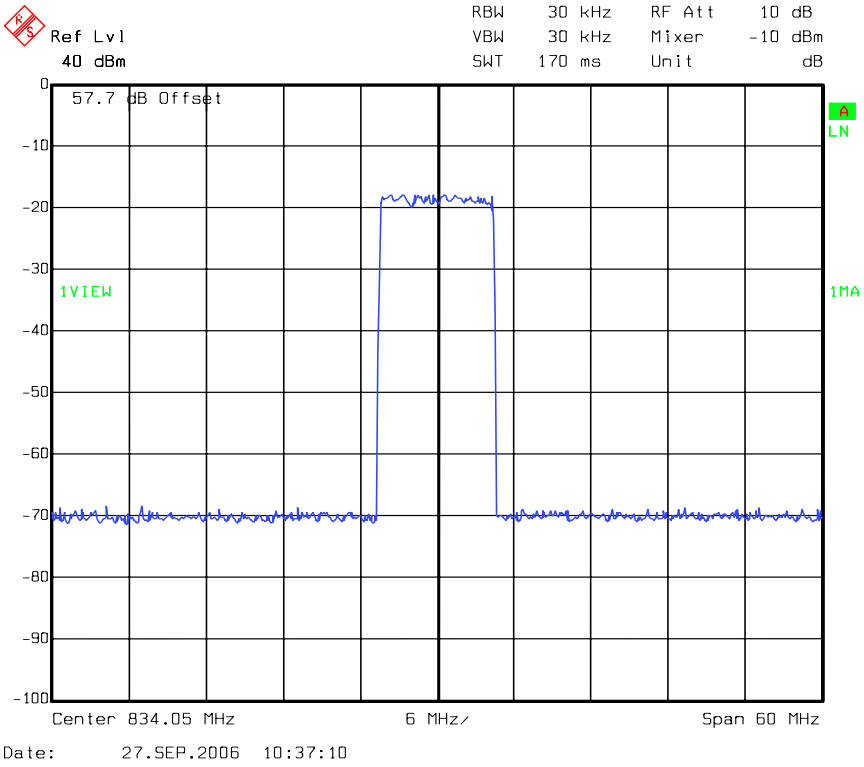
4 Channel Filter Width



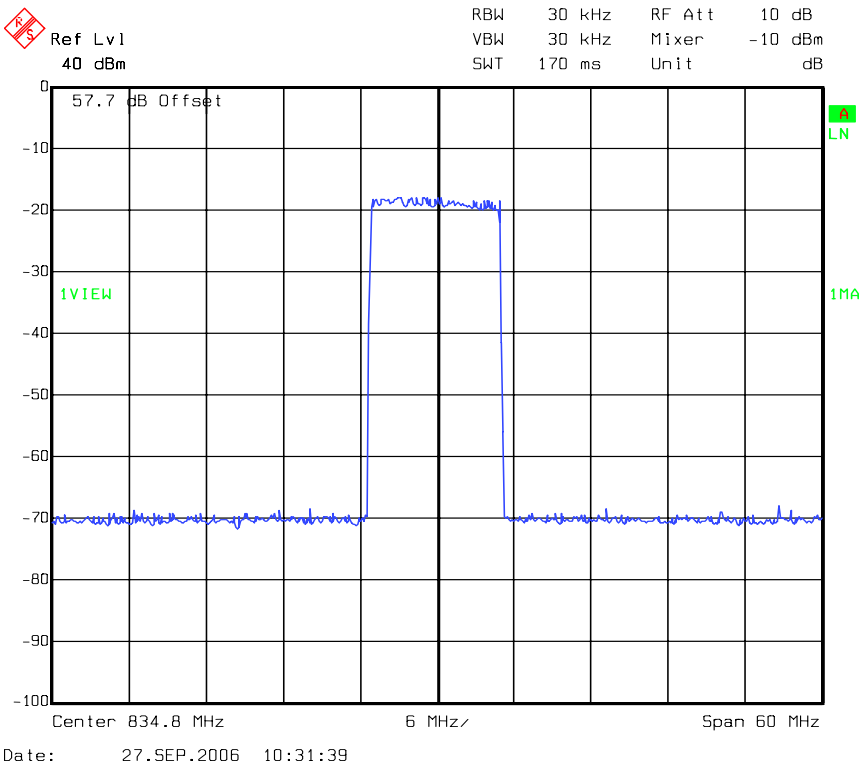
5 Channel Filter Width



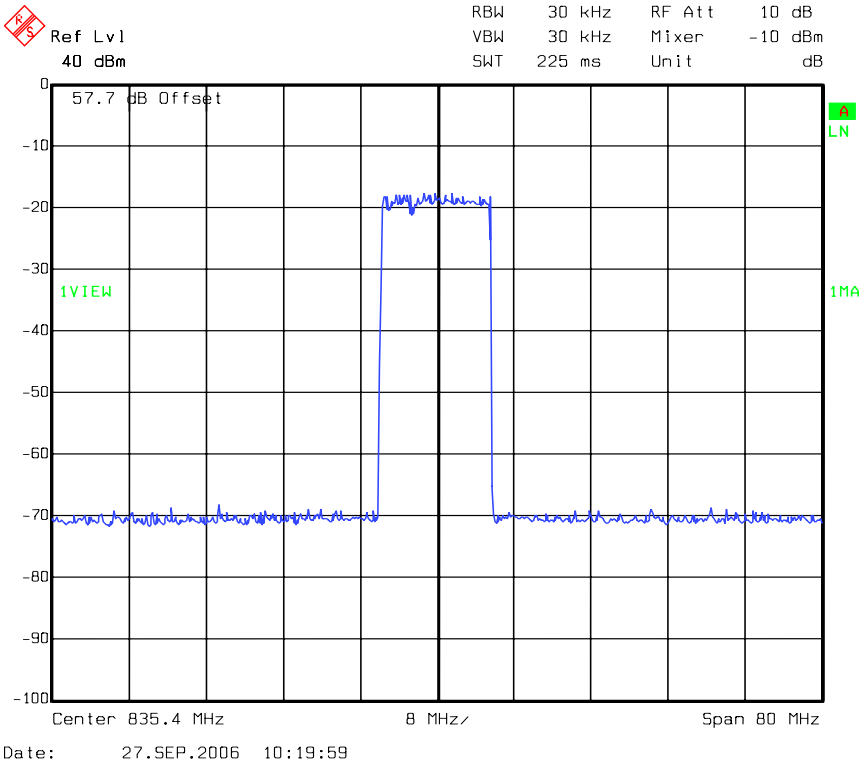
6 Channel Filter Width



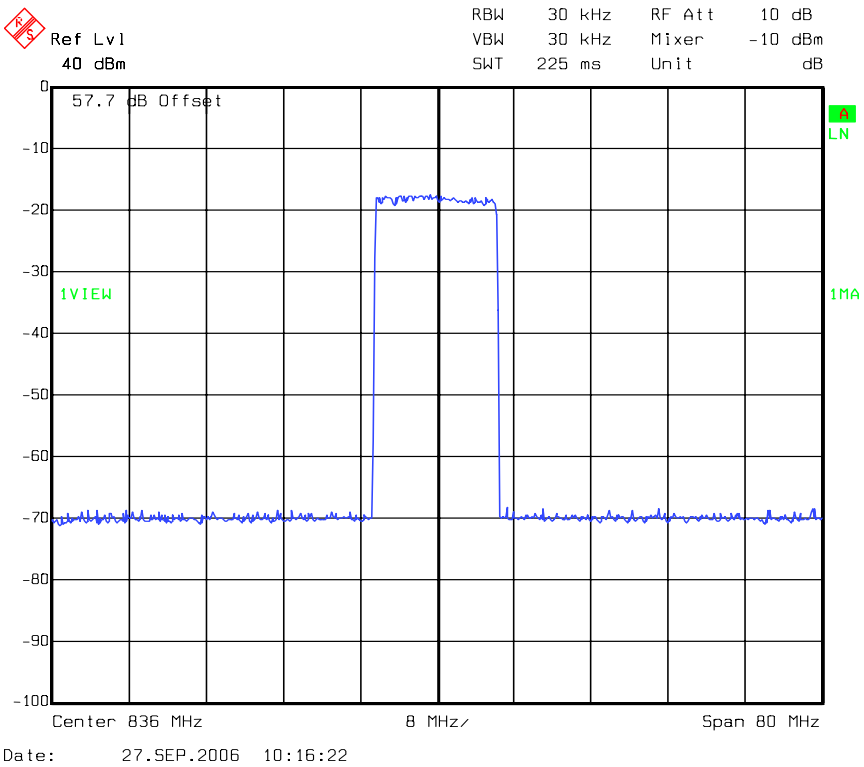
7 Channel Filter Width



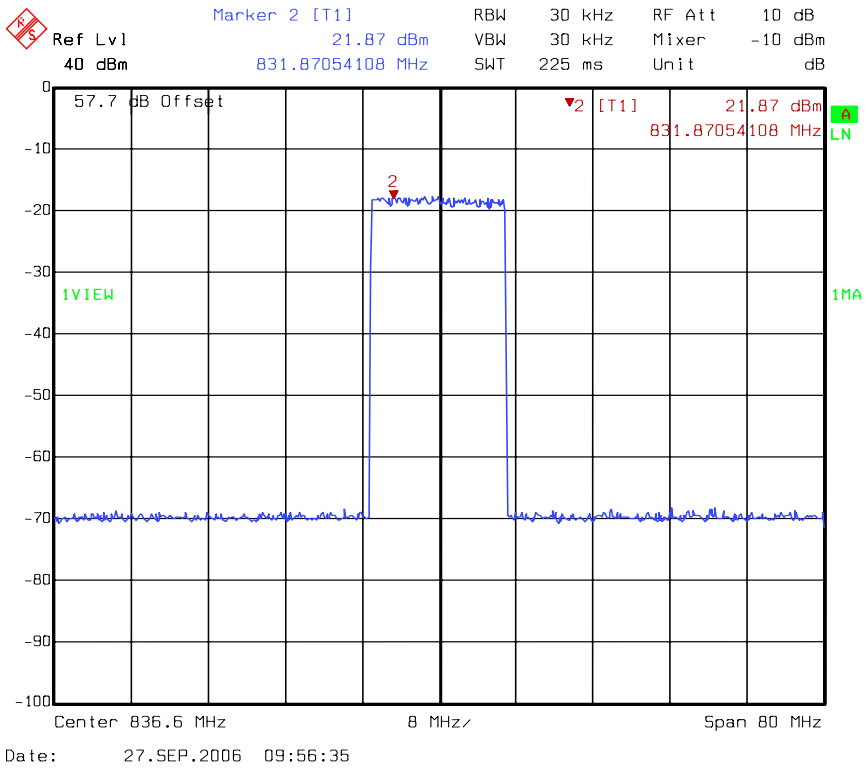
8 Channel Filter Width



9 Channel Filter Width



1 Channel Filter Width



11 Channel Filter

APPENDIX G: 2.1055 FREQUENCY STABILITY

G.1. Base Standard & Test Basis

Base Standard	FCC 2.1055
Test Method	TIA 603-C, 2004

Specifications

22.355 Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C–1 of this section.

Frequency range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile < 3 watts (ppm)
25 to 50.....	20.0	20.0	50.0
50 to 450.....	5.0	5.0	50.0
450 to 512.....	2.5	5.0	5.0
821 to 896.....	1.5	2.5	2.5
928 to 929.....	5.0	n/a	n/a
929 to 960.....	1.5	n/a	n/a
2110 to 2220.....	10.0	n/a	n/a

G.2. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

G.3. Test Results

Not Applicable. This device uses a common oscillator to down-convert and up-convert the modulated rf carrier so that the output frequency tracks the input frequency. This was determined by inspection of the schematics provided by the client.

G.4. Observations

None

G.5. Deviations from Normal Operating Mode During Test

None.

G.6. Sample Calculation

Frequency drift (ppm) = Frequency Drift (Hz)/Authorized frequency (MHz)

G.7. Test Data

None

G.8. Test Diagram

None

G.9. Tested By

.

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX H: TEST EQUIPMENT LIST

H.1. Field Strength of Spurious Emissions 30 MHz – 26.5 GHz Measurement Equipment

Description	Manufacturer	Type/Model	Calibration Frequency	Cal Due	NTS Control No.
3m ANECHOIC CHAMBER					
RX Bilog Antenna	ETS	3142C	12 Months	8/17/07	E1288P
Ref. Horn Antenna	ETS	3115	12 Months	11/1/07	E1019P
RX Horn Antenna	ETS	3115	12 Months		E1022P
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07	W1010P
Reference Antenna	ETS	3121 Dipole Set	12 months	8/8/07	S/N. 274
CONTROL ROOM					
Test Receiver	Rohde & Schwarz	FSQ 26	12 Months	9/21/07	W1020P
High Frequency - Cable 2	MegaPhase	NA	12 Months	8/23/07	W1011P
Amplifier	HP	8449B	12 Months	5/4/07	E1010P

H.2. Antenna Conducted Emissions Measurement Equipment

Instrument	Manufacturer	Model	Calibration Frequency	Calibration Due
ANTENNA CONDUCTED EMISSIONS				
Spectrum Analyzer	Rohde & Schwarz	FSQ 26	12 Months	9/21/07
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07
Directional Coupler	Narda	3020A	12 Months	8/28/07
Directional Coupler	Narda	4242-10	12 Months	8/28/07
50 ohm loads	Amphenol	50R	12 Months	8/28/07
I/Q Signal Generator	Rohde & Schwarz	SMIQ 03	12 Months	8/25/07
I/Q Modulation Generator	Rohde & Schwarz	AMIQ	12 Months	8/28/07
Combiner	Mini-Circuits	ZFSC-2-2500	N/A	N/A*
IS-95 CDMA BTS simulator	Rohde & Schwarz	CMD80	N/A	N/A*

* This device was not used for calibrated measurements.

END OF DOCUMENT