

Certification Test Report

CFR 47 FCC Part 2 and Part 24, Subparts C and E

Model: Node C1943, Node M1943

FCC ID NO.: BCR-RPT-NCM1943

Project Code: W6397

Revision: 0

Prepared for:	Andrew Corporation 108 Rand Park Drive Garner, North Carolina 27529
Author:	Tom Tidwell, Manager of Wireless Services
Issued:	28 November, 2006

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Report Summary

NTS Plano

Accreditation Numbers:	FCC: IC:	101741 46405-4319	File # IC-4319A-1
Applicant:	108 Ra	w Corporation and Park Drive r, North Carolina	a 27529
Customer Representative:	Michae	el 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 PCS 1900 band.	Andrew Wireless Systems Gmbh	Node C 1943 IS-95 Node M 1943 W-CDMA	0	12

Variations in models: The Node C1943 and Node M1943 are electrically identical devices. The software mode options for channel filter settings are reduced to two 5 MHz channels on the Node M1943 model to accommodate up to two W-CDMA carriers, while the Node C1943 allows additional channel filter settings for single 1.23 MHz channels for IS-95 CDMA.

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Test Summary

ndix	Test/Requirement	Deviations from:		Pass / Fail	Appliachia Dula Darta	
Appendix	Description	Base Standard	Test Basis	NTS Procedure	Fass/Faii	Applicable Rule Parts
А	RF Power Output	No	No	No	PASS	CFR 47, Part 2, Para. 2.1046 CFR 47, Part 24, Para.24.232
В	Modulation Characteristics	No	No	No	PASS	CFR 47, Part 2, Para. 2.1047
С	Occupied Bandwidth	No	No	No		CFR 47, Part 2, Para. 2.1049 CFR 47, Part 24, Para. 24.238
D	Spurious Emissions at Antenna Terminals	No	No	No	PASS	CFR 47, Part 2, Para. 2.1051 CFR 47, Part 24, Para. 24.238
Е	Field Strength of Spurious Radiation	No	No	No		CFR 47, Part 2, Para. 2.1053 CFR 47, Part 24, Para. 24.238
F	Frequency Stability	No	No	No		CFR 47, Part 2, Para. 2.1055 CFR 47, Part 24, Para. 24.235

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.

levens

Robert Stevens, Quality Assurance Manager

Tóm Tidwell, ⁽ Wireless Test Engineer

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Register of revisions

Revision	Reason for Revision	Release Date
0	Original	11/28/06

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INTRODUCTION

1.1 **PURPOSE**

The purpose of this document is to describe the tests applied by NTS Plano to demonstrate compliance of the Node C1943 and Node M1943 to FCC Part 24 Subparts C and E 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	C1943 / M1943	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	1850 - 1910 MHz, 1930 ·	– 1990 MHz				
Power	Downlink: +43 dBm (20 at antenna port.	Downlink: +43 dBm (20 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 M1943 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)

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2.2 EUT CABLES

Quantity	Model/Type	Routin	g	Shielded /	Description	Cable
Quai	Model/Type	From	То	Unshielded	Description	Length (m)
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 (+43 dBm, 20 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
 - o Single channel and multiple channel filter settings
- Gain configurations
 - Lowest gain setting
 - Highest gain setting

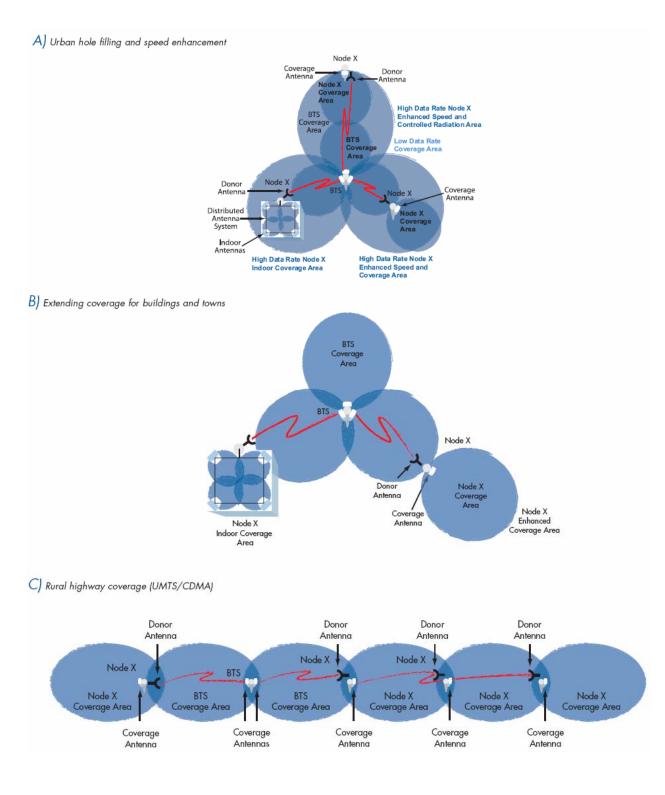
The rf power output of the device can be set in two different ways:

- 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 maximum and rf input level adjusted to obtain maximum rf output power.

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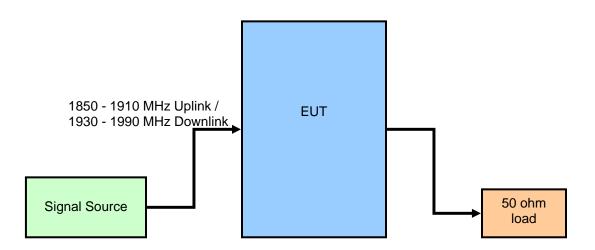


3.0 SUPPORT EQUIPMENT

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

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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

24.232 Power and antenna height limits.

(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph 24.232(b).

(b) Base stations that 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, are limited to 3280 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

(c) Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Applicable RF Power Limit from Above: 1640 watts EIRP

A.3. Deviations

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

A.4. Test Procedure

TIA 603-C, 2004 and 24.232(d)

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 20 watts (downlink) and 0.201 watts (uplink).

A.6. Operating Mode During Test

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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) = $10^{(rf power(dBm)/10)} \times 1000$

A.8. Test Data

Channel	Signal Path	Modulation Mode	RF Power Output at Antenna Terminals (dBm)
25 (1931.25 MHz)	DL	F9W (IS-95 CDMA)	42.96
600 (1960.00 MHz)	DL	F9W (IS-95 CDMA)	42.69
1175 (1988.75 MHz)	DL	F9W (IS-95 CDMA)	43.07
62 (1933.10 MHz)	DL	F9W (W-CDMA)	42.91
600 (1960.00 MHz)	DL	F9W (W-CDMA)	42.77
1138 (1986.90 MHz)	DL	F9W (W-CDMA)	43.00
25 (1851.25 MHz)	UL	F9W (IS-95 CDMA)	22.90
600 (1880.00 MHz)	UL	F9W (IS-95 CDMA)	22.74
1175 (1908.75 MHz)	UL	F9W (IS-95 CDMA)	22.88
62 (1853.10 MHz)	UL	F9W (W-CDMA)	22.79
600 (1880.00 MHz)	UL	F9W (W-CDMA)	22.81
1138 (1906.90 MHz)	UL	F9W (W-CDMA)	22.92

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 (10 Ms).

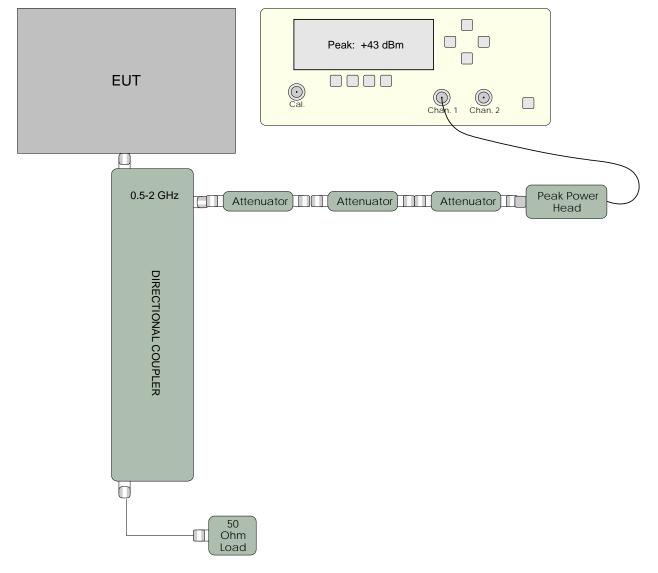
*DL = Downlink (BTS to Mobile) path, UL = Uplink (Mobile to BTS) path

Test Date: November 20, 2006

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A.9. Test Diagram



A.10. Tested By

Name:	Tom Tidwell,
Function:	Manager of Wireless Services

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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	Time &	Description and	De	viation Referen	се	
Number	Date	Justification of Deviation	Base Standard	Test Basis	NTS Procedure	Approval
none						

B.4. Test Method

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

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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 TidwellFunction:Manager of Wireless Services

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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

24.238 Emission limitations for Broadband PCS equipment

(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.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified). 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	Time &	Description and	De			
Number	Date	Justification of Deviation	Base Standard	Test Basis	NTS Procedure	Approval
none						

C.4. Test Method

TIA 603-C, 2004 and 24.238(b)

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

IS-95 CDMA carrier:

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<u>Downlink</u>

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

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Channel Mapping

Chan.	Walsh	Power	Data	Chan.	Walsh	Power	Data	Chan.	Walsh	Power	Data
No.	Code	(dB)		No.	Code	(dB)		No.	Code	(dB)	
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				

<u>Uplink</u>

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

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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

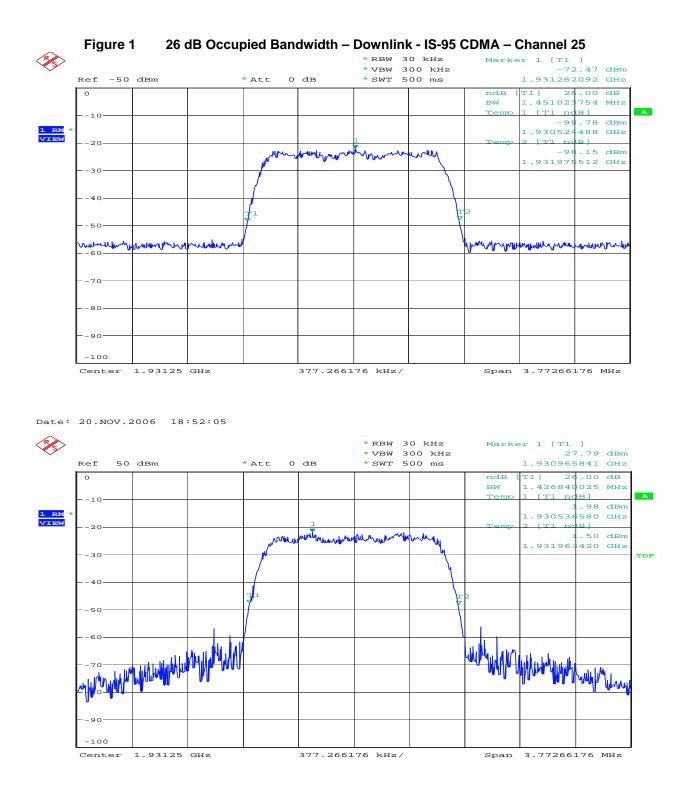
None.

C.8. Test Data

See plots following.

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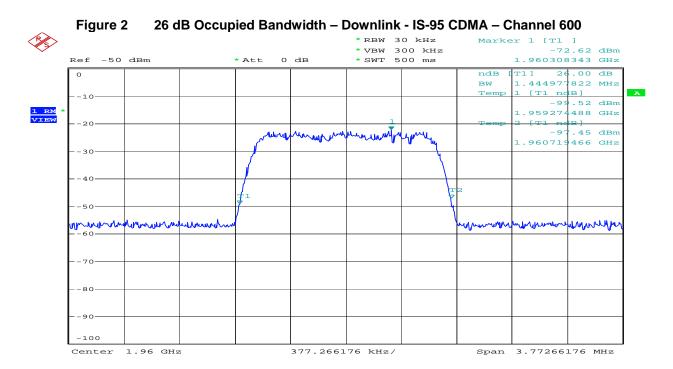




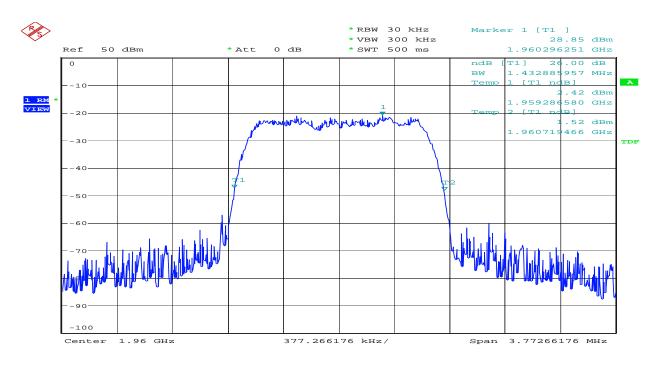
Date: 20.NOV.2006 19:08:08

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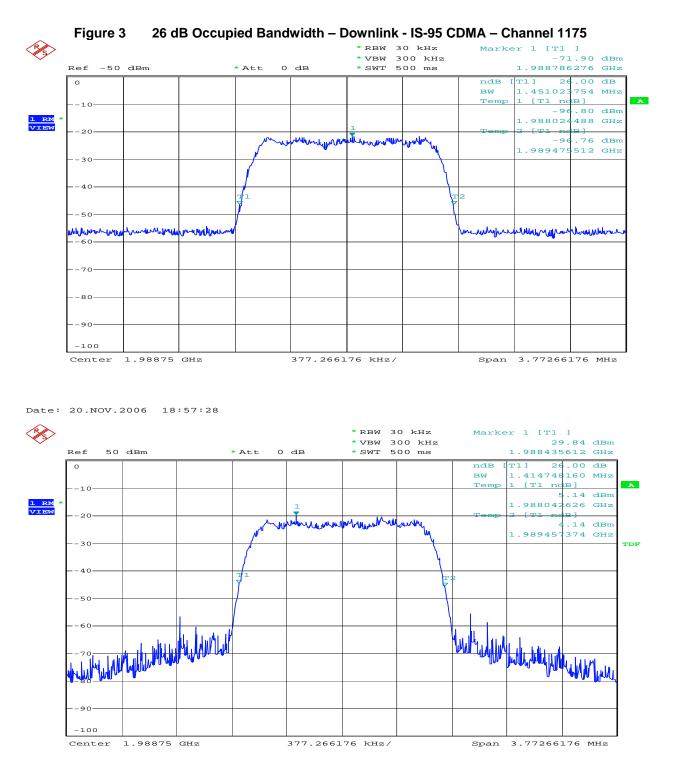
Date: 20.NOV.2006 18:55:10



Date: 20.NOV.2006 19:00:42

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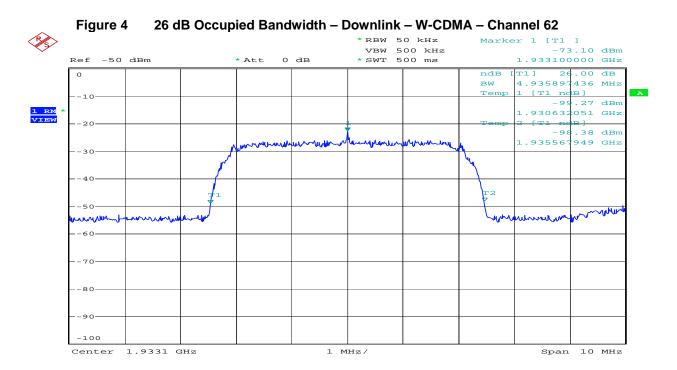




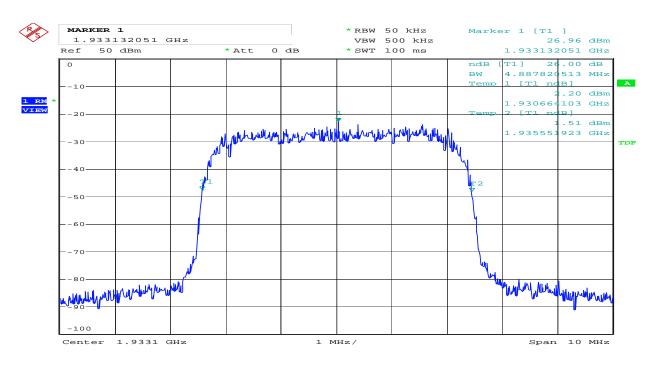
Date: 20.NOV.2006 19:05:36

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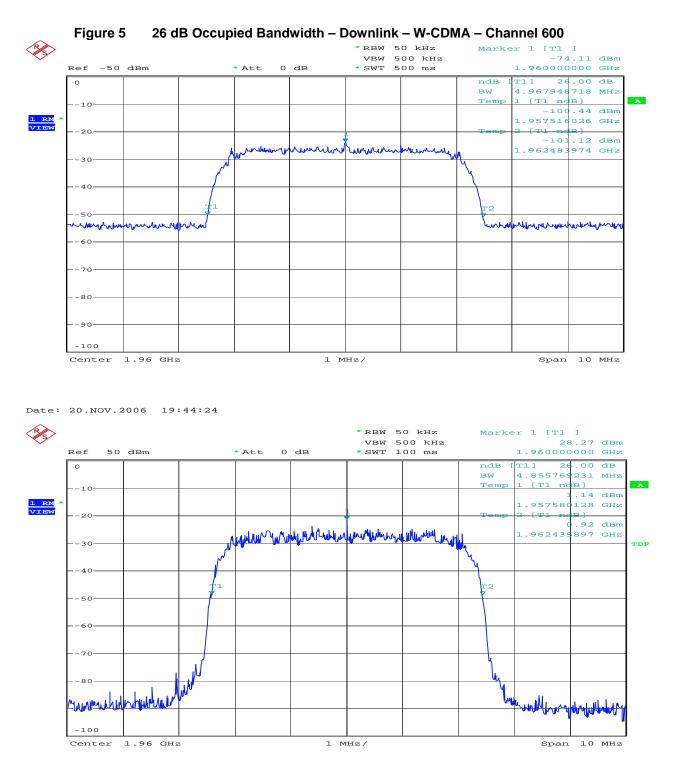
Date: 20.NOV.2006 19:45:42



Date: 20.NOV.2006 19:23:51

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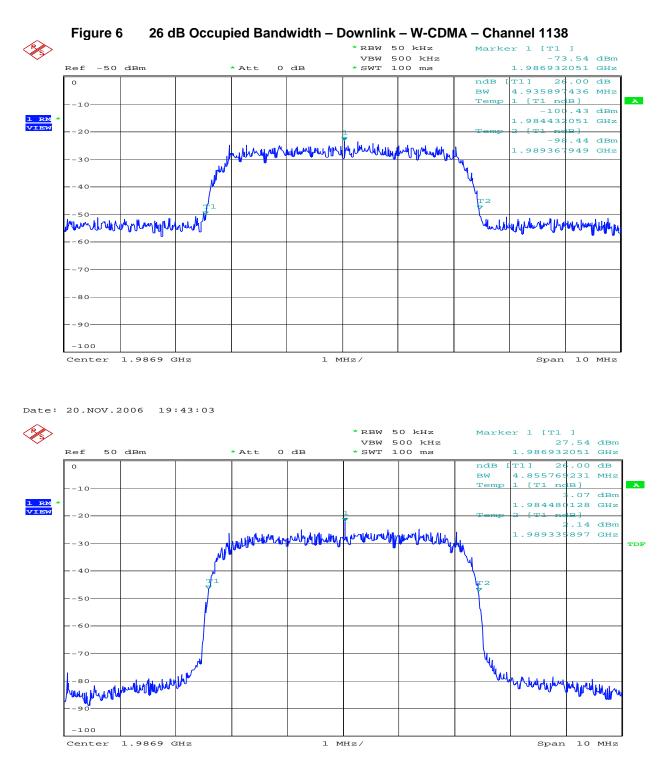




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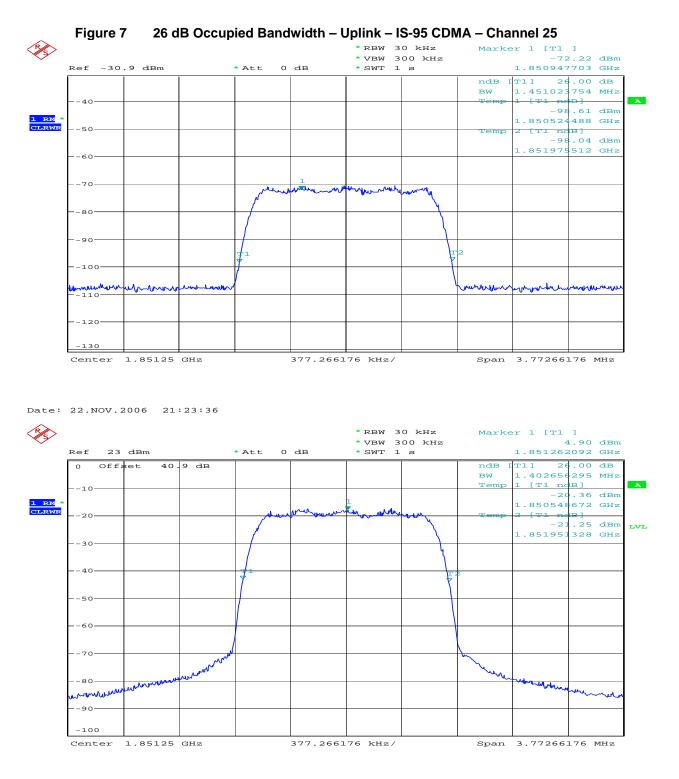




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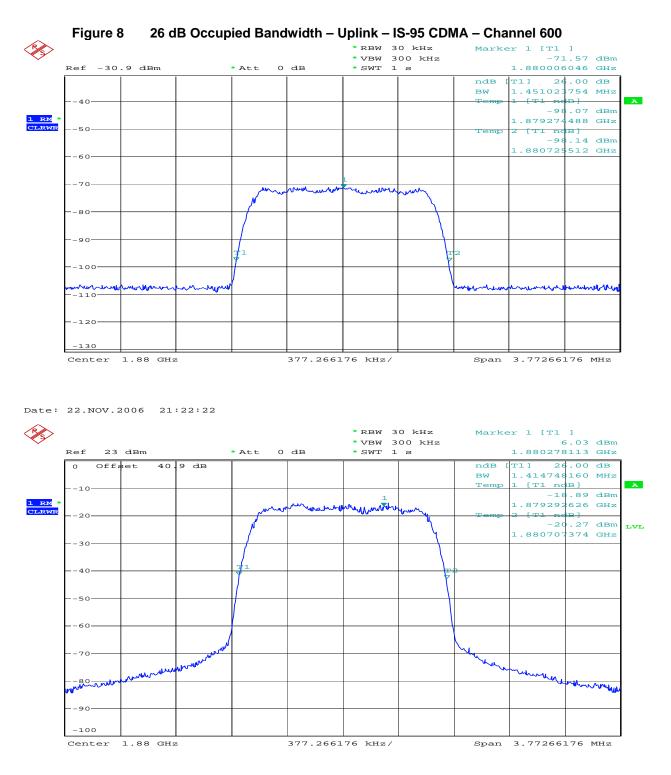




Date: 22.NOV.2006 21:13:00

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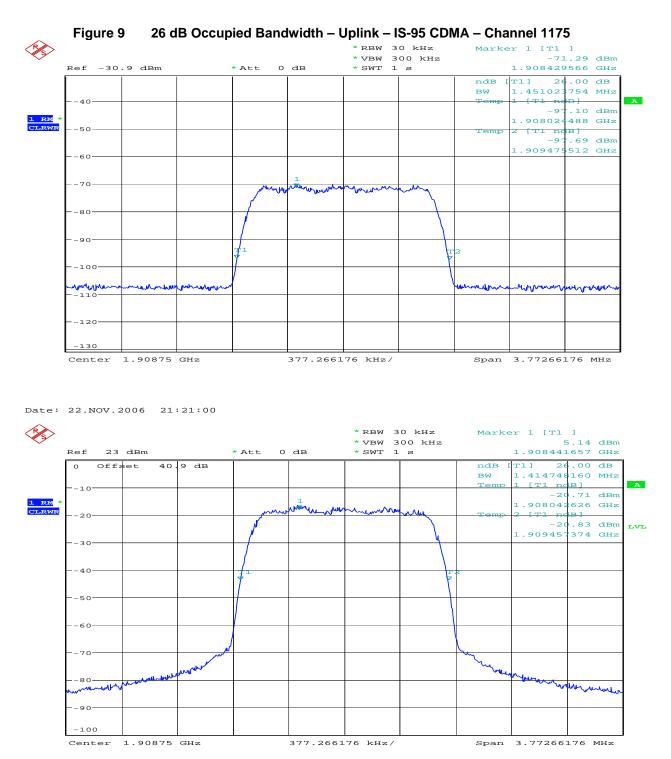




Date: 22.NOV.2006 21:08:11

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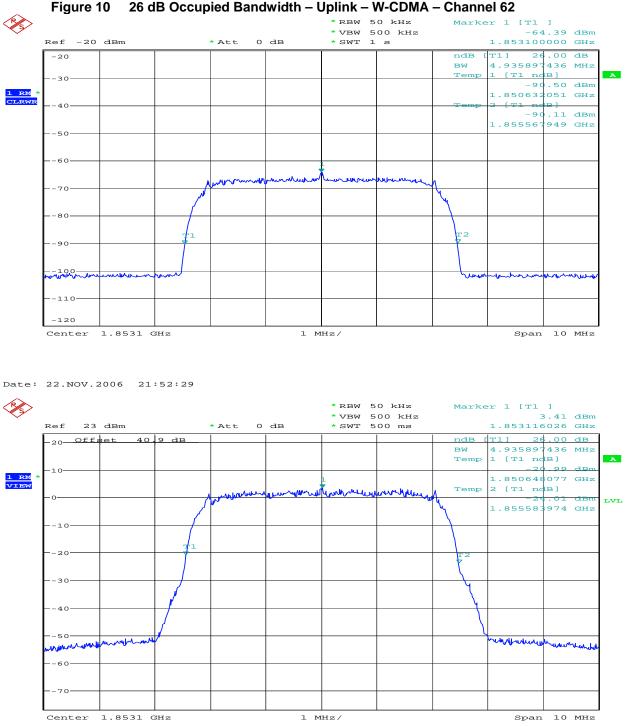




Date: 22.NOV.2006 21:15:20

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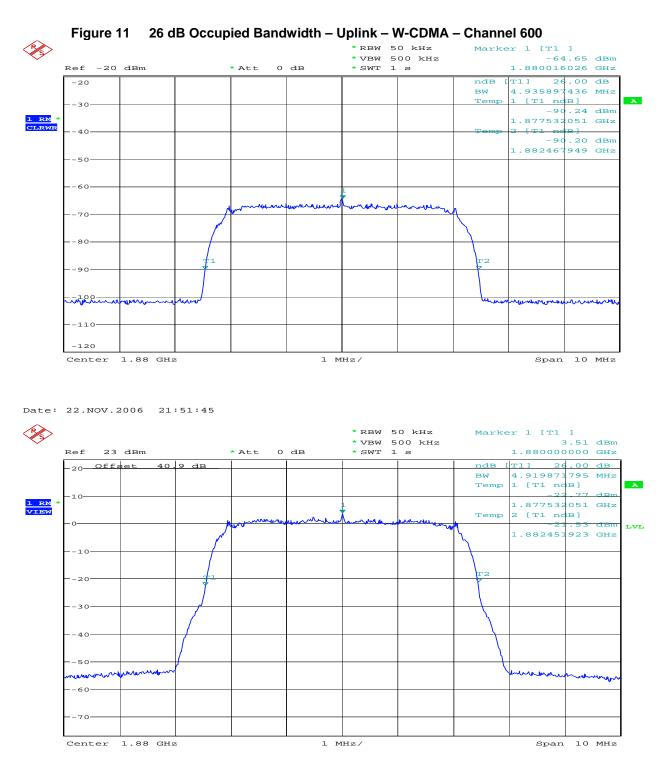


26 dB Occupied Bandwidth – Uplink – W-CDMA – Channel 62 Figure 10

Date: 22.NOV.2006 22:00:09

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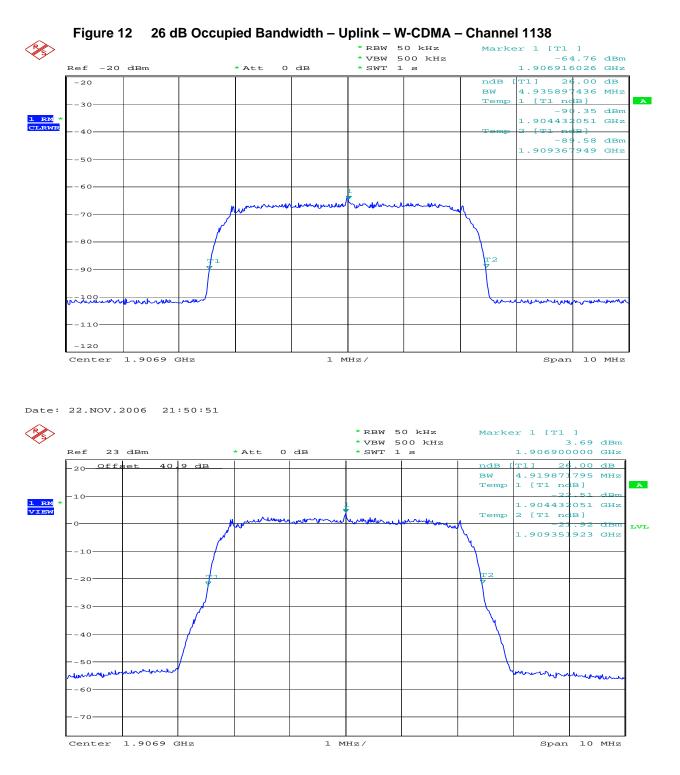




Date: 22.NOV.2006 21:58:23

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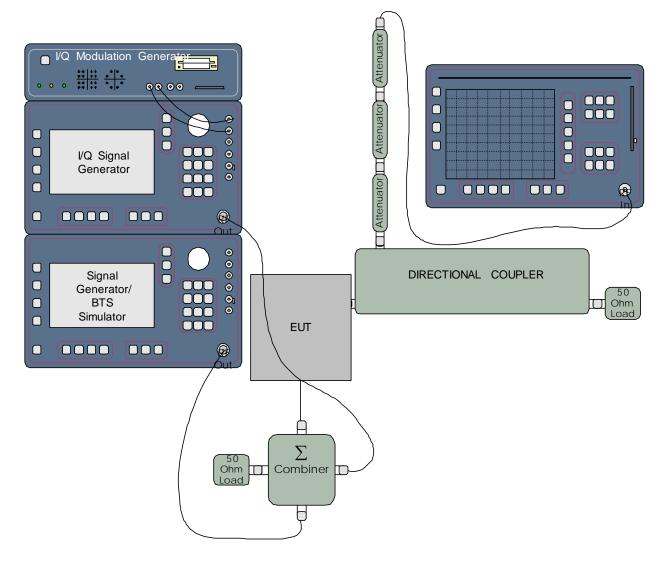


Date: 22.NOV.2006 21:56:15

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C.9. Test Diagram



C.10. Tested By

Name:	Tom Tidwell,
Function:	Manager of Wireless Services

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APPENDIX D: 2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

D.1. Base Standard & Test Basis

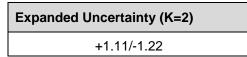
Base Standard	FCC 2.1051
Test Basis	FCC 2.1051 Spurious Emissions at Antenna Terminals
Test Method	TIA 603-C, 2004

D.2. Specifications

24.238 Emission limitations for Broadband PCS equipment

(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



D.4. Deviations

Deviation	on Time &	Description and	De			
Numb		Justification of Deviation	Base Standard	Test Basis	NTS Procedure	Approval
none)					

D.5. Test Results

Complies. All emissions meet the out of band limits.

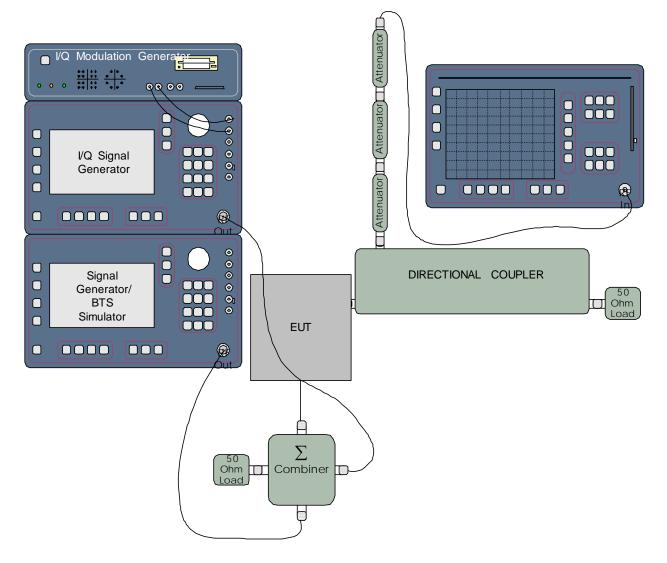
Out-of-Band Emissions limit is 43 + 10 log(P) which relates to -13 dBm absolute power.

Attenuation limit = $43 + 10 \log(20) = 56 \text{ dB}$

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D.6. Test Diagram



D.7. Test Data

See following pages.

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				100 kHz	Mark	er 1 [T1	
Ref 43 dBm	Att	20 dB		300 kHz 50 ms	3	-2 78.28525	5.66 dBm 6410 MHz
0 Offset 48.6 dB							
10							
20							
30							
40							
D1 -56 dB							
wingsthemakensterentiterentationstation	Jon Marth	Multuri	ward and the	hunderen	L Uhmer Lunder	http://www.hole	muhante
-100							

igure 13 - Antenna Conducted Spurious - Downlink – IS-95 – Channel 25

Date: 15.NOV.2006 22:50:30

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								* RBW			Marke	er 1 [T1		
								* VBW					3.55	
	Ref	43	dBm		Att	10) dB	SWT	2.	5 ms		1.956730	0769	GH
	0													
	-10-													-
•	20-													
-	30-													
ľ	40-													
	50-													
	60-		D1 -56.	043 dB -										1
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	-90-													
	-100)												

Date: 16.NOV.2006 00:01:26

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				* RB	8W 1	MHz		Marker 1 [T1]	
				VB	W 1	0 МН	z	-23.18 d	Βn
Ref 43 dBm		Att 3	10 dB	SW	т 1	05 m	s	18.036746472 G	Hz
							10	GHz	
-40									
-30									
*									
-20									
20									
-10									
-0									
10									
-10 PCS_SPUR									
								1	
								mm minument	A
-30	hannah		han	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~/	m	~~~		
have the second									

Stop 20 GHz

Date: 27.NOV.2006 19:28:48

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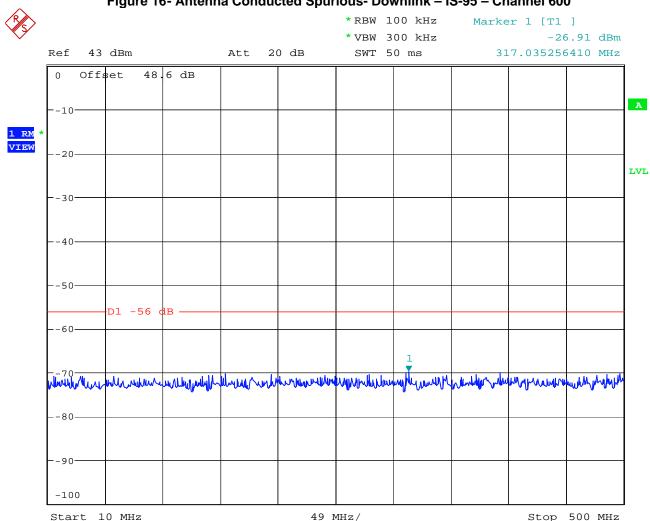


Figure 16- Antenna Conducted Spurious- Downlink - IS-95 - Channel 600

Date: 15.NOV.2006 22:51:16

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				*RBW	1 MHz	Marke	er 1 [T1]	
					10 MHz		-2	5.84	dBı
Ref 43	dBm	Att	10 dB	SWT !	5 ms		2.00000	0000	GH
-40									<u> </u>
-30									
50									
-20									
-10									H
-0									
10 PCS_SPU	R								
20									╢
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40									
L F0.									
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Figure 47 Automa Conducted Country Doumlink 10.05 Channel 600

Date: 27.NOV.2006 19:20:54

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		*RBW 1 MHz	Marker 1 [T1]
		VBW 10 MHz	-23.21 dBm
Ref 43 dBm	Att 10 dB	SWT 105 ms	18.508709944 GHz
-40		1) GHz
-30			
-20			
-10			
-0			
-10 PCS_SPUR			
			1
			and the second sec
		m	
t-30	man		
-50			

stad C 40 Line L 1 000 0

Start 2 GHz

Stop 20 GHz

Date: 27.NOV.2006 19:27:05

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			* RBW	100 kHz	Marke	er 1 [T1]
			* VBW	300 kHz		-2	5.58 dBm
Ref 43 dBm	Att	20 dB	SWT	50 ms	33	39.80769	2308 MHz
0 Offset 48.6 dB							
*							
40							
50							
D1 -56 dB							
				1			
until Roman and Marked a	ul dun de la	unput the second content	uk www.me	mit with harding	leven and an and	Munnund	there
80							
90							<u> </u>
-100							

10 4 -~ -1-..... 4 0. link 1 4 4 7 5 -:

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F	igure 20	- Anten	na Con	ldu	cted Sp		Downlin	k – IS-95	5 – Chan	nel 117	75
						* RBW	1 MHz	Mark	er 1 [T1]	
						VBW	10 MHz		-2	1.11 d	lB
Ref 43	dBm		Att	10	dB	SWT	5 ms		1.96875	0000 G	Η
-40											
10											
-30			_	\rightarrow							
2.0											
-20											
-10				\rightarrow							
-0											
-10 PCS_SPU											
PCS_SPU	R			—							
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		*RBW 1 MHz	Marker 1 [T1]
		VBW 10 MHz	-23.08 dBi
Ref 43 dBm	Att 10 dB	SWT 105 ms	18.103425741 GH
4.0		10	GHz
-40			
-30			
50			
-20			
-10			
-0			
10 PCS_SPUR			
			1
			a mar an annound
	-		
t-30	the second second		
4.0			
40			
-50			

Stop 20 GHz

Date: 27.NOV.2006 19:25:51

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	Figure 22	2- Antenn	a Cond	ucted Spur		wnlink – W			
					* RBW	30 kHz	Mark	er 1 [T1]
					* VBW	300 kHz		- 3	7.08 dBm
Ref 4	3 dBm		Att	20 dB	SWT	560 ms	2	40.86538	4615 MHz
0 Of	set 48	.6 dB							
10									
*									
20									
30									
40									
50									
60	D1 -56 (ав ———							
00									
70									
	mmmuhanga	-en marine	munhe	1	mahre	hummanau	malion	mmmm	amendades
90									
-100									

Date: 15.NOV.2006 23:29:27

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R							5 MHz					
\checkmark	Ref 43	3 dBm		Att 1	0 dB		0 MHz 2.5 ms		-19 1.985576	9.45 5923		
	0											
	10											A
1 RM * VIEW												
	20											
	30										$\left - \right $	TDI
	10											
	-50											
	60	-D1 -56.	043 dB —								1	
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	70	·										
												-
	90											
	-100											J
	Start	500 MHz			150	MHz/			Sto	p 2	GHz	

Figure 23- Antenna Conducted Spurious- Downlink – W-CDMA – Channel 62

Date: 15.NOV.2006 23:44:20

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						BW 5			Marker 1 [T1]	
					* V	BW 1	0 MH	Z	-22.28	dBr
Ref	43 dBm		Att	10 dB	S	WT 2	5 ms		2.00000000	GH:
0								10	GHz	
-										
_ 10-										
10-										
•										
10										
40-										
	D1 -5	6.043 dB -								
60-										
The second secon									······	~~~~
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70-		lund								
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-90-										
-100)			1						

Stop 20 GHz

Date: 16.NOV.2006 00:03:23

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							* RBW	30 kHz	Marke	er 1 [T1	1
							* VBW	300 kHz		-3	7.01 dBr
Ref	43	dBm		Att	20 d	В	SWT	560 ms	19	94.53525	6410 MH
0	Offs	set 48	3.6 dB								
10											
-10											
20											
30											
40											-
50											
		D1 -56	ф в ——								
60											
70·											
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have	man	www.www	- Marine			(M)		A CARACTER AND A CARACTER		an fra second and a final of	
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-10	0										

Date: 15.NOV.2006 23:30:06

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•							* RBW		Marke	er 1 [T1]	
							* VBW	10 MHz		-2	0.62 0	lBn
	Ref ·	43	dBm		Att	10 dB	SWT	2.5 ms		1.98798	0769 0	3H2
	0											
	10											╈
*												
	20										<u> </u>	╨
	2.0											
												Т
	40											╫
	50											╢
			D1 -56.	143 dB -								
	60		50.	- 15 QD								
											~	Л
	heren	m	milliteration	maninal	unkloh mm	mbermhand	unumunu	menenne	manden	and mehanne	mm	
	70											
	80											
	-90										<u> </u>	
	-100											

Date: 15.NOV.2006 23:46:47

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						* R	BW 5	MHz		Marker 1 [T1]	
						* V	BW 10	О МН	Z	-19.45	dBn
Ref	43 dBm		Att	: 10) dB	S	WT 25	5 ms		18.103425741	GHz
0									10	GHz	
10-											
20-											
30-											
40-											
50-			_								
60-	D1 -56	0.043 d	в —								1
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~								~~~~	······································	Mini-
70-											
80-											
90-											

Stop 20 GHz

Date: 16.NOV.2006 00:04:22

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										* RBW	30	kHz	Marke	er 1 [T1	1
										* VBW	300	kHz			7.18 dBm
Re	f	43	dBm				Att	2	0 dB	SWT			45	55.24038	
0	C	Offs	et	48.	6 dB										
:	10—														
*	2.0														
	20—														
:	30—														
	40—														
!	50—														
	60—		D1 -	56 c	lв —										
	00														
'	70—														
	80— ~~~~	Normal	um_~	mu	mala	يربس	Mun	M	untrementer	mantina	~~~~	under	monenter	- Munuph	1 Adamente
	90—														
-:	100														

## 20 1. . . . ~ -1-.... 4 0 ...... link Ch 1 4 4 2 0 -:

Date: 15.NOV.2006 23:30:50

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>							*RBW 5	5 MHz	Marke	er 1 [T1	]
							* VBW 1	0 MHz		-19	9.70 dBr
	Ref	43	dBm		Att 1	0 dB	SWT 2	2.5 ms		1.966346	5154 GH2
	0										
	10										
*	20										
	30-										
	40										
	50-										
	60		D1 -56.	043 dB —							1
		unh	ulman men	when when wh	huhan	mm	umenn	mmmm	nuluna	un	munu
	80										
	90										
	-100										

Date: 15.NOV.2006 23:51:29

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					* R	BW 5	MHz		Marker 1	[T1 ]	
					* V	BW 10	0 MHz	:		-25.44	dBn
Ref	43 dBm		Att	10 dB	S	WT 25	5 ms		3.9	72893459	GHz
0								10 GH	Z		
10-											
20-											
30-											
40-											
50-											
60-	D1 -56	6.043 dB									
			1					~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		·····
		L									
-90-											
-100											

Stop 20 GHz

Date: 16.NOV.2006 00:06:02

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	Figure 31	Anter	nna Conc	ducted Sp	ourious -	- Uplink –	IS-95 CI	DMA – Cł	hann	el 25
>					RBW	3 MHz	Marke	er 1 [T1	]	
					VBW	10 MHz		-34	4.52	dBm
	Ref 23 dBm		Att 1	0 dB	SWT	5 ms		1.99681	0897	GHz
	20 Offset	40.9 dB								
M *	-10									
M										
	-0									
	-10 PCS_SPUR									
	PCS_SPUR								$\left  \cdot \right $	μ
		unliknumment	MARK INSK 11 JAN	unununu	hallingen	-unnum	here makely	manne	in he	Marker
	<u>unmlun unlinu</u>									
	60									
	Start 10 MHz			199					p 2	

Date: 22.NOV.2006 22:47:26

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		RBW 3 MHz	Marker 1 [T1 ]
		VBW 10 MHz	-24.00 dBr
Ref 23 dBm	Att 5 dB	SWT 105 ms	18.103425741 GH:
		10	GHz
-20			
-10			
-0			
PCS_SPUR			
-20			1
			and the second s
-30		m	
haman man	hammen		
60			
-70			

Stop 20 GHz

Date: 22.NOV.2006 22:55:00

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R		-				RBW	3 MHz	Mark	er 1 [T1	]		
< Y							10 MHz				5 dBm	
	Ref 23	dBm		Att	10 dB	SWT	5 ms		1.99681	0897	/ GHz	
	_ ₂₀ Off	set 40	9 dB									
	-											
												A
l RM *	-10											-
VIEW												
	- 0											LV
	10											
	PCS_SPU	JR										
												-
											hun	
		mmunu	munham	mound	munne	Muhaha Jawa	monument	when when	Mulhululu			
	40									-		1
												-
	60											
	-70						_			+		1
												]
	Start 1	0 MHz			199	MHz/			Sto	2 qc	2 GHz	

# Figure 33 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 600

Date: 22.NOV.2006 22:45:02

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			RBI	₹ 3	MHz		Marker 1 [T1 ]
			VBI	v 1	0 MH	Z	-23.94 dBm
Ref 23 dBm	Att 5	dB	SW	r 1	05 m	5	18.103425741 GHz
-20						_10	" GHz
-10							
- 0							
PCS_SPUR							
-30				مهد	m		when when when when when when when when
harmon and har har	m	~~~~~					
60							
- 70							

Stop 20 GHz

Date: 22.NOV.2006 22:53:46

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_						10 MHz			4.40	
Ref 2			Att	10 dB	SWT S	5 ms		1.99681	0897	GH
O	fset 40	9 dB							–	_
-10										
- 0										╟─
-10										
PCS_SF	VUR									U
20										
						Limme	mound	المعادية والمعاد	hum	llm
-40-	munulum	www.www.w	an march	Madaman						
-40-										
									+	
60									<b> </b>	
70										

# Figure 35 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 1175

Date: 22.NOV.2006 22:49:15

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		RBW 3 MHz	Marker 1 [T1 ]
		VBW 10 MHz	-23.95 dBr
Ref 23 dBm	Att 5 dB	SWT 105 ms	18.103425741 GH:
-20			10 GHz
-10			
-0			
PCS_SPUR			
PCS_SPUR			
-30			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-so	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
-70			

Center 6.32455532 GHz

Span 18 GHz

Date: 22.NOV.2006 22:52:22

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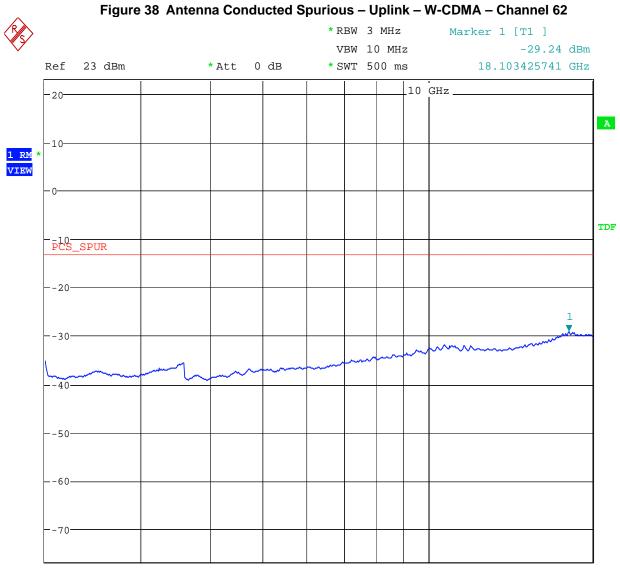


	Figure 37	Antenna	a Conc	lucted S	spurious	– Uplink –	- W-CDM	A – Chan	nel 62	
					* RBW	3 MHz	Mark	er 1 [T1	1	
					VBW	10 MHz		-4	2.00 dH	Bm
Ref 23	3 dBm	* ]	Att (	) dB	* SWT	500 ms		1.89475	9615 GH	Hz
0 Off	set 40.9	dB								
-10										
*20										
PCS_SP	UR									
50										
60									1	
70			~							
90										
-100										

Date: 22.NOV.2006 22:11:59

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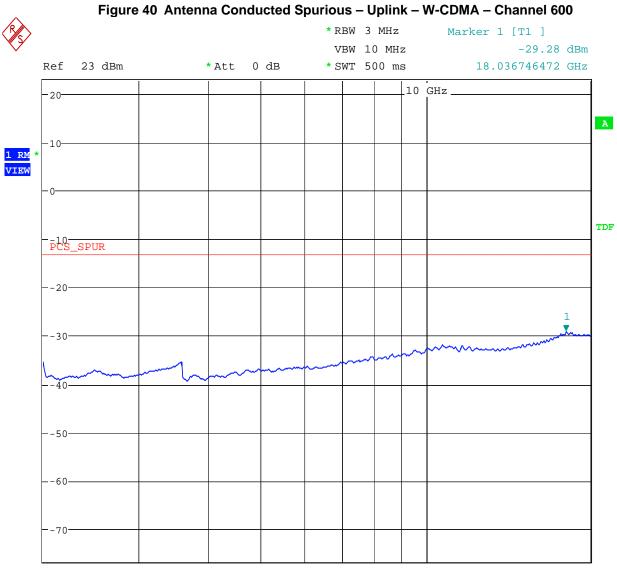
						3 MHz	Marke	er 1 [T1		
					VBW	10 MHz		-34	4.50	dBr
Ref 23	dBm		Att	10 dB	SWT	5 ms		1.99681	0897	GHz
_ ₂₀ 0ff	set 40	9 dB								
20										
-10										
- 0										
PCS_SPI	JR									U
30										
healthand	man Lalle	manne	mourne	un mar	Menter ano	mound	manul	hunder	w	hum
40										
-										
60										
60										
-70										
<u>.                                    </u>										

## 40 Inlink 20 A ... 4 ~ -1 - 4 -... 1 000

Date: 22.NOV.2006 22:43:20

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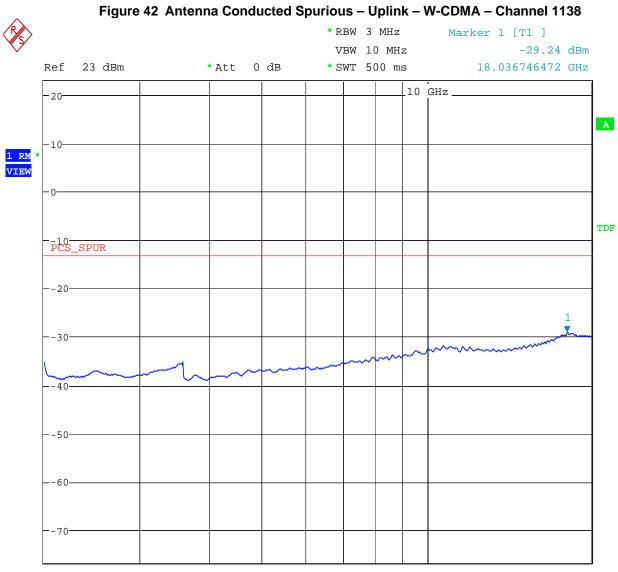
										MHz	Marke				
										0 MHz				1.93	
Ref	23	dBm			Att	1(	) dB	SWT	5	ms		1.99	6810	)897	GH:
	Off	set	40.	9 dB											
20															
-10-															
1															
-0-															
-=10	S_SPU	TD I							_						╫┼─
PC.	S_SPU	IR.													μ
20	)								_						
30	)														
				manun						munth				Marta	Ilm
		MUNUM	L WILL		umun	mw	www.www.www	mun	~				~~~		
40	)														
50															
50															
60	)														
70	)								_						

# Figure 41 Antenna Conducted Spurious – Uplink – W-CDMA – Channel 1138

Date: 22.NOV.2006 22:41:48

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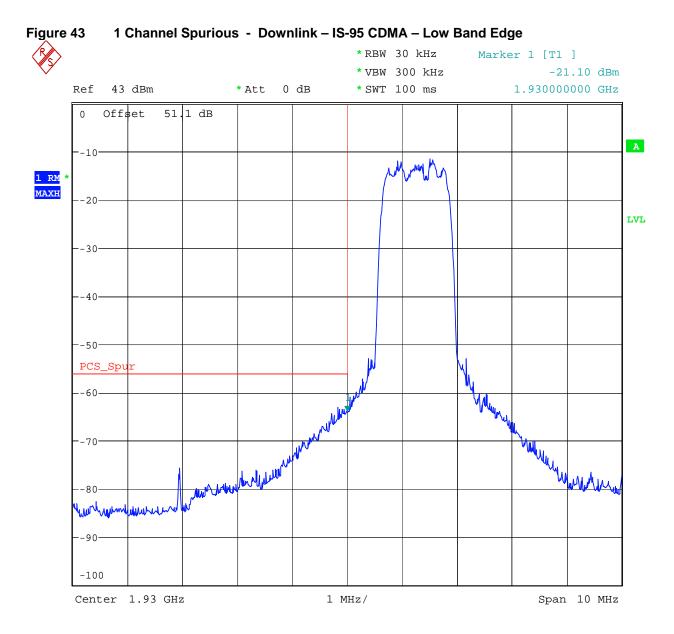


Stop 20 GHz

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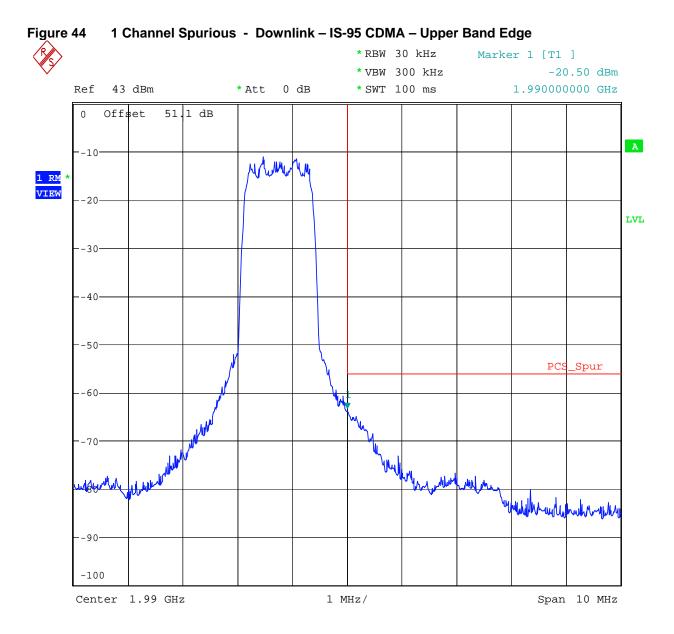




Date: 20.NOV.2006 23:45:25

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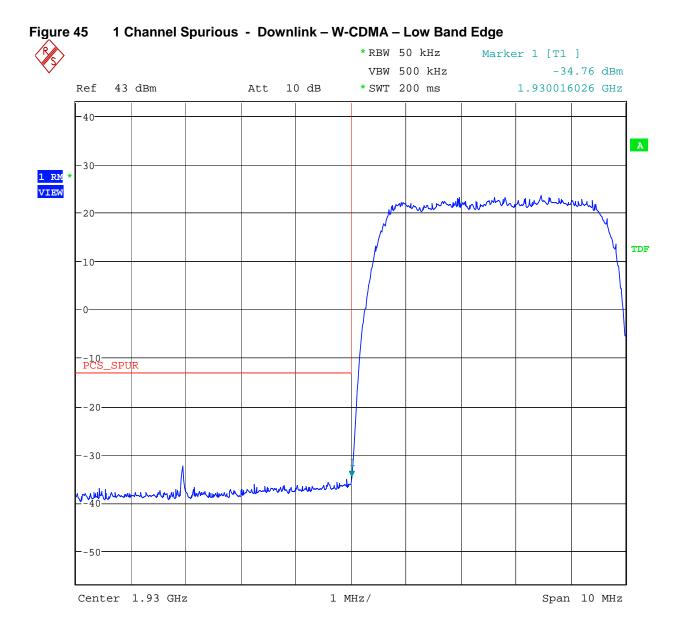




Date: 20.NOV.2006 23:58:25

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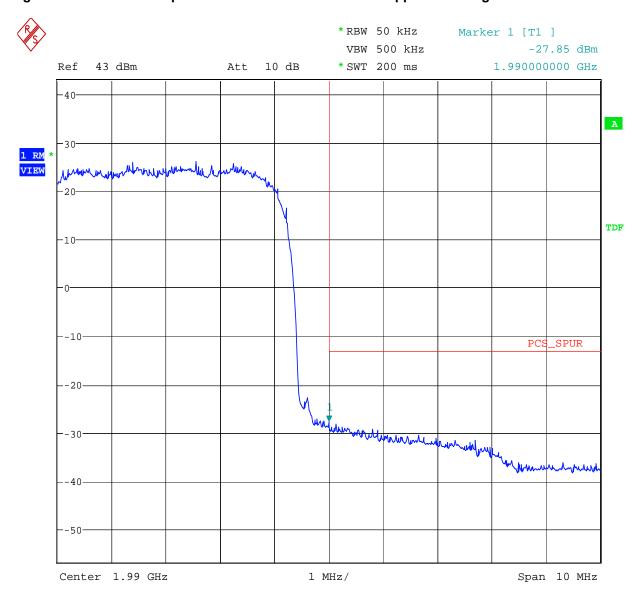




Date: 28.NOV.2006 18:17:35

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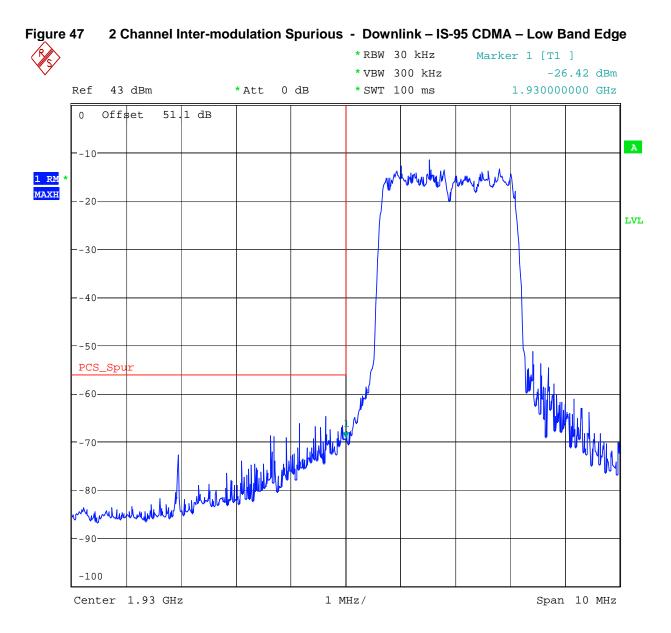


# Figure 46 1 Channel Spurious - Downlink – W-CDMA – Upper Band Edge

Date: 28.NOV.2006 18:21:34

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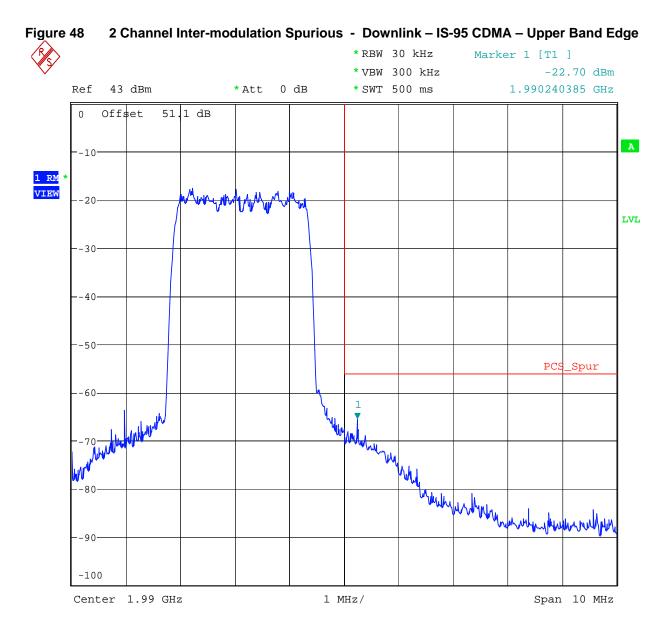




Date: 20.NOV.2006 23:39:15

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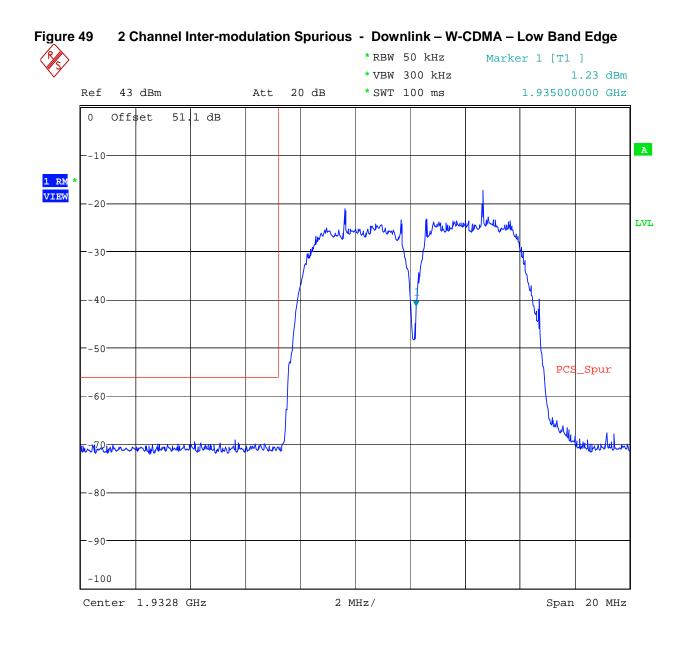




Date: 21.NOV.2006 15:10:07

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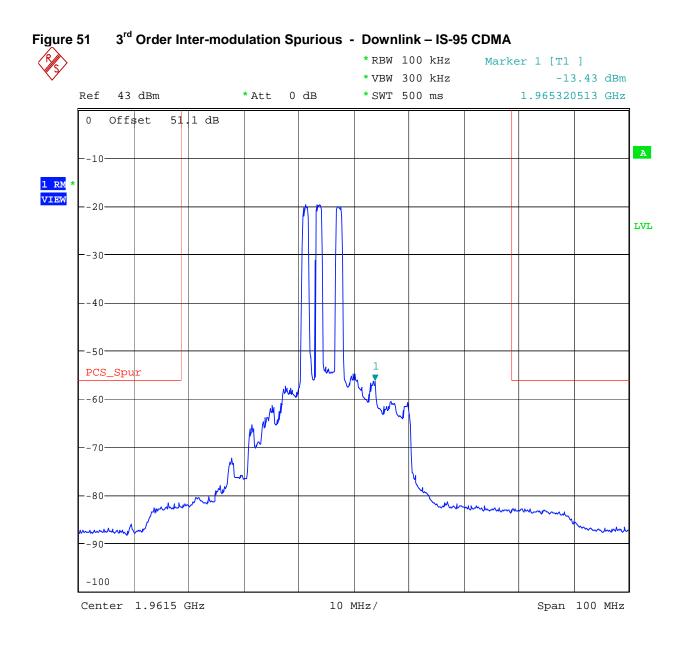


							*RBW 50 kHz		CDMA – Upper Band Edge Marker 1 [T1 ]			
								*VBW 300 kHz		-25.76 dB		
Ref	43 dBm			Att 20 dB			* SWT 100 ms		1.990000000 GH			
0	Offset	51.	1 dB									
10-												
20-					-							
Mr	Annua	Umbran	lum	which here	Manh	١						
30-						$\left\{ - \right\}$						
40-												
50- PCS	_Spur		V									
60-												
							-	uptur Monte	www.	nter the formation of the second s	houter	
-90-												
-100												
L	er 1.					L.5		1			і 15 МН	

Date: 20.NOV.2006 23:03:20

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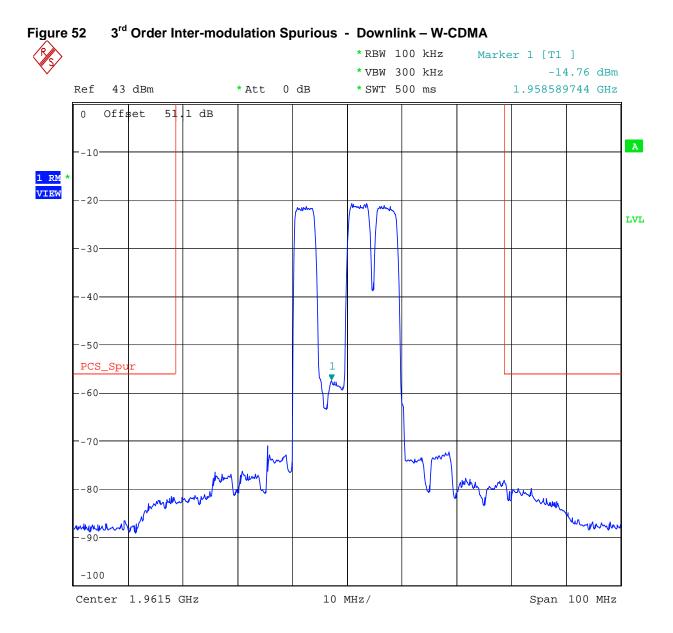




Date: 21.NOV.2006 16:06:09

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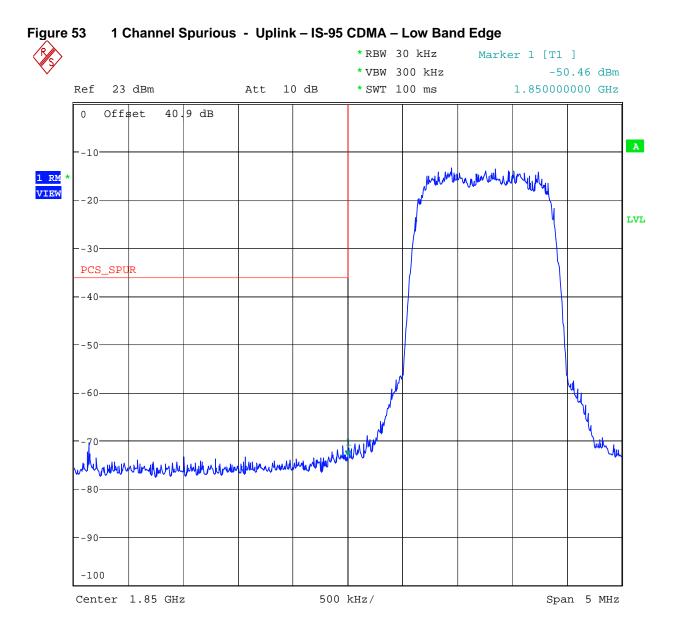




Date: 21.NOV.2006 16:17:31

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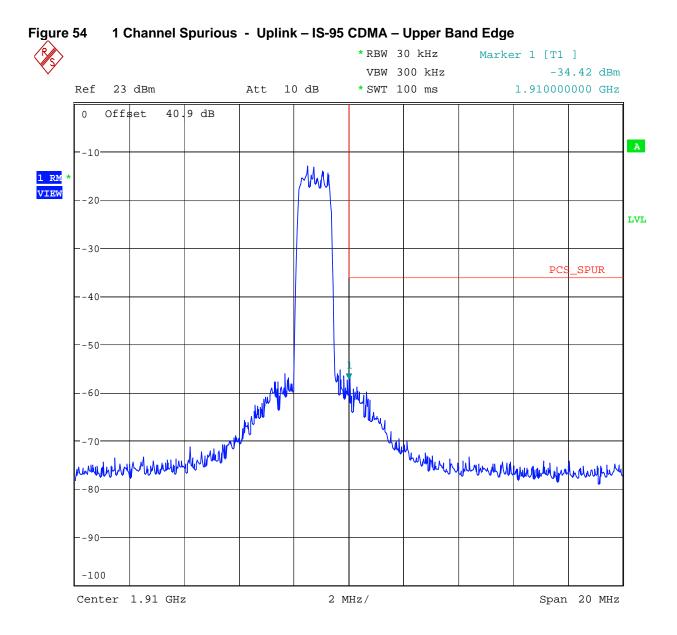




Date: 22.NOV.2006 23:09:34

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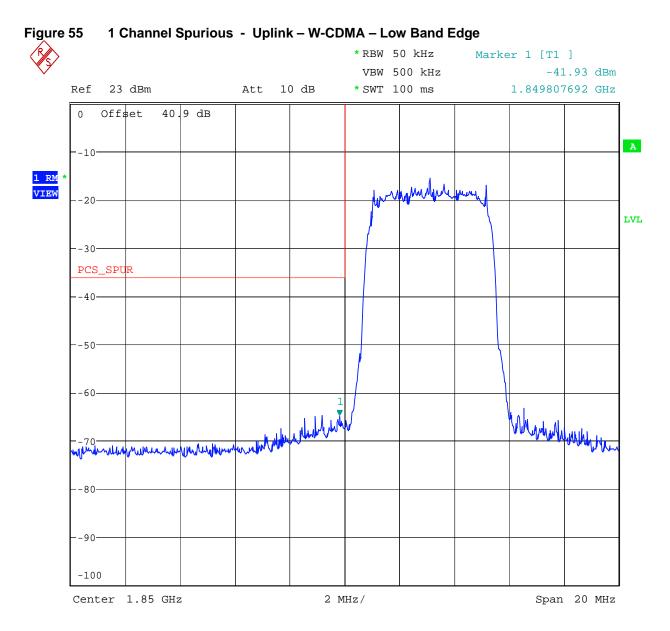




Date: 22.NOV.2006 23:18:34

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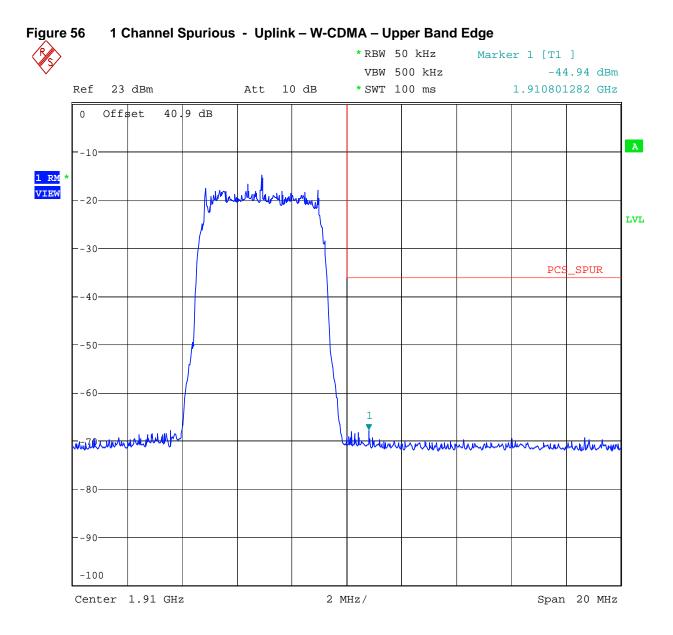




Date: 22.NOV.2006 23:13:12

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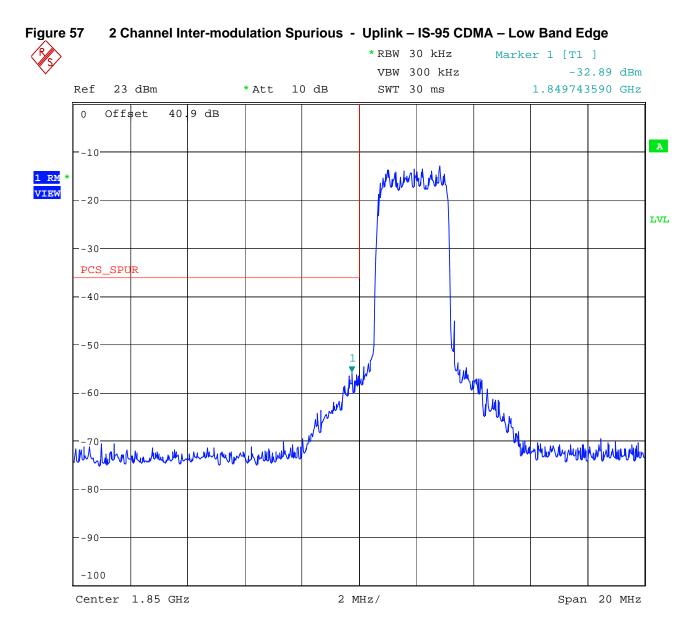




Date: 22.NOV.2006 23:14:48

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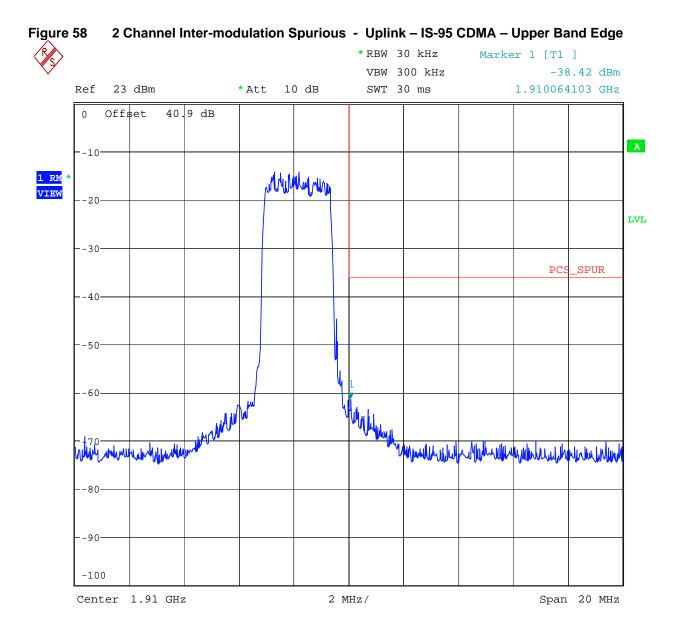




Date: 27.NOV.2006 16:49:00

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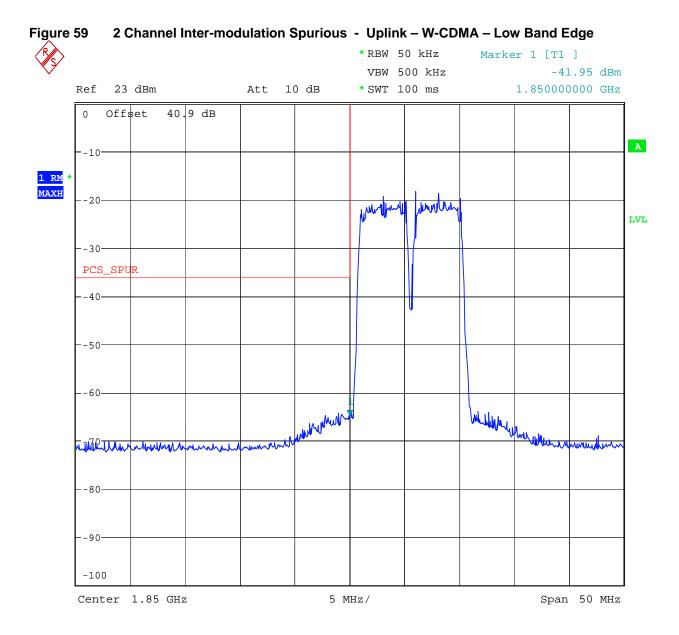




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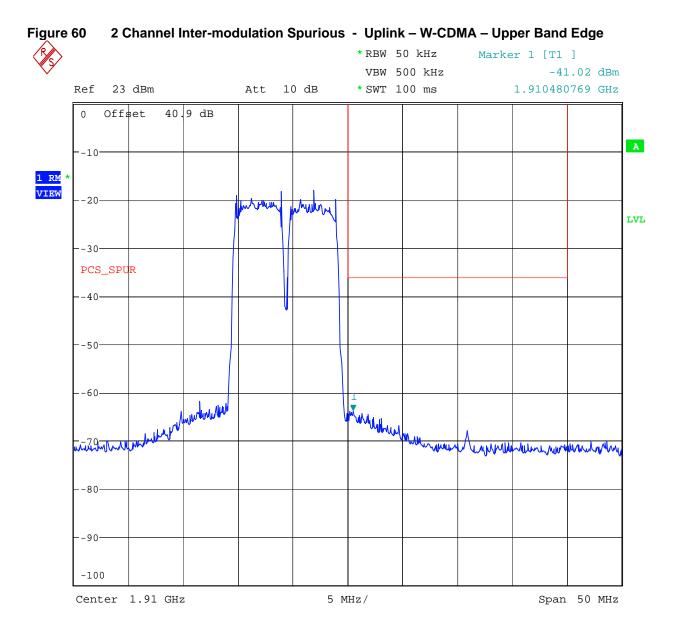




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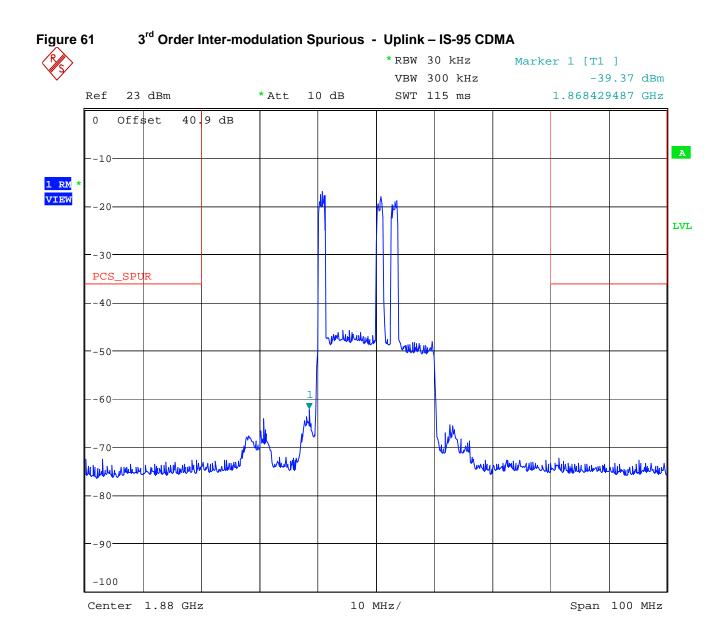




Date: 22.NOV.2006 23:37:24

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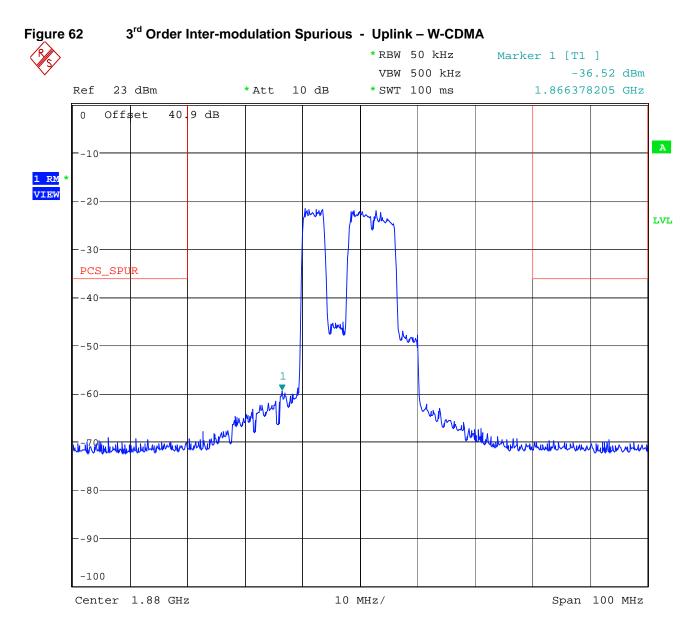




Date: 27.NOV.2006 17:28:14

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## D.8. Tested By

Name:Tom Tidwell,Function:Manager of Wireless ServicesDate:11/28/2006

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## 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

24.238 Emission limitations for Broadband PCS equipment

(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 -25.9 dBm at 3977.5 MHz. This level is 12.9 dB below the specification limit of -13 dBm. The spectrum was searched up to 20 GHz with the device operating on three channels in the Uplink direction and three channels in the Downlink direction.

### E.4. Deviations from Normal Operating Mode During Test

None.

E.5. Sample Calculation

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

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

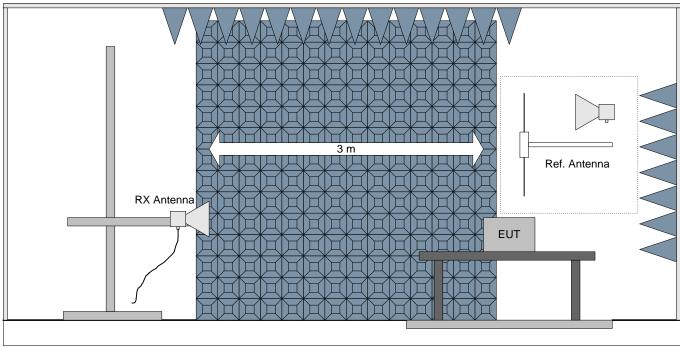
Min. Atten. Limit dB) = 43 + 10 * log(20 watts) = 43 + 10 * 1.3 = 43 + 13 = 56 dB

43 dBm - 56 dB = -13 dBm

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## 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.

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### E.7. Test Data

	Project No:	Andrew Corporation W6397
	Model:	Node C/M 1943
	Comments:	Transmit at full rf output power (20 watts), Ch. 25, 600, 1175
	Date:	11/28/2006

Distance:	3 m	Standard:	CFR 47, Part 2.1043	RBW: (unless < 1 GHz = 120 kHz noted) > 1 GHz = 1 MHz	VBW: (unless _{Peak} = RBW Avg. = RBW noted)
	-		Curbodiitu dia		D /linium una

Antenna	Polarization	Frequency	Measured	Substitution Level	Antenna Gain	Final Measured Value		Peak Carrier Power		Attenuation	Margin
	(V/H)	(MHz)	(dBm)	(dBm)	(dBi)	(dBm)	(watts)	(dBm)	(watts)	(dBc)	(dB)
Ref. E1019	V	3862.5	-113.7	-39.662	7.71	-32.0	6.38E-07	43	20	56	19.0
Ref. E1019	Н	3862.5	-115.1	-41.062	7.71	-33.4	4.62E-07	43	20	56	20.4
Ref. E1019	V	3920	-115.3	-41.334	7.71	-33.6	4.34E-07	43	20	56	20.6
Ref. E1019	Н	3920	-115.3	-41.334	7.71	-33.6	4.34E-07	43	20	56	20.6
Ref. E1019	V	3977.5	-107.5	-33.601	7.71	-25.9	2.58E-06	43	20	56	12.9
Ref. E1019	Н	3977.5	-110.4	-36.501	7.71	-28.8	1.32E-06	43	20	56	15.8
Ref. E1019	V	5793.75	-112.8	-40.475	8.68	-31.8	6.61E-07	43	20	56	18.8
Ref. E1019	Н	5793.75	-113.1	-40.775	8.68	-32.1	6.17E-07	43	20	56	19.1
Ref. E1019	V	7725	-113.4	-42.568	9.15	-33.4	4.55E-07	43	20	56	20.4
Ref. E1019	Н	7725	-114.1	-43.268	9.15	-34.1	3.87E-07	43	20	56	21.1
Ref. E1019	V	9656.25	-113.7	-44.084	9.85	-34.2	3.77E-07	43	20	56	21.2
Ref. E1019	Н	9656.25	-113.7	-44.084	9.85	-34.2	3.77E-07	43	20	56	21.2
Ref. E1019	V	11587.50	-113.7	-45.62	10.59	-35.0	3.14E-07	43	20	56	22.0
Ref. E1019	Н	11587.50	-113.7	-45.62	10.59	-35.0	3.14E-07	43	20	56	22.0
Ref. E1019	V	19312.50	-111.6	-48.052	5.7	-42.4	5.82E-08	43	20	56	29.4
Ref. E1019	Н	19312.50	-111.6	-48.052	5.7	-42.4	5.82E-08	43	20	56	29.4
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: Measurements were made with the device operating in the following modes:

Downlink, 20 W rf output, Channel 25 Downlink, 20 W rf output, Channel 600 Downlink, 20 W rf output, Channel 1175 Uplink, 0.2 W rf output, Channel 25 Uplink, 0.2 W rf output, Channel 600 Uplink, 0.2 W rf output, Channel 1175

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#### E.8. Test Photo



## E.9. Tested By

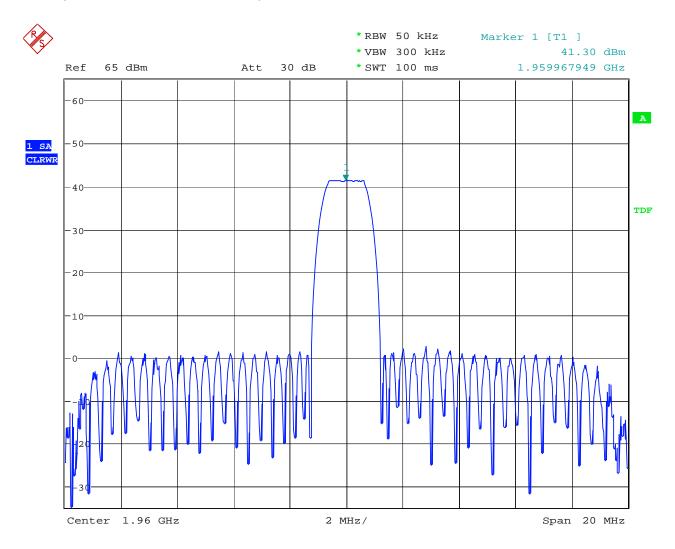
Name: Function: Date: 11/28/2006 Tom Tidwell, Manager of Wireless Services

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# **APPENDIX F: 2.1053 FILTER PLOTS**

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

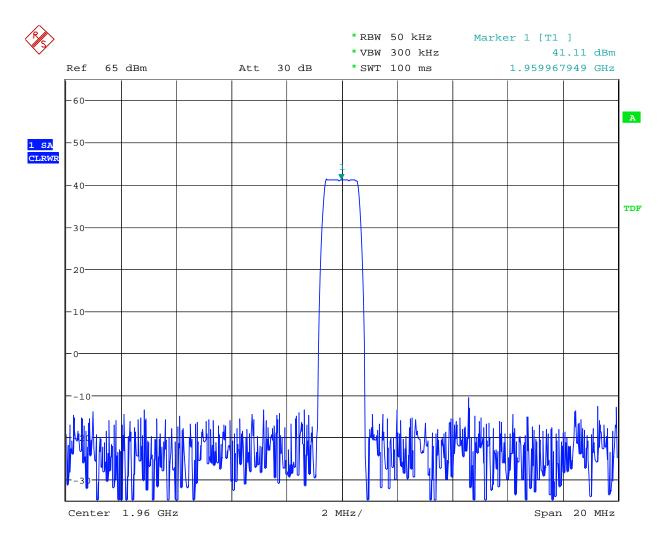


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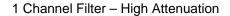
One Channel Filter – Normal Attenuation

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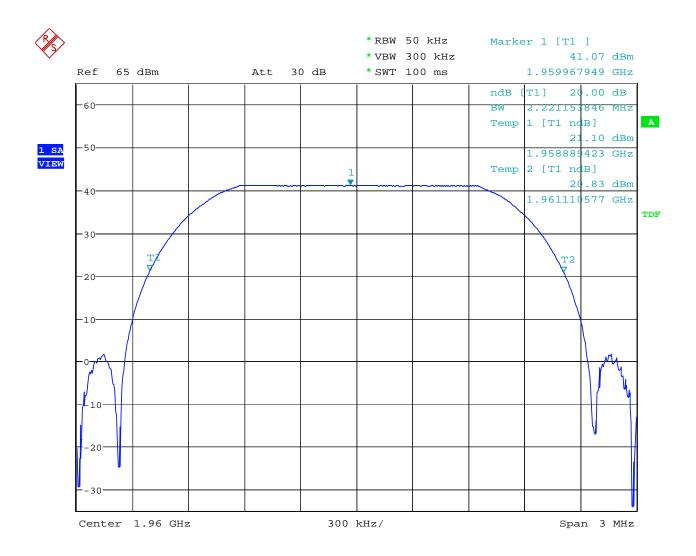


Date: 8.NOV.2006 23:06:23



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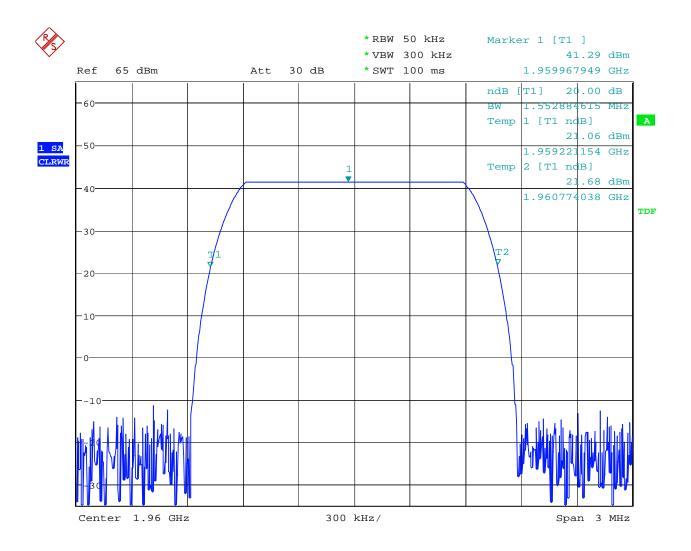


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1 Channel Filter – Normal Attenuation

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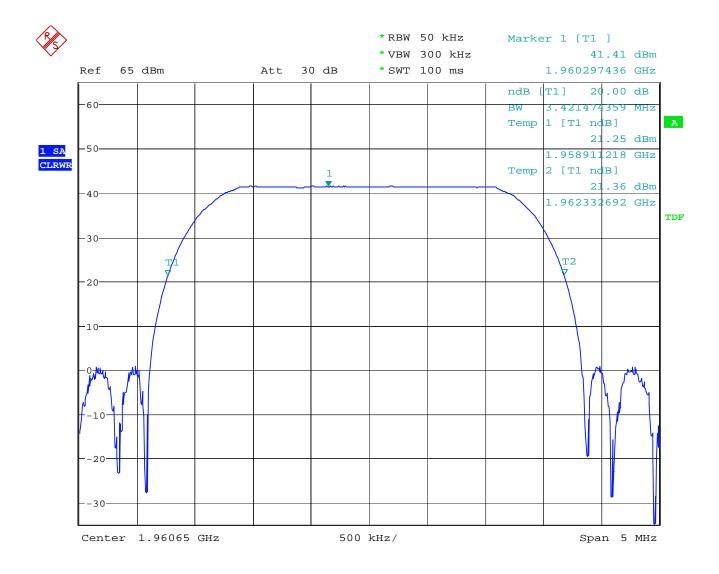


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1 Channel Filter – High Attenuation

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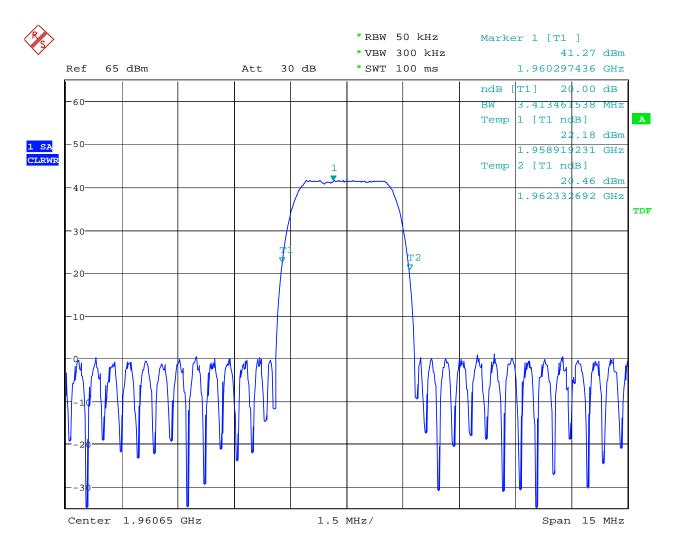


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2 Channel Filter

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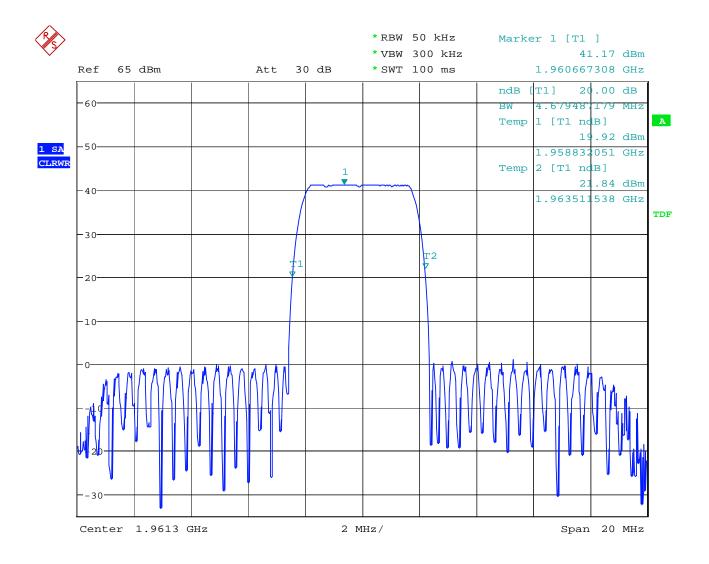


Date: 8.NOV.2006 23:28:37

2 Channel Filter

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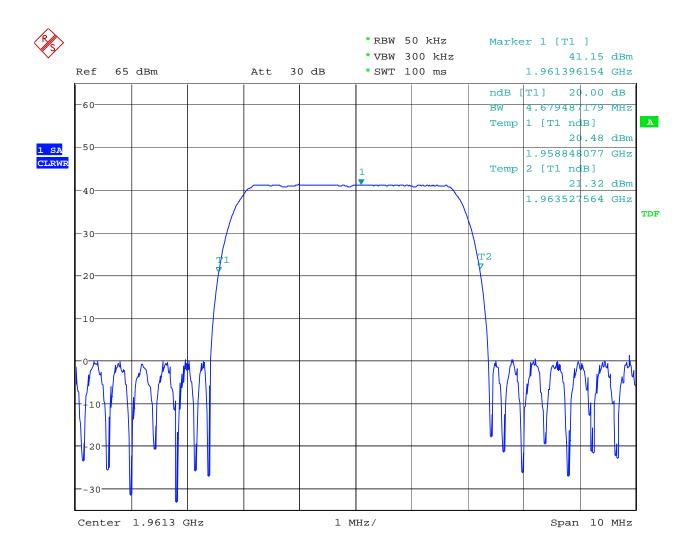


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**3 Channel Filter** 

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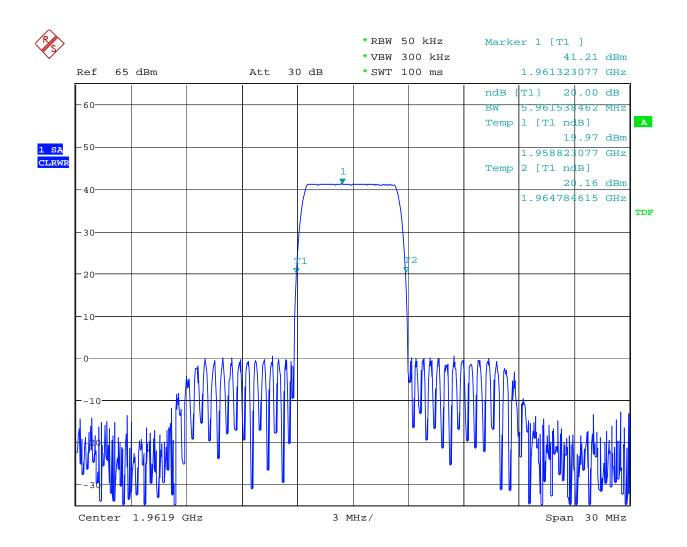


Date: 8.NOV.2006 23:35:48

3 Channel Filter

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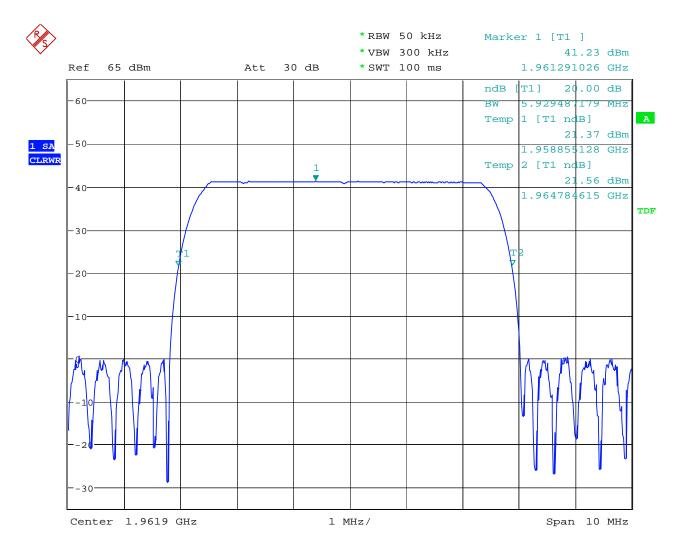


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4 Channel Filter

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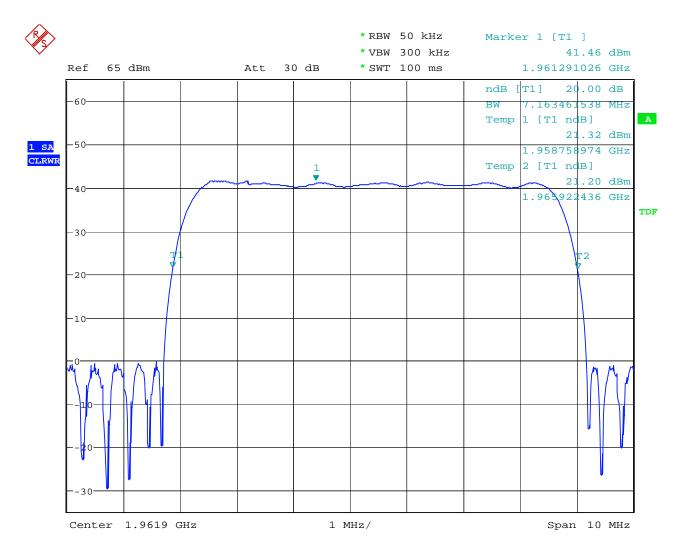


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4 Channel Filter

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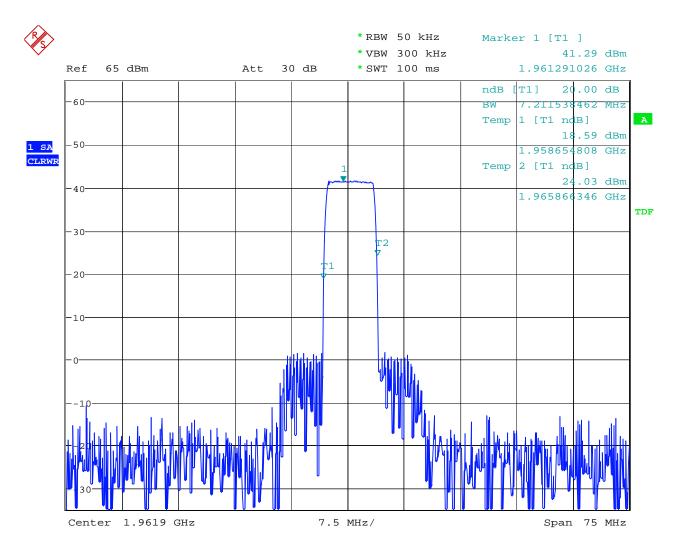


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5 Channel Filter

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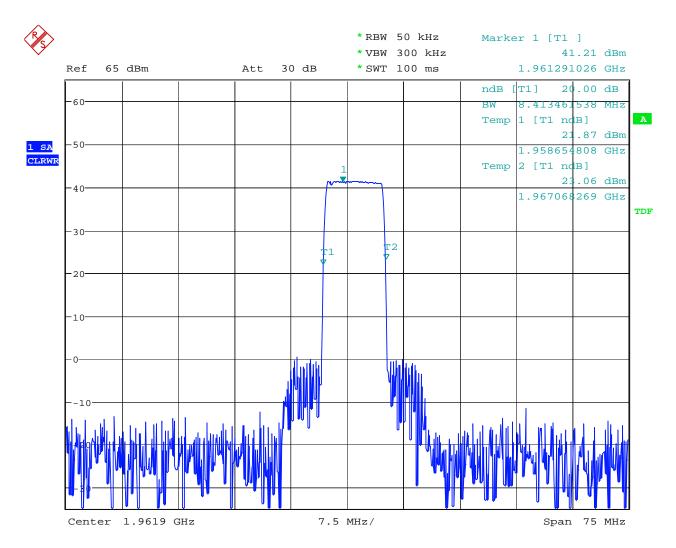


Date: 8.NOV.2006 23:47:32

**5** Channel Filter

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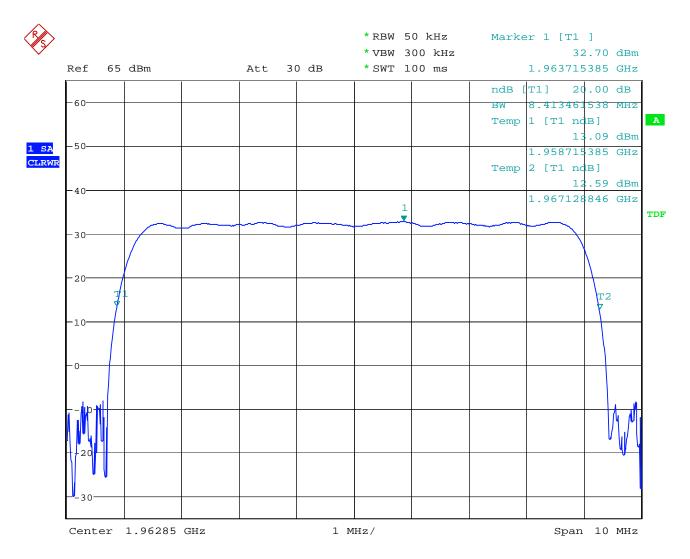


Date: 8.NOV.2006 23:49:17

6 Channel Filter

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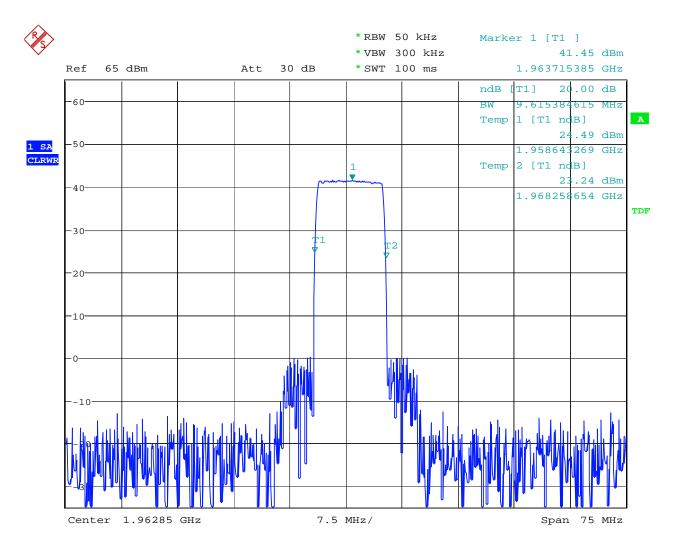


Date: 8.NOV.2006 23:51:05

6 Channel Filter

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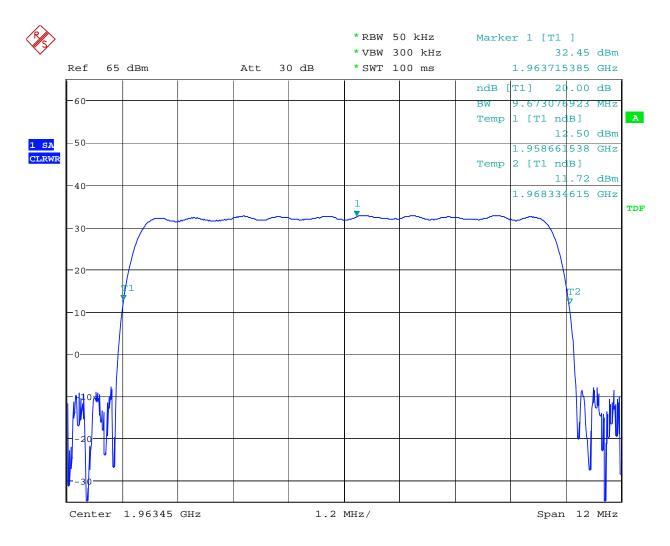


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7 Channel Filter

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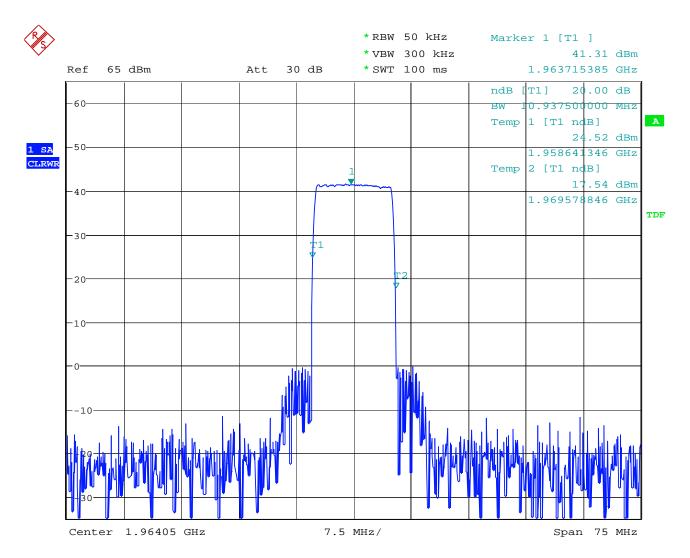


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7 Channel Filter

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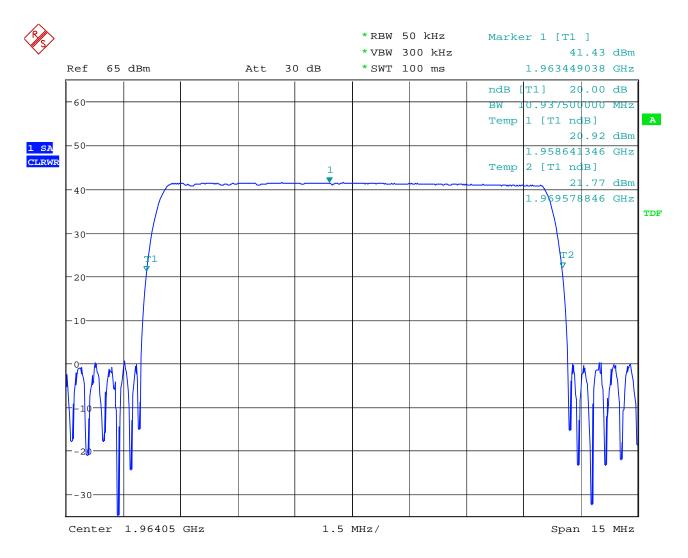


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8 Channel Filter

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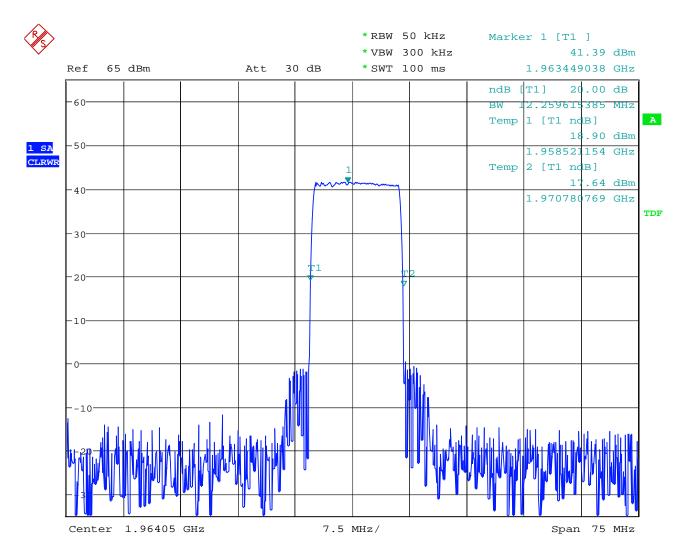


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8 Channel Filter

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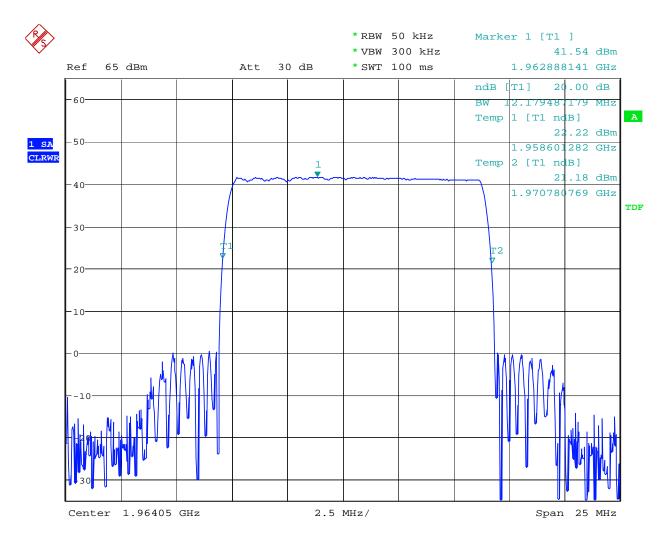


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9 Channel Filter

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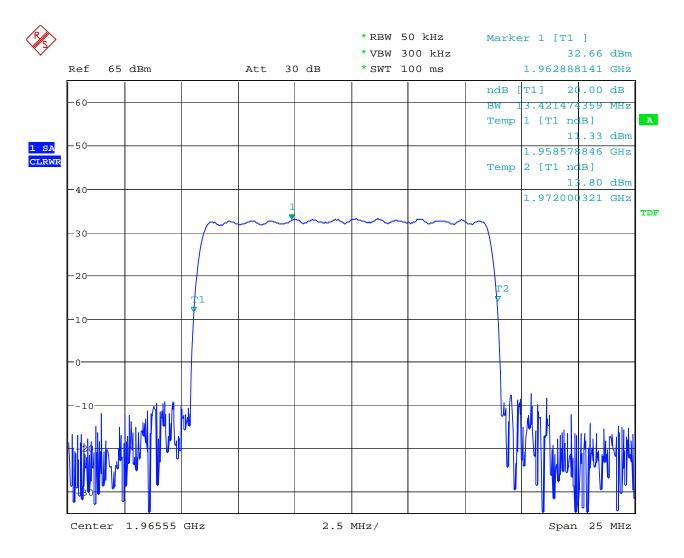


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9 Channel Filter

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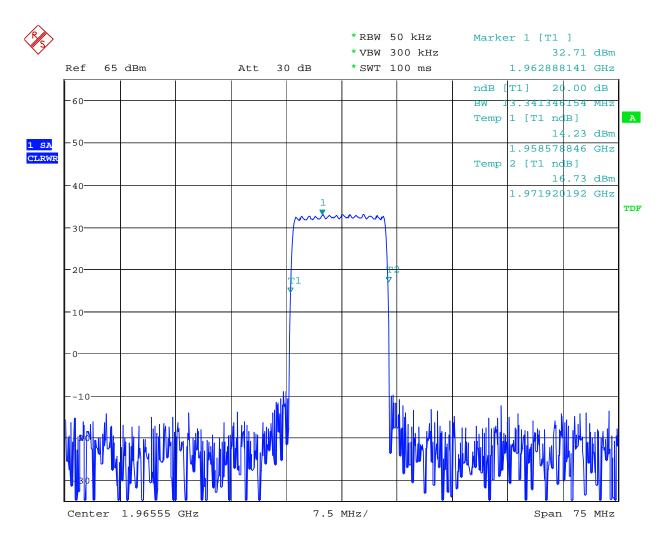


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10 Channel Filter

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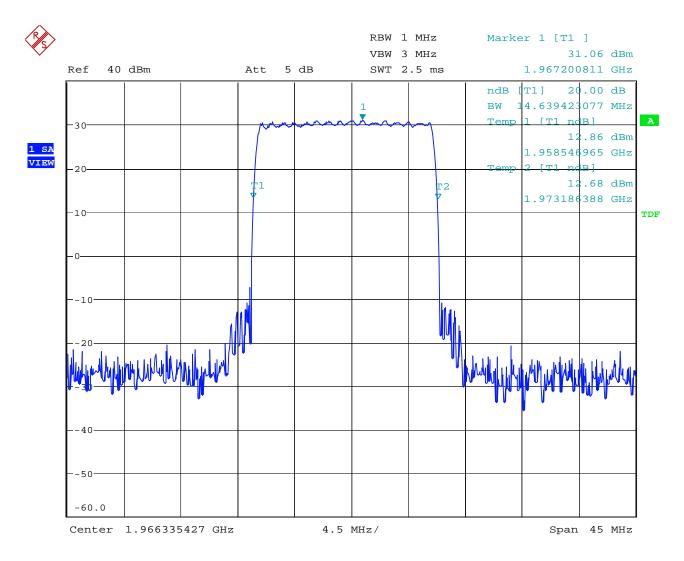


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10 Channel Filter

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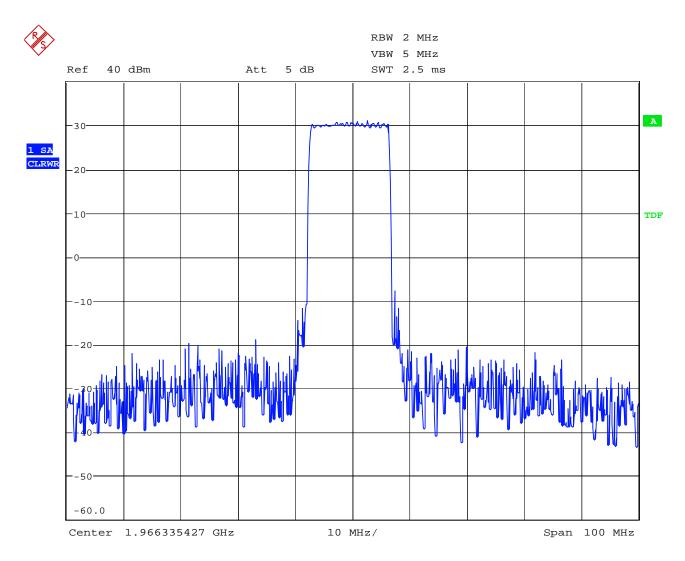


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11 Channel Filter

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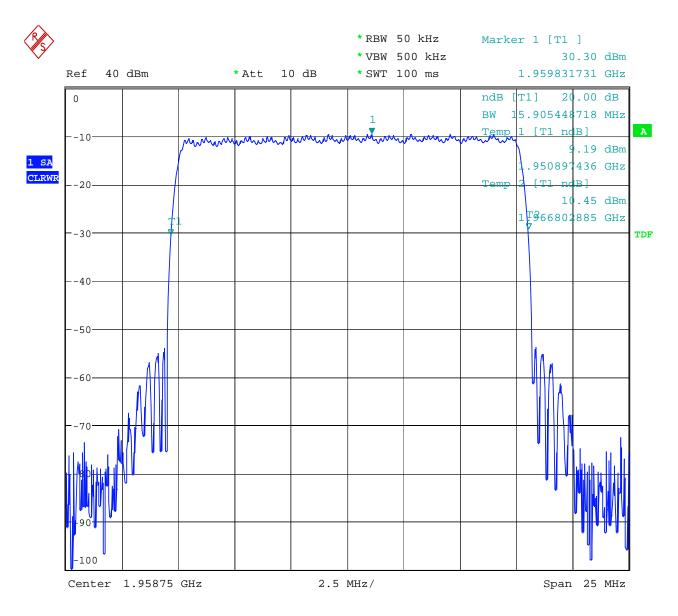


Date: 15.NOV.2006 16:08:03

11 Channel Filter

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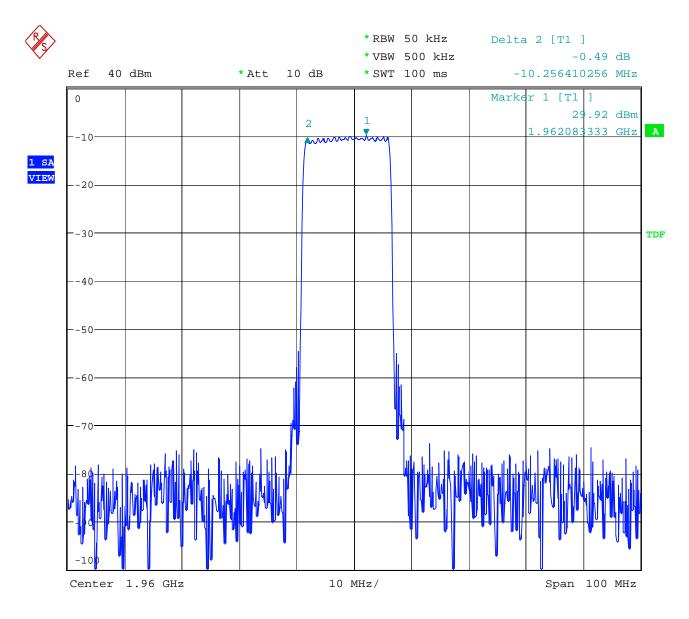


Date: 27.NOV.2006 18:59:11

12 Channel Filter

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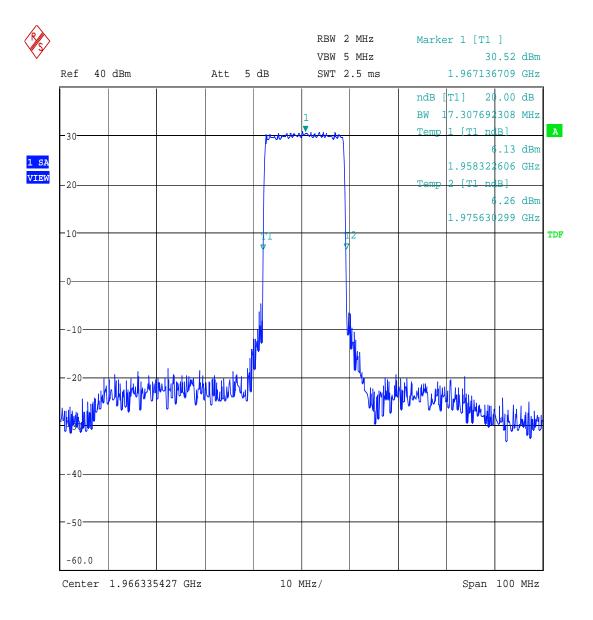


Date: 27.NOV.2006 18:53:23

12 Channel Filter

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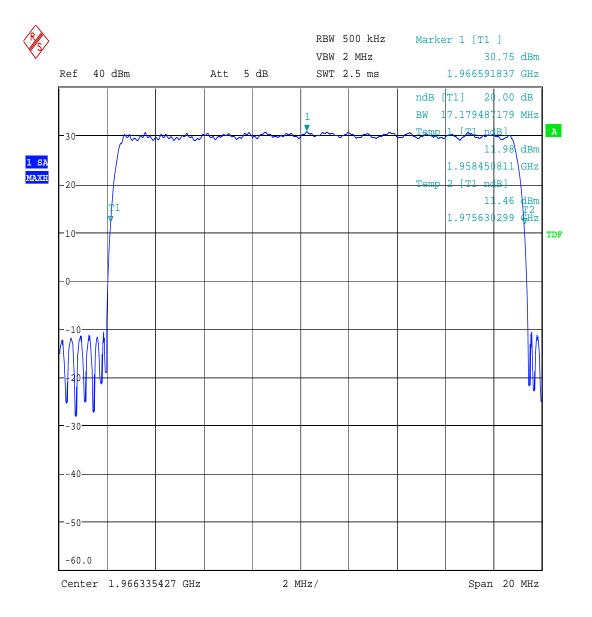


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13 Channel Filter

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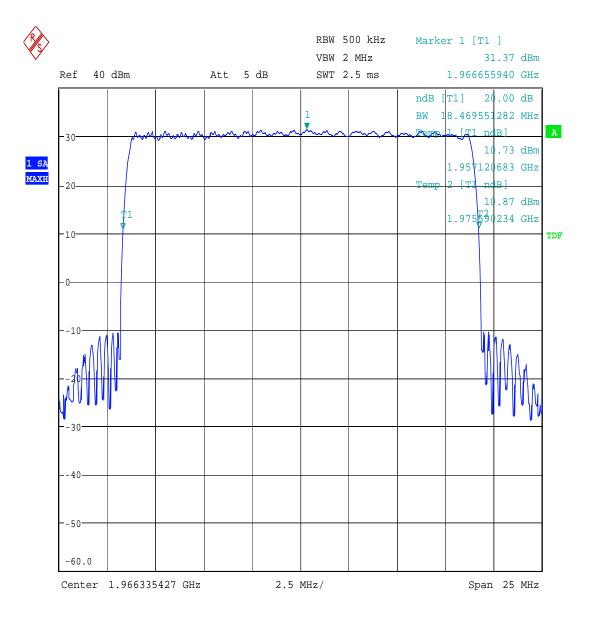


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13 Channel Filter

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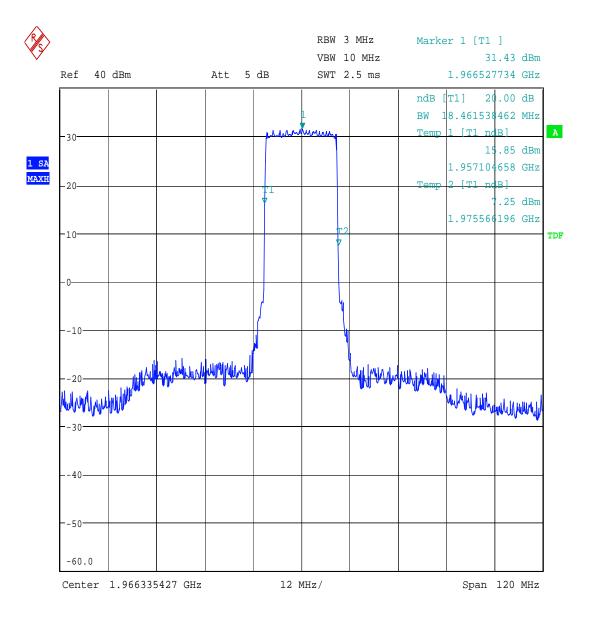


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14 Channel Filter

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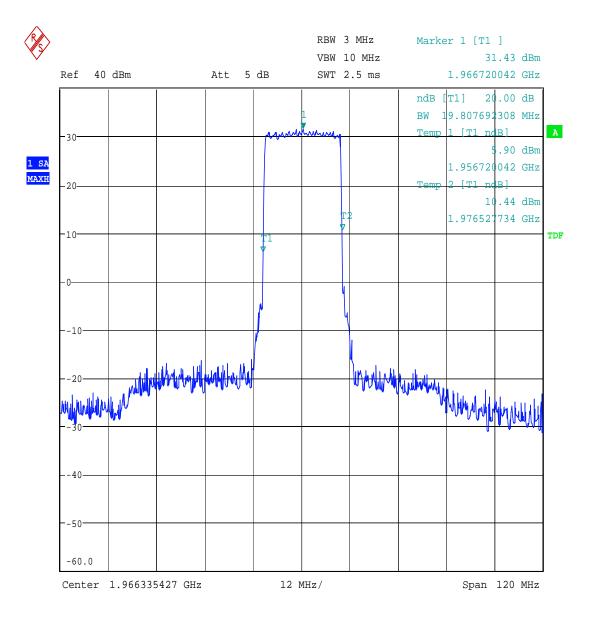


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14 Channel Filter

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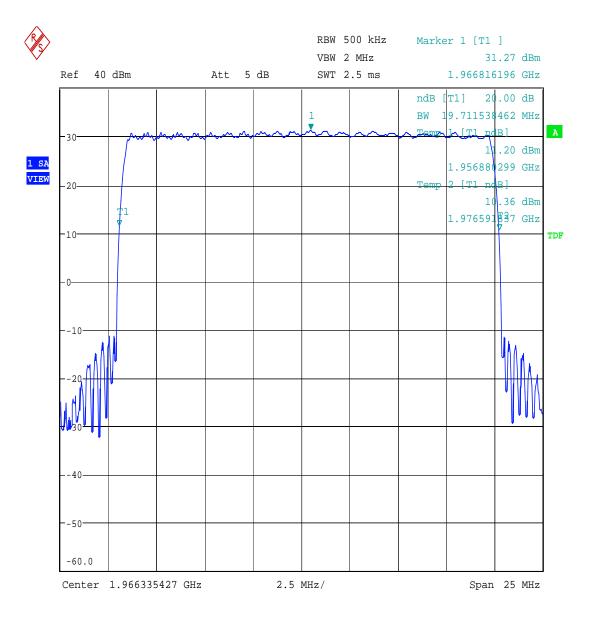


Date: 15.NOV.2006 16:36:38

15 Channel Filter

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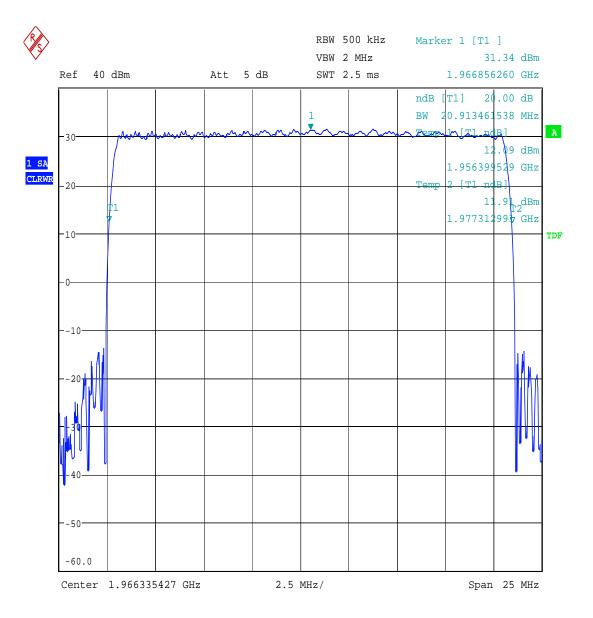


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15 Channel Filter

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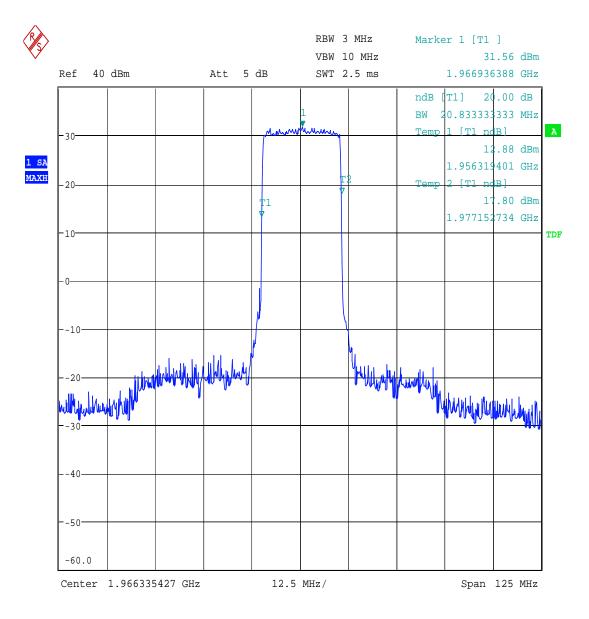


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16 Channel Filter

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### APPENDIX G: 2.1055 FREQUENCY STABILITY

#### G.1. Base Standard & Test Basis

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

#### **Specifications**

24.235 Frequency Stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### G.2. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			
			Base Standard	Test Basis	NTS Procedure	Approval
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

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#### G.9. Tested By

Name:Tom Tidwell,Function:Manager of Wireless Services

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# APPENDIX H: TEST EQUIPMENT LIST

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			
Tunable Notch Filter	K&L Microwave	3TNF- 1000/2000-N/N	N/A*	N/A*	S/N 614			
Reference Antenna	ETS	3121 Dipole Set	12 months	8/8/07	S/N. 274			
CONTROL ROOM								
Test Receiver	Rohde & Schwarz	z 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.1. Field Strength of Spurious Emissions 30 MHz – 26.5 GHz Measurement Equipment

#### H.2. Antenna Conducted Emissions Measurement Equipment

		Model	Calibration	Calibration		
Instrument	Manufacturer		Frequency	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.

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