



Product Integrity Laboratory

5151-47th Street, NE
Calgary, Alberta T3J 3R2
Tel: (403) 568-6605
Fax : (403) 568-6970

Certification Test Report
FCC Part 22, Subpart H/ Industry Canada RSS 132
Part 24, Subpart E/ Industry Canada RSS 133

Novatel Wireless Inc
MiFi-2352

FCC ID # NBZNRM-MIFI2352
IC ID # 3229A-MIFI2352
Project Code CG-1161
(Report CG-1161-RA-1-2)
Revision: 2

March 31, 2009

Prepared for: Novatel Wireless Inc

Author: Glen Moore
EMC Manager

Approved by: Nick Kobrosly
Lab Manager

Confidentiality Statement: This report and the information contained herein represent the results of testing articles/products identified and selected by the client. The tests were performed to specifications and/or procedures approved by the client. National Technical Systems ("NTS") makes no representations expressed or implied that such testing fully demonstrates efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article or similar products for a particular purpose. This document shall not be reproduced except in full without written approval from National Technical Systems ("NTS") and the customer.

Test Facility:	National Technical Systems, Canada Product Integrity Laboratory 5151-47 th Street, N.E. Calgary Alberta T3J 3R2
Accreditation Numbers:	FCC 101386 IC 3978A-1 Accredited by Standards Council of Canada Accredited Laboratory No. 440 Conforms with requirements of CAN-P-4D (ISO/IEC 17025) CLIENTS SERVED: All interested parties FIELDS OF TESTING: Electrical/Electronic, Mechanical/Physical ACCREDITATION DATE:: 2008-06-17 VALID TO: 2013-03-20
Applicant:	FCC: Novatel Wireless Inc. 9645 Scranton Rd, Suite 205 San Diego, CA 92121 IC: Novatel Wireless Technologies Ltd 6715 – 8th St N.E. Suite 200 Calgary, Alta. T2E-7H7
Customer Representative:	Mr. Jim Turner Regulatory Specialist Ph: (403) 295-4855 Fax: (403) 295-4801 E Mail: jturner@nvtl.com


The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970


Test Summary

Appendix	Test/Requirement Description	Deviations* from:			Status	Applicable Rule Parts		
		Base Standard	Test Basis	NTS Procedure		Mode	FCC	IC
A	Occupied BW	No	No	No	PASS	Cell	2.1049/22.905	RSS 132 4.5
						PCS	2.1049/24.238	RSS 133 6.5
B	Radiated Peak Power Output	No	No	No	PASS	Cell	2.1046/22.913	RSS 132 4.4
						PCS	2.1046/24.232	RSS 133 6.4
C	TX Frequency Stability	No	No	No	PASS	Cell	2.1055/22.335	RSS 132 4.3
						PCS	2.1055/24.235	RSS 133 6.3
D	TX Conducted Spurious Emissions	No	No	No	PASS	Cell	2.1051/22.917	RSS 132 4.5
						PCS	2.1051/24.238	RSS 133 6.5
E	Field Strength of Spurious Emissions (TX/RX)	No	No	No	PASS	Cell	2.1053/22.917	RSS 132 4.3 RSS Gen
						PCS	2.1053/24.238	RSS 133 6.3 RSS Gen
F	Test Equipment List	No	No	No	NA	NA		


Digitally signed by gmoore
DN: cn=gmoore, c=US,
o=nts, email=glen.
moore@ntscorp.com
Date: 2009.04.02 16:22:43
-06'00'



Prepared By: _____
Glen Moore
Wireless/EMC Manager

Reviewed By:  Alex Mathews
2009.04.02
16:26:52 -06'00'

Alex Mathews
Quality Management Representative

Approved By:  Alex Mathews
2009.04.02
16:27:23
-06'00'

Alex Mathews
Quality Management Representative

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Table of Contents

TEST SUMMARY	3
REGISTER OF REVISIONS	5
1.0 INTRODUCTION	6
1.1 PURPOSE	6
2.0 EUT DESCRIPTION	6
2.1 CONFIGURATION	6
2.2 MODE OF OPERATION DURING TESTS	7
3.0 SUPPORT EQUIPMENT	7
3.1 CONFIGURATION	7
APPENDICES	8
APPENDIX A: OCCUPIED BANDWIDTH	9
APPENDIX B: RADIATED PEAK POWER OUTPUT	16
APPENDIX C: FREQUENCY STABILITY	19
APPENDIX D: TX CONDUCTED SPURIOUS EMISSIONS	22
APPENDIX E: TX/RX RADIATED SPURIOUS EMISSIONS 30 MHZ – 20 GHZ	32
APPENDIX F: TEST EQUIPMENT LIST	37

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Register of revisions

Revision	Date	Description of Revisions
0	March 25, 2009	Initial release
1	March 30, 2009	Edits after internal and customer review
2	March 31, 2009	Edits – TCB comments

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Canada to demonstrate compliance of the MiFi 2352 Wireless Modem from Novatel Wireless Inc to the following specifications:

FCC Part 22, Subpart H Public Mobile Services
 FCC Part 24, Subpart E Personal Communications Services
 RSS 132 – Issue 2
 RSS-133, Issue 3, Rev.1 2GHz Personal Communications Services
 RSS Gen – (Receiver Spurious Emissions)

Note: The MiFi 2352 also has 802.11 b/g capability for which compliance test data is shown in report S/N 0812101726.NBZ from PC Test as provided by Novatel Wireless Inc.

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	MiFi 2352	NRM-MiFi2352	HW: Rev 1 FW: Rev 5.9.00	N/A
Classification	Mobile			
TX Operating Frequency Range	GSM 850	824.2-848.8 MHz		
	PCS 1900	1850.2 -1909.8 MHz		
	WCDMA Band II:	1852.4 -1907.8 MHz		
RX Operating Frequency Range	GSM 850	869-894 MHz		
	PCS 1900	1930-1990 MHz		
	WCDMA Band II:	1930-1990 MHz		
Maxium Output Power	Cell band 1.81 Watts ERP in GSM Mode PCS band 1.95 Watts EIRP in GSM Mode PCS band 0.9 Watts EIRP in WDCMA Mode			
Antenna Type/Gain	Manufacturer: Connor Manufacturing (Suzhou) Co., Ltd Typical Gain: - 3 dbi Part number : 120150294			
Manufactured by	Bill Dong Inventec Appliances (Shanghai) Co., Ltd. 7 Gui Qing Road, Shanghai 200233, China, P.R.C. Ph: +86-21-6485-3668 Ext:2817 Fax: +86-21-6485-0019 E Mail: dong.bill@iac.com.tw			
Functional description	The equipment under test (EUT) is the MIFI2352, a quad-band (850/900/1800/1900) GSM/GPRS, tri-band (900/1900/2100) WCDMA/HSPA diversity USB WWAN modem. The diversity support is in the 900, 1900 and 2100 MHz WCDMA bands. In addition to these features this product also supports 802.11 functionality, and can be operated using battery power or from a wall adapter			

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Voltage/Power source	AC Power Adaptor Input: 100-240VAC 50/60 Hz Output: 5.0 V 1.2 Amps DC Power (Battery) : 3.7 VDC Nominal, 3.41 VDC end operating point
Voltage/current into final amplifier stage	➤ Nominal 3.6 Vdc Current: WCDMA 1900 MHz - 350mA, GSM 850 MHz – 1.5 A, 1900 MHz Band: 1.0 A
Tune up procedure	See separate exhibit
Composite device description	The MiFi2352 also contains an 802.11 b/g device which has a separate report S/N 0812101726.NBZ from PC Test as provided by Novatel Wireless Inc.
Emission Designators	GSM/GPRS 850 247K5GXW GSM/GPRS 1900 - 247K5GXW EDGE 850 244K5G7W EDGE 1900 246K5G7W WCDMA 1900 4M17F9W
Frequency Tolerance	2.5 ppm in all modes

2.2 MODE OF OPERATION DURING TESTS

The EUT was tested in all configurations to determine worst case results. See test appendices for specific EUT operating modes and conditions

3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

The following equipment was used as the host system for the EUT

Peripheral/Device Description	Manufacturer	Model	Description	Serial Number
Power supply	KTEC	KSAA0500120W1UV-1	Input: 100-240VAC 50/60 Hz Output: 5.0 V 1.2 Amps	N/A

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDICES

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

APPENDIX A: OCCUPIED BANDWIDTH

A.1. Base Standard & Test Basis

Base Standards	FCC Part 2.1049
	Industry Canada: Cell Mode – IC RSS 132, Issue 2 PCS Mode – IC RSS 133, Issue 5
Test Basis	FCC PART 2.1049
Test Method	FCC PART 2.1049 or TIA 603-C-2004

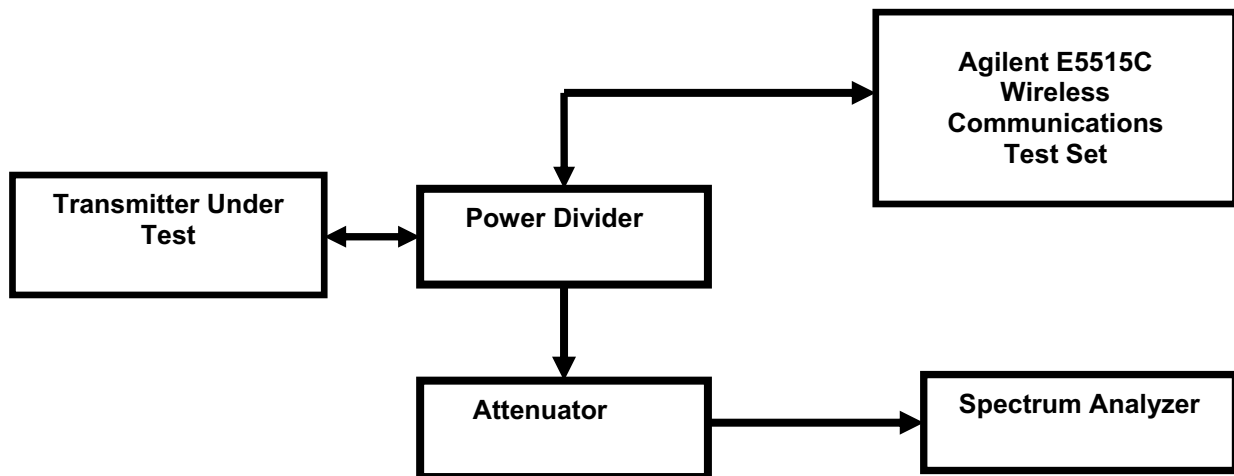
A.2. Specifications

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission

A.3. Test Method

FCC 2.1049 or TIA 603-C-2004. The 99% bw function on the analyzer was used to measure the Occupied bandwidth in all EUT operating modes for Industry Canada 99% Bandwidth measurements. For FCC 26 dB OBW measurements the marker delta function was used to determine the 26 dB bandwidth

A.4. Test Setup diagram



The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

A.5. Operating Mode During Test

The EUT was tested while in a continuous transmit mode operating at maximum rated RF output for all bands and operating modes.

A.6. Test Results

The EUT is in compliance with the limits as specified above. The worst case bandwidths are provided below:

Industry Canada 99% Bandwidth Summary of Results

Cell Mode

Modulation type	Channel	Frequency (MHz)	Occupied Bandwidth
GSM/GPRS	190	836.6	247.5 KHz
EDGE	190	836.6	244.5 KHz

PCS Mode

Modulation type	Channel	Frequency (MHz)	Occupied Bandwidth
GSM/GPRS	661	1880	247.5 KHz
EDGE	661	1880	246.5 KHz
WCDMA	9400	1880	4.16 MHz

FCC Part 2, 22 and 24 26 dB Bandwidth Summary of Results

Cell Mode

Modulation type	Channel	Frequency (MHz)	Occupied Bandwidth
GSM/GPRS	190	836.6	280.6 KHz
EDGE	190	836.6	286.6 KHz

PCS Mode

Modulation type	Channel	Frequency (MHz)	Occupied Bandwidth
GSM/GPRS	661	1880	278.6 KHz
EDGE	661	1880	282.6 KHz
WCDMA	9400	1880	4.4 MHz

A.7. Test Data

See plots on following pages

A.8. Tested By

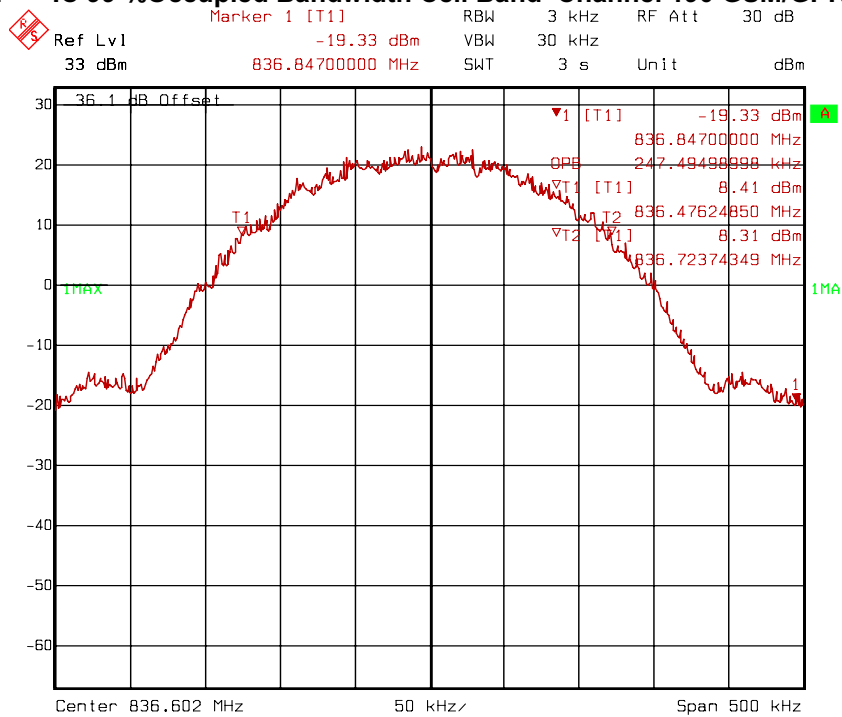
This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Deniz Demirci
Function: Sr Wireless/EMC Technologist

Name: Glen Moore
Function: Wireless/EMC Manager

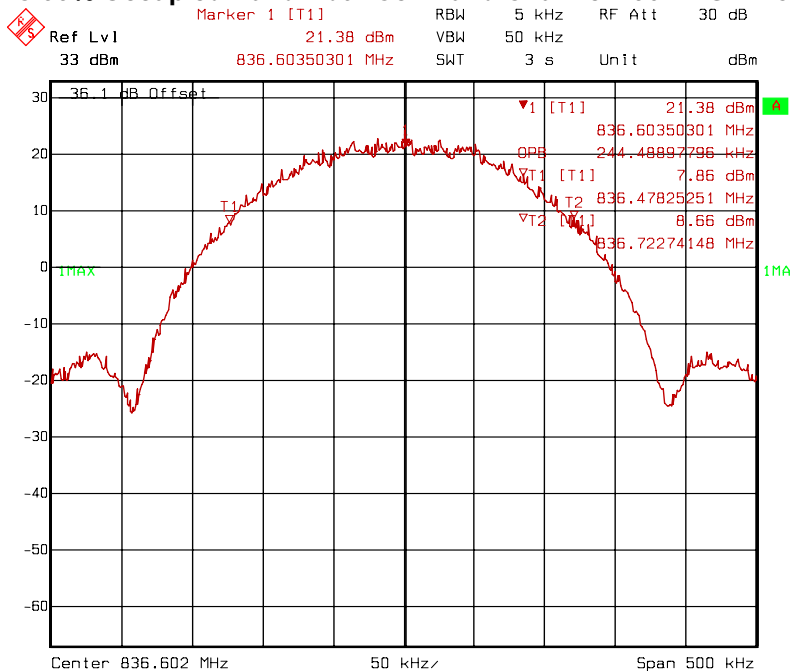
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 1 IC 99 %Occupied Bandwidth Cell Band Channel 190 GSM/GPRS Mode



Comment A: CG 1161 Novatel Wireless MIFI2352
PCS 850 MHz GPRS, 836.6 MHz, Max P
Date: 26.MAR.2009 11:22:00

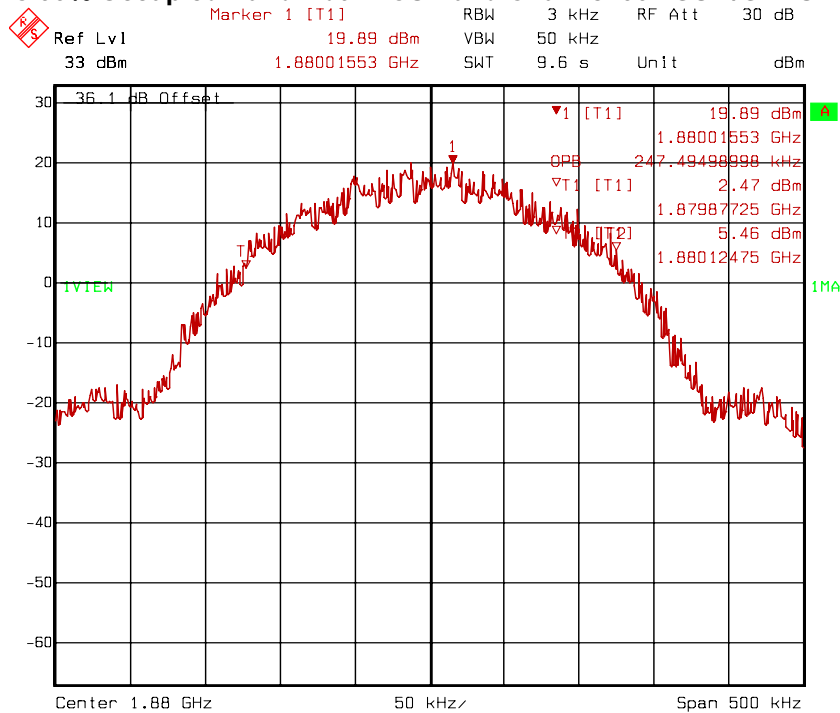
Figure 2 IC 99% Occupied Bandwidth Cell Band Channel 190 EDGE Mode



Comment A: CG 1161 Novatel Wireless MIFI2352
PCS 850 MHz EGPRS, 836.6 MHz, Max P 8PSK
Date: 26.MAR.2009 11:26:34

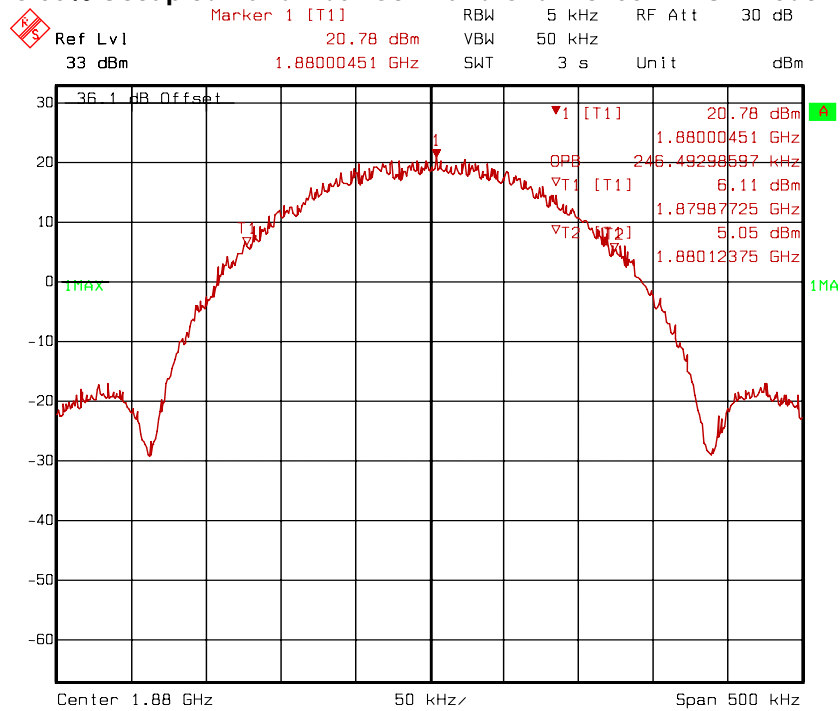
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 3 IC 99% Occupied Bandwidth PCS Band Channel 661 GSM/GPRS Mode



Comment A: CG 1161 Novatel Wireless MIFI2352
PCS 1900 MHz GSM/GPRS, 1880 MHz, Max p
Date: 26.MAR.2009 12:08:14

Figure 4 IC 99% Occupied Bandwidth Cell Band Channel 661 EDGE Mode



Comment A: CG 1161 Novatel Wireless MIFI2352
PCS 1900 MHz EGPRS, 1880 MHz, Max P
Date: 26.MAR.2009 11:06:32

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 5 IC 99 % Occupied Bandwidth PCS Band Channel 9400 WCDMA Mode

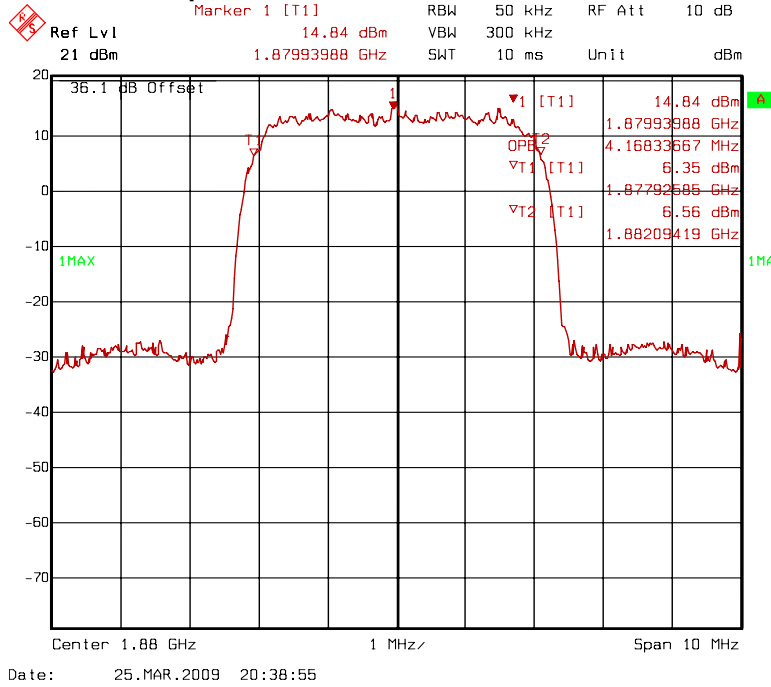
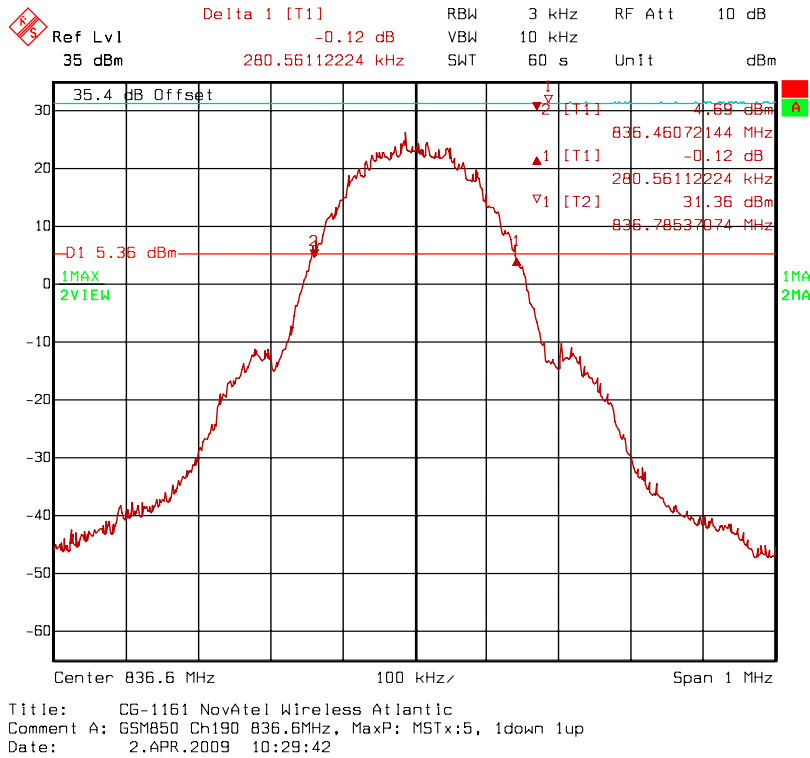
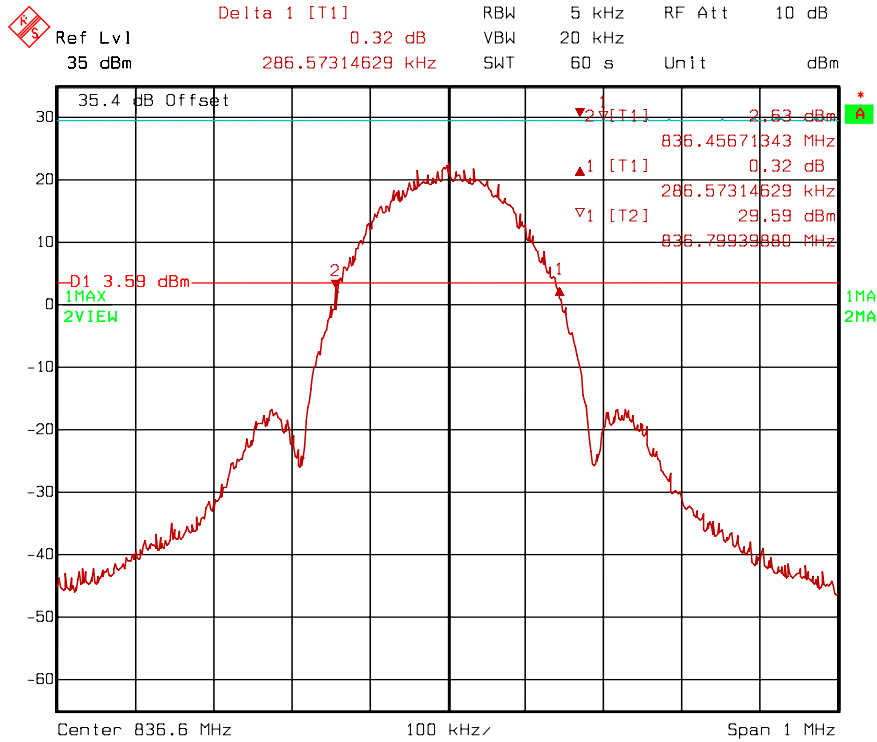


Figure 6 FCC 26 dB Bandwidth Cell Band Channel 190 GSM/GPRS Mode



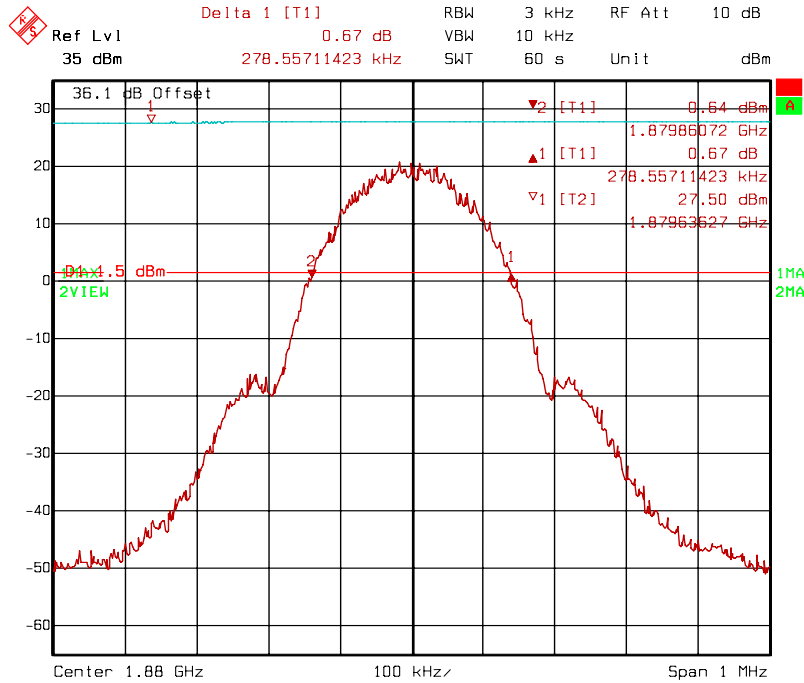
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 7 FCC 26 dB Bandwidth Cell Band Channel 190 EDGE Mode



Title: CG-1161 NovAtel Wireless Atlantic
Comment A: GSM850 Ch190 EGPRS 8PSK 836.6MHz, MaxP: MSTX:5, 1down 1up
Date: 2.APR.2009 11:45:15

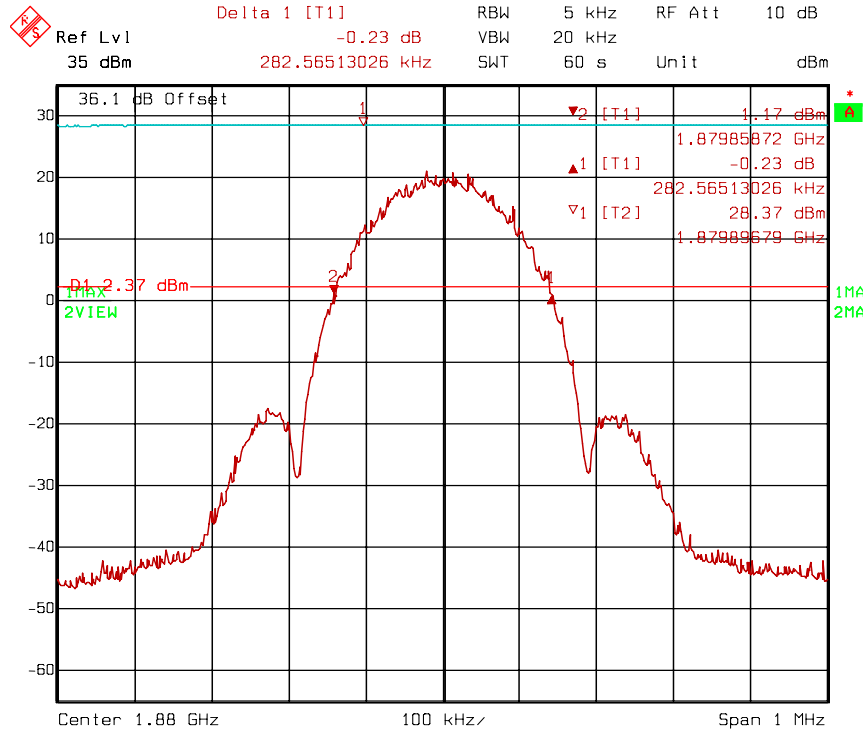
Figure 8 FCC 26 dB Bandwidth PCS Band Channel 661 GSM/GPRS Mode



Title: CG-1161 NovAtel Wireless Atlantic
Comment A: PCS1900 Ch661 GPRS 1880.0MHz, MaxP: MSTx:0, 1down 1up
Date: 2.APR.2009 10:49:25

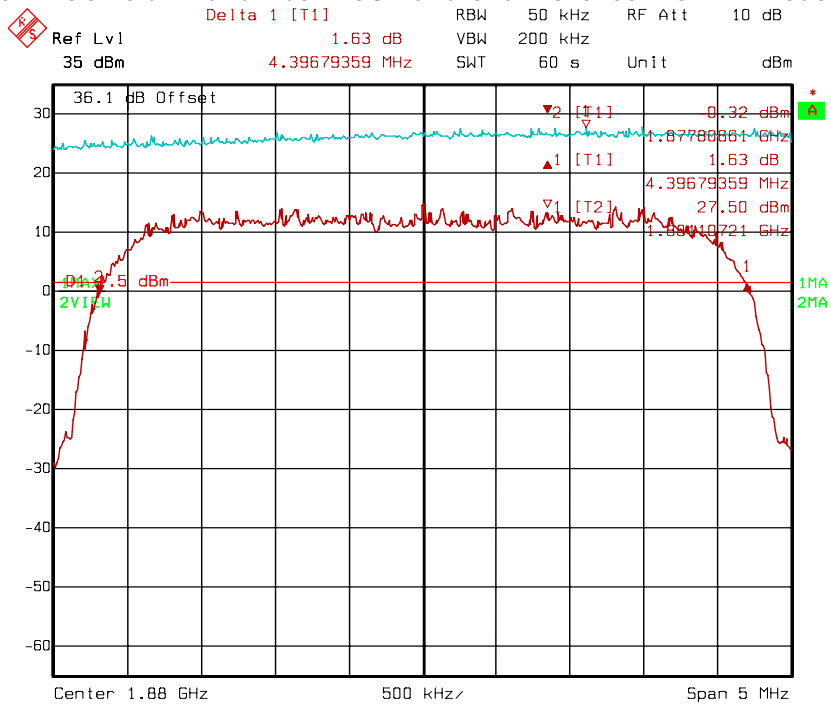
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 9 FCC 26 dB Bandwidth Cell Band Channel 661 EDGE Mode



Title: CG-1161 NovAtel Wireless Atlantic
Comment A: PCS1900 Ch661 EGPRS 8PSK 1880.0MHz, MaxP: MSTX:0, 1down 1up
Date: 2.APR.2009 11:53:50

Figure 10 FCC 26 dB Bandwidth PCS Band Channel 9400 WCDMA Mode



Title: CG-1161 NovAtel Wireless Atlantic
Comment A: WCDMA Ch9400 1880.0MHz, MaxP: All up bits, 12.2k RMC
Date: 2.APR.2009 11:16:33

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX B: RADIATED PEAK POWER OUTPUT

B.1. Base Standard & Test Basis

Base Standards	FCC 2.1046 : Cell Mode: FCC Part 22.913 - PCS Mode: FCC Part 24.232
	Industry Canada: Cell Mode – IC RSS 132, Issue 2 PCS Mode – IC RSS 133, Issue 5
Test Basis	FCC 2.1046
Test Method	TIA/EIA 603 C

B.2. Specifications

Cell Mode

22.913 Effective radiated power limits.

(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.**

PCS Mode

24.232 Power and antenna height limits.

(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.

B.3. Test Method

TIA 603-C-2004 using signal substitution. The carrier signal is maximized for worst case power level and the maximum field strength is recorded. The EUT is replaced with a ½ wave dipole tuned to the frequency of interest driven by a signal source. The signal generator level is adjusted until the field strength level is equal to the field strength measured from the EUT. The signal generator level is recorded and corrected for cable losses and antenna gain to arrive at the final ERP/EIRP value. For all radiated measurements the peak power was reported using the following instrument settings:

GSM/GPRS/EDGE Measurements:

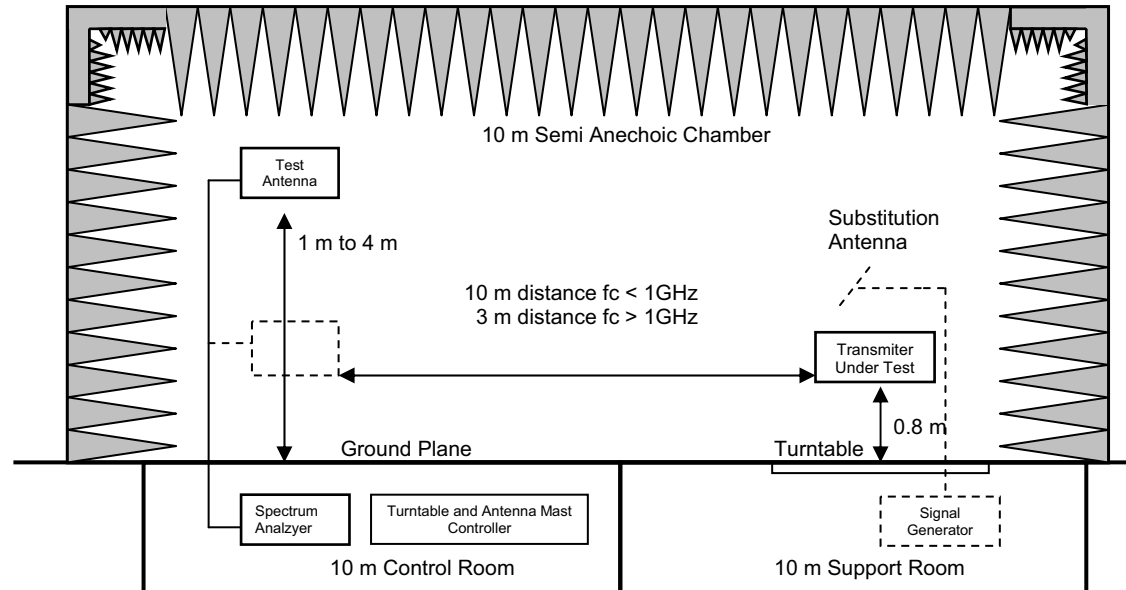
RBW: 1 MHz
VBW: 1 MHz
Detector: Peak

WCDMA Measurements:

RBW: 5 MHz
VBW: 5 MHz
Detector: Peak

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

B.4. Test Setup Diagram



B.5. Operating Mode During Test

The EUT was tested to determine worst case operating modes to produce maximum peak power for the different modulation types. The following modes and associated configurations produced the highest power levels

- WCDMA Mode - HSDPA Active at 12.2 kbps RMC and PC bits set to 1
- 850 GSM/GPRS/Edge Mode - Power control level set to 5, for Edge mode 8PSK Modulation on
- 1900 GSM/GPRS/Edge Mode - Power control level set to 0, for Edge mode 8PSK Modulation on

B.6. Test Results

Compliant – The maximum ERP is 32.57 dbm or 1.81 watts on channel 190 in GPRS Mode
Results are indicated for each channel in the table below

FCC Part 22- 850 MHz Radiated Power Measurement Test Data Summary

GSM850 Channel #		Frequency (MHz)	Measured Field strength @ 10m (dBuV/m)	Substitution Signal generator level (dBm)	Antenna gain (dBd)	Cable Loss (dB)	Measured ERP (dBm)
GPRS	128	824.2	123.12	33.11	-0.10	1.45	31.76
	190	836.6	123.00	33.92	-0.10	1.45	32.57
	251	848.8	122.76	33.57	-0.10	1.45	32.22
EDGE	128	824.2	122.37	32.36	-0.10	1.45	31.01
	190	836.6	121.73	32.65	-0.10	1.45	31.30
	251	848.8	121.42	32.23	-0.10	1.45	30.88

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

B.7. PCS Mode – FCC 24.232 Test Results

Compliant – The maximum EIRP is 32.9 dbm or 1.95 Watts on channel 661 in Edge Mode Mode antenna. This is 0.1 db below the limit. Results for each channel are indicated in the table below

GSM1900 Channel #		Frequency (MHz)	Measured Field strength @ 3m (dBuV/m)	Substitution Signal generator level (dBm)	Antenna gain (dBi)	Cable Loss (dB)	Measured EIRP level (dBm)
GPRS	512	1850.20	131.32	24.39	8.77	1.31	31.85
	661	1880.00	131.70	25.32	8.81	1.32	32.81
	810	1909.80	131.41	25.11	8.85	1.33	32.63
EDGE	512	1850.20	131.70	24.77	8.77	1.31	32.23
	661	1880.00	131.79	25.41	8.81	1.32	32.90
	810	1909.80	130.92	24.62	8.85	1.33	32.14
WCDMA	9262	1852.40	127.21	20.38	8.78	1.31	27.85
	9400	1880.00	128.45	22.07	8.81	1.32	29.56
	9538	1907.60	127.54	21.27	8.84	1.33	28.78

B.8. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Deniz Demerci, Sr Wireless/EMC Specialist

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX C: FREQUENCY STABILITY

C.1. Base Standard & Test Basis

Base Standard	Cell Mode: FCC 22.335 – PCS Mode: FCC 24.235
Test Basis	FCC Part 2.1055
Test Method	FCC Part 2.1055

C.2. Specifications

Cell Mode 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.

Table C-1. - Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed	Mobile >3	Mobile <=3
	(ppm)	watts (ppm)	watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.
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

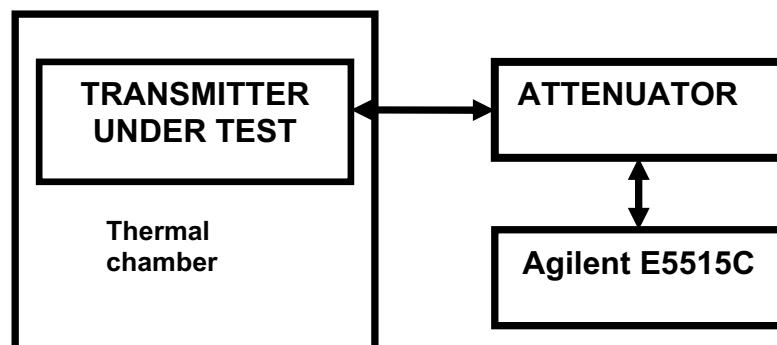
PCS Mode

Sec. 24.235 Frequency stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

C.3. Test Method

The EUT was placed in the thermal chamber and tested at 20 Celsius and increased in 10 degree increments to 50 Celsius and then down to -30 c. After a sufficient time of temperature stabilization the EUT was powered on in standby mode for 1 min, the transmitter was then set to transmit at full rated RF power output and frequency drift was recorded using the appropriate technique in the case of digital modulations. The input voltage was also varied to 115 % nominal and to the battery end operating point.

C.4. Test Setup diagram



The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

C.5. Operating Mode During Test

For all modulation modes and bands the EUT was configured to transmit at maximum RF Power output.

C.6. Test Results

Compliant. The maximum measured frequency drift in cell mode (Part 22 Subpart H – 2.5ppm limit) was -79 Hz. The maximum measured drift in PCS mode was -62 Hz (Part 24 subpart E), sufficient to stay within the frequency block.

PCS Mode Test Results-

PCS WCDMA 1880 MHz			PCS GPRS 1880 MHz		
Temp	Error (Hz)	Error (ppm)	Temp	Error (Hz)	Error (ppm)
21	20	0.01064	21	-64	-0.03404
-30	-41	-0.02181	-30	-44	-0.02340
-20	-49	-0.02606	-20	-65	-0.03457
-10	-47	-0.02500	-10	-76	-0.04043
0	32	0.01702	0	-34	-0.01809
10	-27	-0.01436	10	-13	-0.00691
30	27	0.01436	30	-39	-0.02074
40	30	0.01596	40	-38	-0.02021
50	-56	-0.02979	50	-79	-0.04202
Voltage			Voltage		
4.26	35	0.01862	4.26	-56	-0.02979
3.44	32	0.01702	3.44	-42	-0.02234

Note: 3.44 volts was the battery end operating point

GSM850 GPRS 836.6 MHz		
Temp	Error (Hz)	Error (ppm)
21	-24	-0.02869
-30	-26	-0.03108
-20	-18	-0.02152
-10	-62	-0.07411
0	28	0.03347
10	-27	-0.03227
30	-25	-0.02988
40	-38	-0.04542
50	-31	-0.03705
Voltage Variation		
4.26	-35	-0.04184
3.44	-40	-0.04781

Note: 3.44 Volts was the battery end operating point

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

C.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1;
Quality Manual

Spencer Watson, EMC Specialist

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

APPENDIX D: TX CONDUCTED SPURIOUS EMISSIONS

D.1. Base Standard & Test Basis

Base Standard	Cell Mode: FCC Part 22.917 - PCS Mode: FCC Part 24.238
Test Basis	FCC 2.1051
Test Method	FCC 2.1051

D.2. Specifications

Cell Mode:

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 100 kHz or greater. 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.* 100 kHz 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.

PCS Mode:

24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(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.

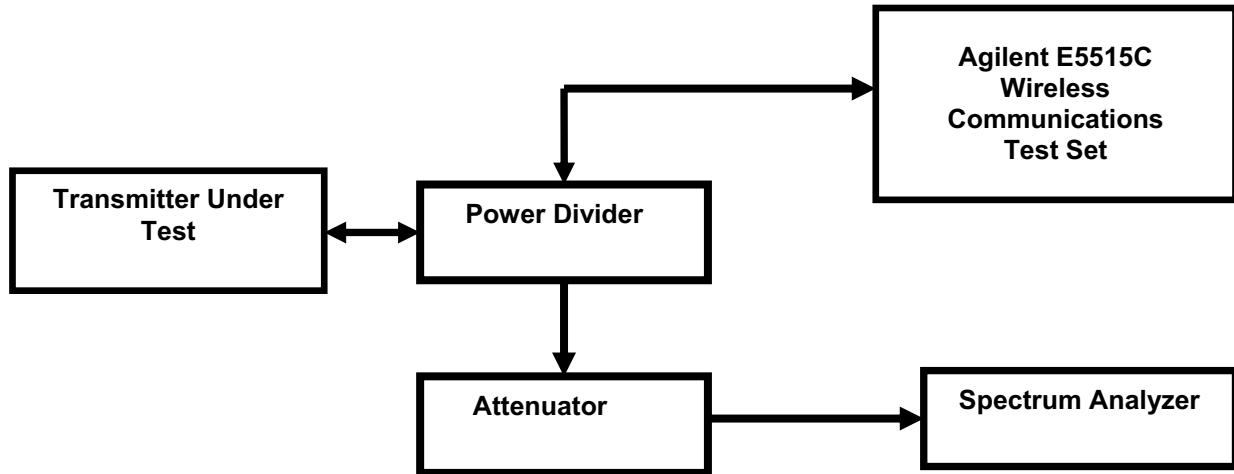
(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission 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

D.3. Test Method

The EUT was connected to a spectrum analyzer via a calibrated cable and attenuator assembly. Testing was done with the EUT operating in all modes at highest power level available and on low, mid and high channels with the worst case configurations being reported. All reported emissions are corrected for cable and attenuator losses.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

D.4. Test Setup Diagram



D.5. Test Results Summary

Compliant see plots on following pages and summary tables below

Cell Band

Channel	Mode	Note	Emission Frequency (MHz)	Level (dbm)	Limit (dbm)	Margin (db)
128	GPRS	Lower band edge	823.98	-13.02	-13	.02
251	GPRS	Upper band edge	849.02	-13.28	-13	.28
128	EDGE	Lower band edge	823.97	-19.55	-13	6.55
251	EDGE	Upper band edge	849.02	-17.45	-13	3.45

Note: The above are the worst case measurements, no other reportable emissions were detected in any of the modes. Therefore for spurious emissions noise floor readings are reported along with plots of the EUT operating at highest power mode

PCS Band

Channel	Mode	Note	Emission Frequency (MHz)	Level (dbm)	Limit (dbm)	Margin (db)
512	GPRS	Lower band edge	1849.97	-16.75	-13	3.75
810	GPRS	Upper band edge	1910.02	-16.69	-13	3.69
512	GSM	Lower band edge	1849.98	-21.12	-13	8.12
810	GSM	Upper band edge	1910.02	-21.2	-13	8.2
9262	WCDMA	Lower band edge	1850.00	-21.29	-13	8.3
9538	WCDMA	Upper band edge	1910.00	-21.61	-13	8.6

Note: The above are the worst case measurements, no other reportable emissions were detected in any of the modes. Therefore for spurious emissions noise floor readings are reported along with plots of the EUT operating at highest power mode

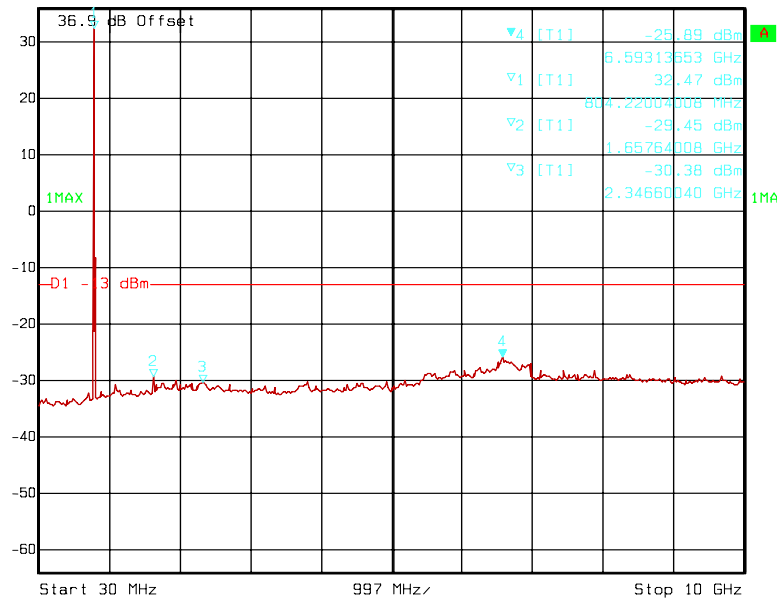
D.6. Test Data

See following pages for plots of band edge for all modes and spurious data to the 10th harmonic. To reduce file size only worst case data has been provided for conducted spurious to 10th harmonic.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

GSM 850 GPRS Mode Channel 128

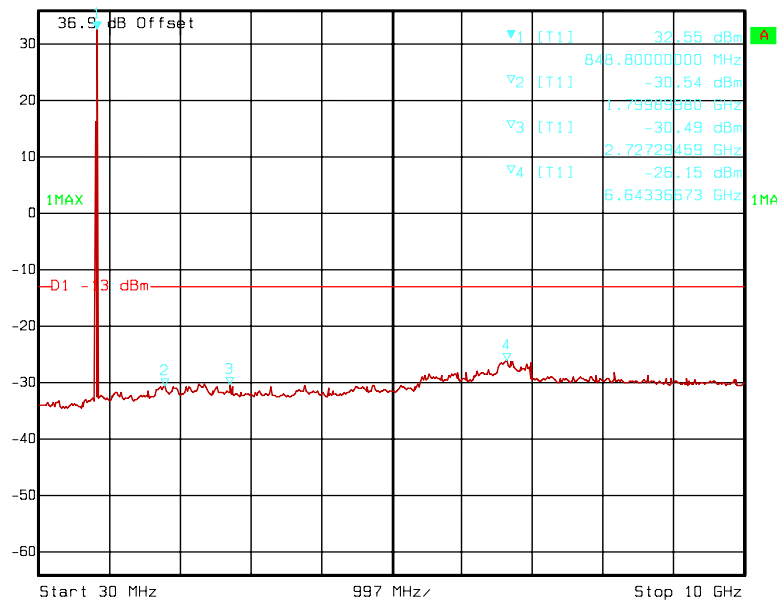
Marker 4 [T1] RBW 1 MHz RF Att 10 dB
 Ref Lvl -25.89 dBm VBW 3 MHz
 36 dBm 6.59313653 GHz SWT 600 s Unit dBm



Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: GSM850 Ch128 GPRS, 824.2MHz, Max Power: MSTx:5, 1down 1up
 Date: 23.MAR.2009 12:25:13

GSM 850 EGPRS Mode Channel 251

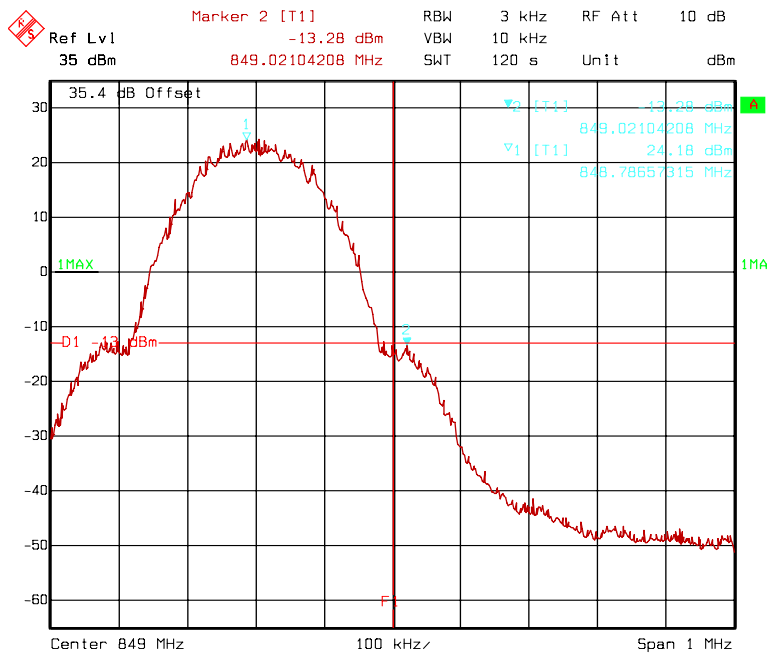
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
 Ref Lvl 32.55 dBm VBW 3 MHz
 36 dBm 848.80000000 MHz SWT 600 s Unit dBm



Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: GSM850 Ch251 EGPRS(EDGE), 848.8MHz, Max Power: MSTx:5, 1down 1up
 Date: 23.MAR.2009 13:19:28

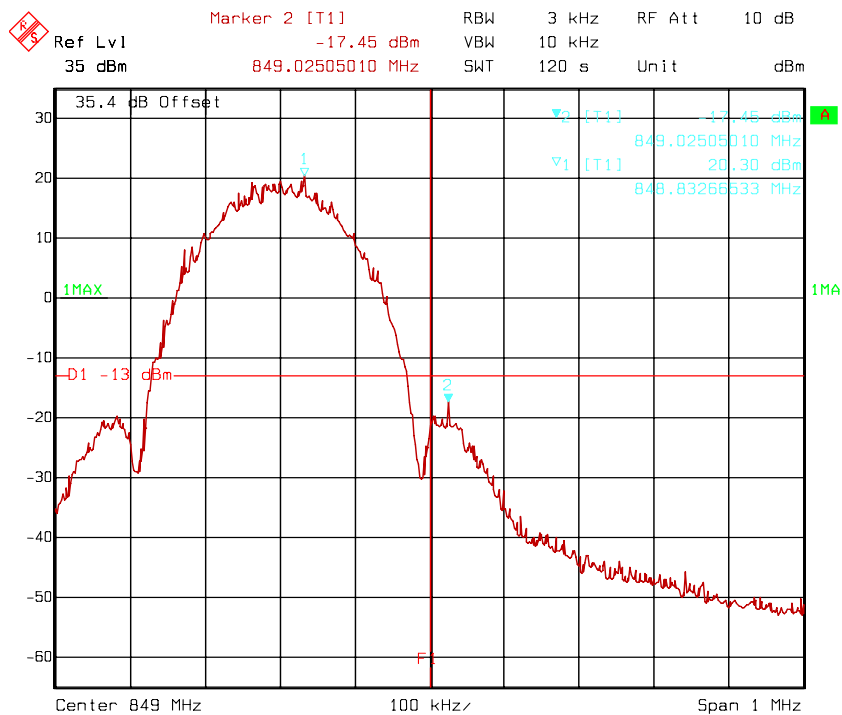
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

GSM 850 GPRS Mode Channel 251 Upper Band Edge



Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: GSM850 Ch251 GPRS ,848.8MHz,Max Power:MSTx:5 ,1down 1up
 Date: 23.MAR.2009 19:24:56

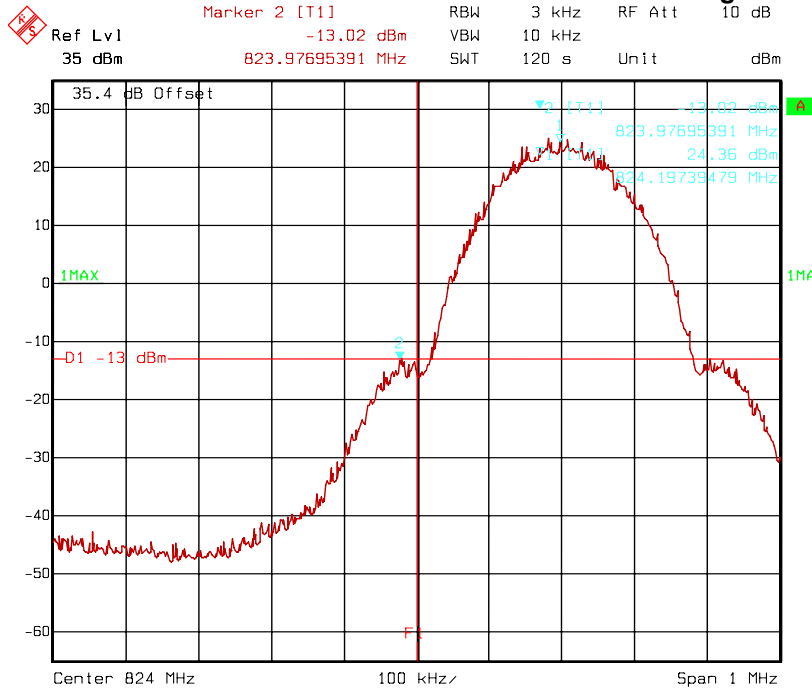
GSM 850 EGPRS Mode Channel 251 Upper Band Edge



Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: GSM850 Ch251 EGPRS 8PSK, 848.8MHz, MaxP:MSTx:5, 1down 1up
 Date: 24.MAR.2009 14:19:02

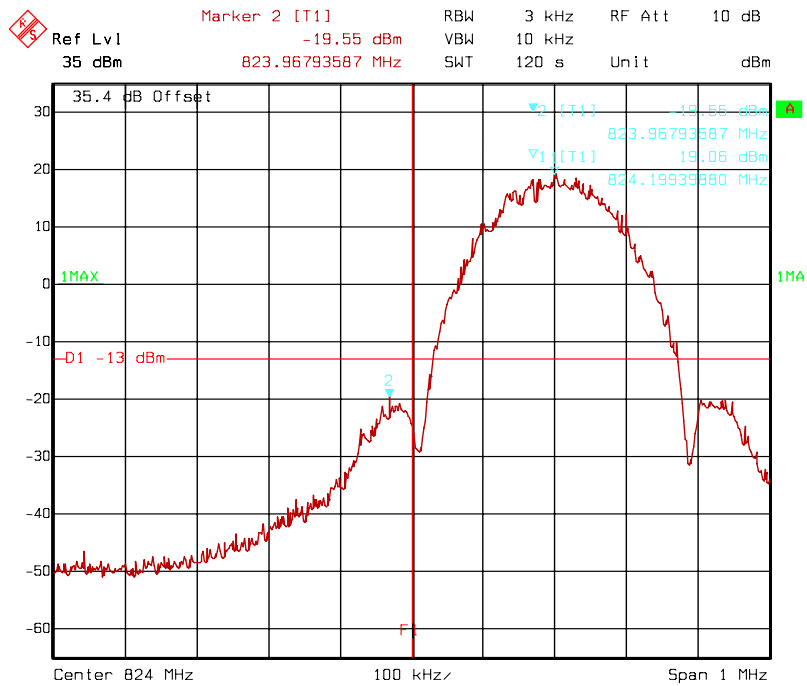
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

GSM 850 GPRS Mode Channel 128 Lower Band Edge



Title: CG-1161 NovAtel Wireless Atlantic
Comment A: GSM850 Ch128 GPRS ,824.2MHz,Max Power:MSTx:5 ,1down 1up
Date: 23.MAR.2009 19:06:18

GSM 850 EGPRS Mode Channel 128 Lower Band Edge



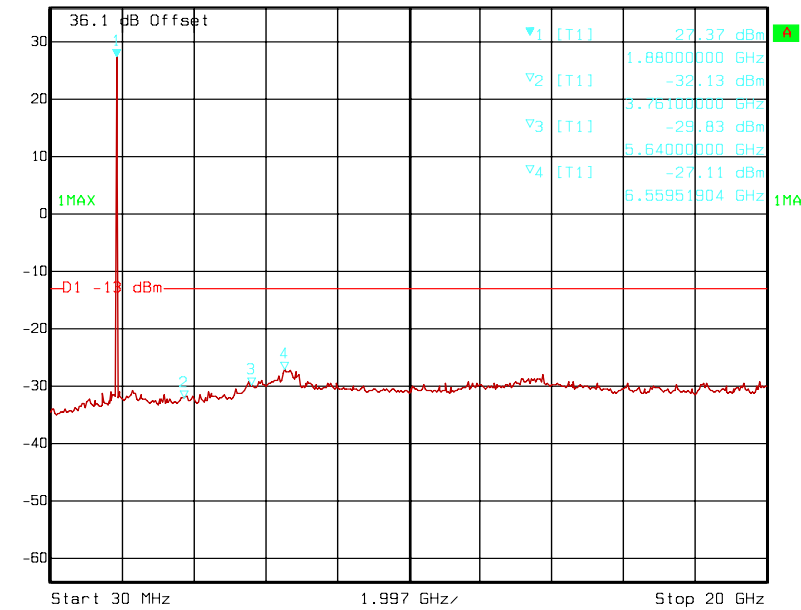
Title: CG-1161 NovAtel Wireless Atlantic
Comment A: GSM850 Ch128 EGPRS 8PSK, 824.2MHz, MaxP:MSTx:5, 1down 1up
Date: 24.MAR.2009 14:12:33

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

PCS GPRS Mode Channel 661

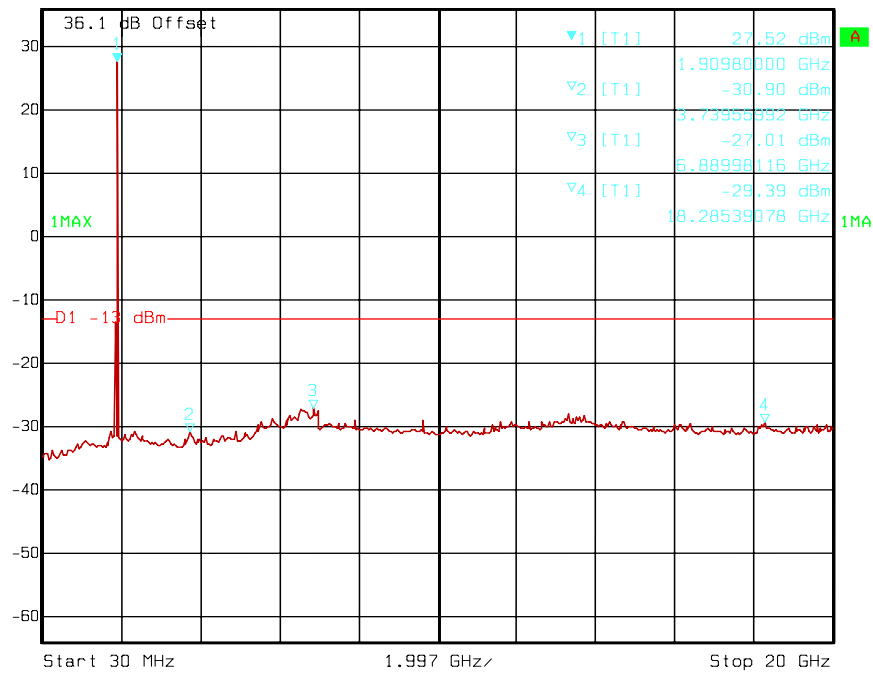
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 27.37 dBm VBW 3 MHz
36 dBm 1.88000000 GHz SWT 600 s Unit dBm



Title: CG-1161 NovAtel Wireless Atlantic
Comment A: PCS Ch661 GPRS, 1880MHz, Max Power: MSTx:0, 1down 1up
Date: 23.MAR.2009 14:39:14

PCS EGPRS Mode Channel 810

Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 27.52 dBm VBW 3 MHz
36 dBm 1.90980000 GHz SWT 600 s Unit dBm

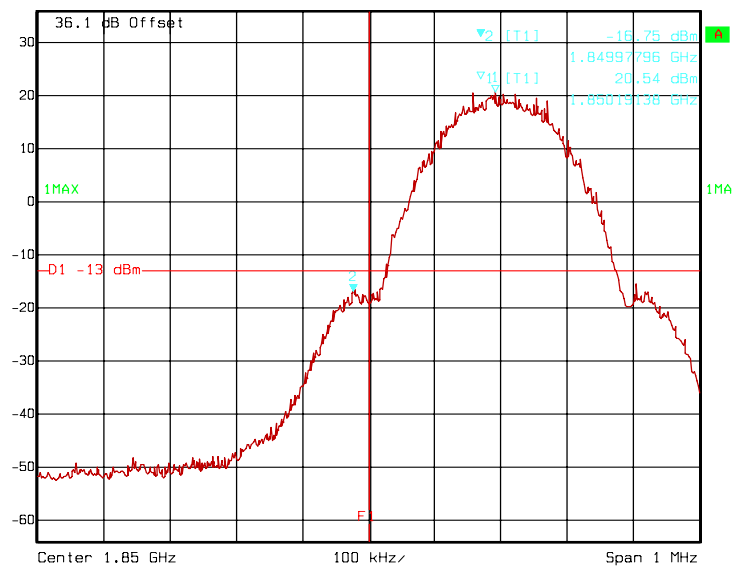


Title: CG-1161 NovAtel Wireless Atlantic
Comment A: PCS Ch810 EGPRS(EDGE), 1909.8MHz, Max Power: MSTx:0, 1down 1up
Date: 23.MAR.2009 15:39:27

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

PCS GPRS Mode Channel 512 Lower Band Edge

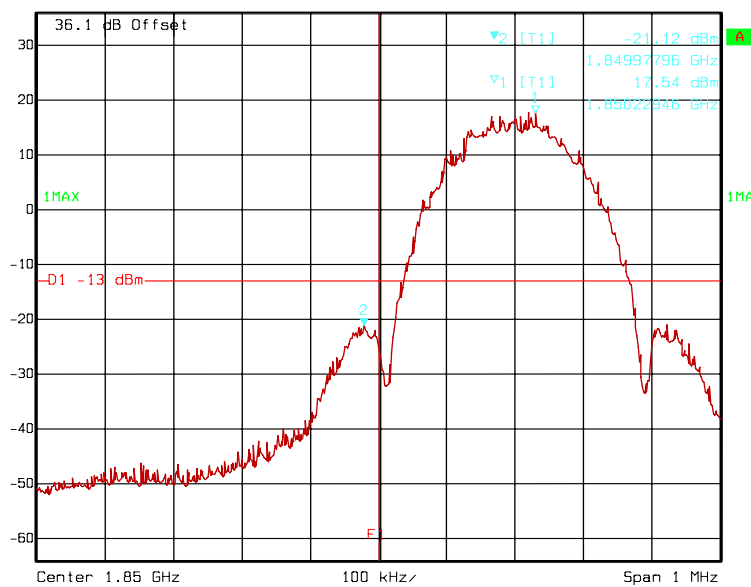
▶ ▶ Marker 2 [T1] RBW 3 kHz RF Att 10 dB
 Ref Lvl -16.75 dBm VBW 10 kHz
 36 dBm 1.84997796 GHz SWT 120 s Unit dBm



Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: PCS1900 Ch512 GPRS, 1850.2MHz, Max Power:MSTx:0, 1down 1up
 Date: 24.MAR.2009 9:04:15

PCS 512 EGPRS Mode Channel 512 Lower Band Edge

▶ ▶ Marker 2 [T1] RBW 3 kHz RF Att 10 dB
 Ref Lvl -21.12 dBm VBW 10 kHz
 36 dBm 1.84997796 GHz SWT 120 s Unit dBm

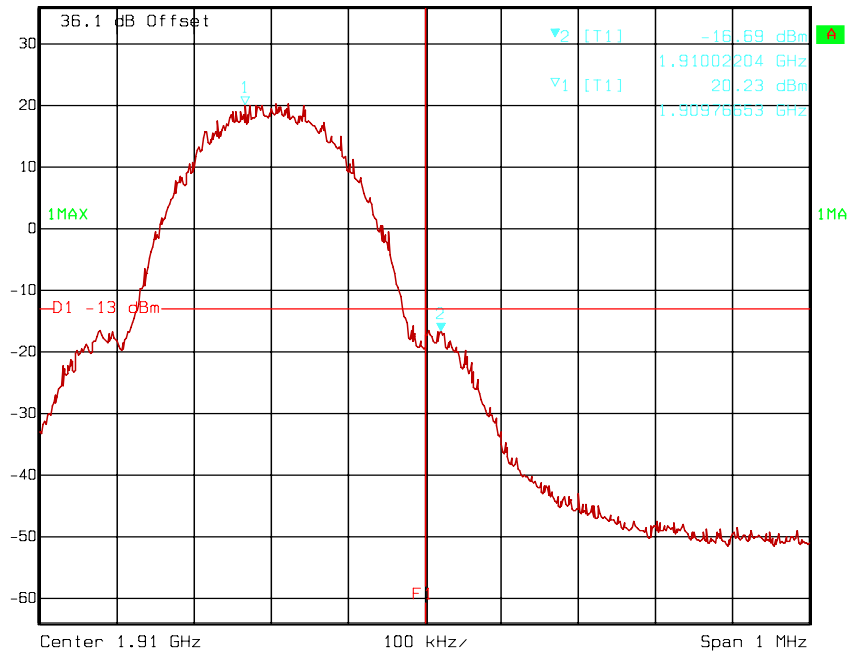


Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: PCS1900 Ch512 EGPRS, 1850.2MHz, Max Power:MSTx:0, 1down 1up
 Date: 24.MAR.2009 9:58:39

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

PCS GPRS Mode Channel 810 Upper Band Edge

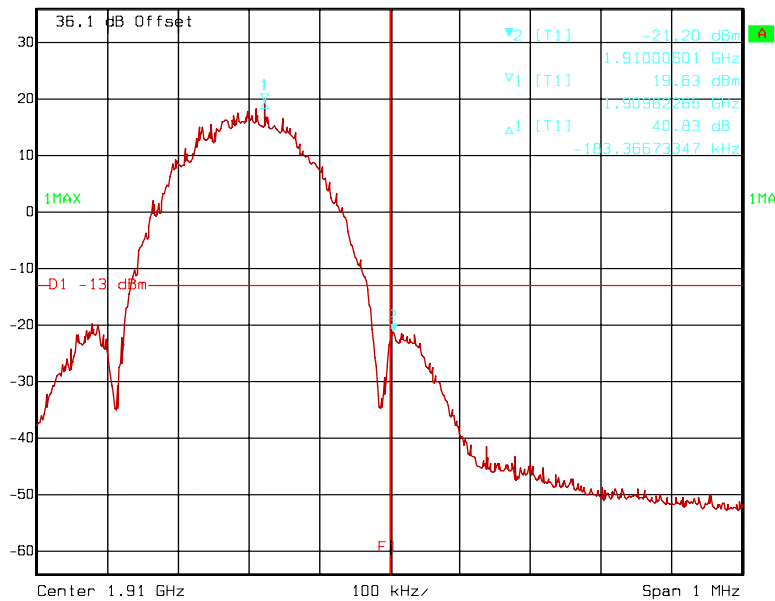
M
S
 Ref Lvl 36 dBm
 Marker 2 [T1] -16.69 dBm
 RBW 3 kHz RF Att 10 dB
 VBW 10 kHz
 1.91002204 GHz
 SWT 120 s Unit dBm



Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: PCS1900 Ch810 GPRS, 1909.8MHz, Max Power:MSTx:0, 1down 1up
 Date: 24.MAR.2009 9:50:28

PCS EGPRS Mode Channel 810 Upper Band Edge

M
S
 Ref Lvl 36 dBm
 Marker 2 [T1] -21.20 dBm
 RBW 3 kHz RF Att 10 dB
 VBW 10 kHz
 1.91000601 GHz
 SWT 120 s Unit dBm

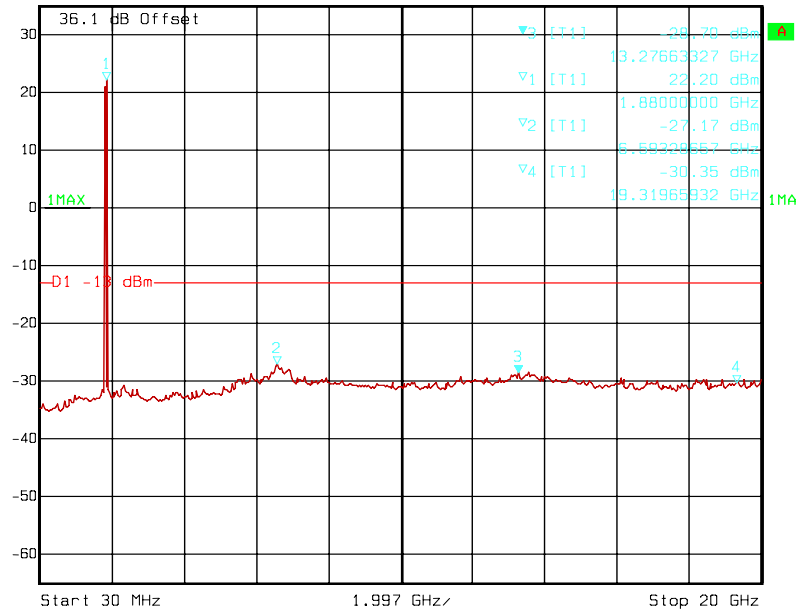


Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: PCS1900 Ch810 EGPRS, 1909.8MHz, Max Power:MSTx:0, 1down 1up
 Date: 24.MAR.2009 9:54:22

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

PCS WCDMA Mode Channel 9400

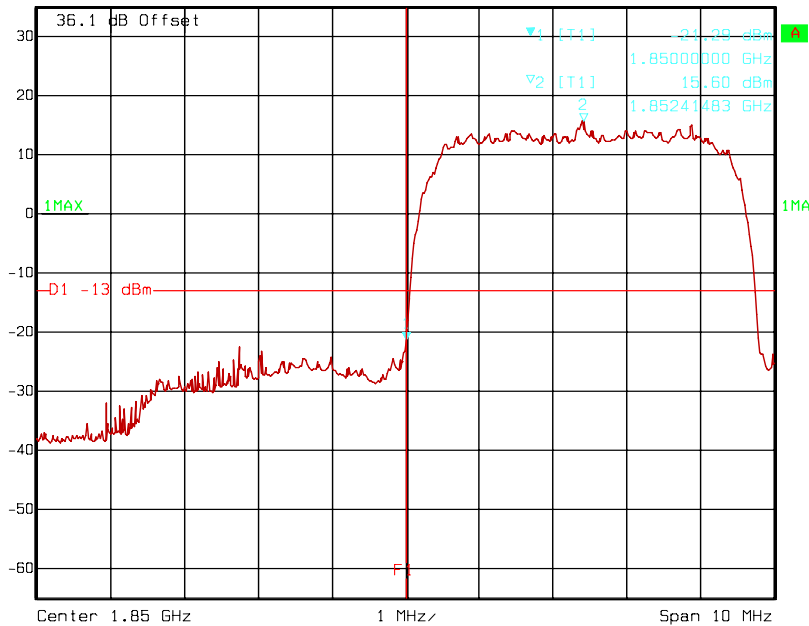
K/S
 Ref Lvl 35 dBm
 Marker 3 [T1] -28.70 dBm
 13.27663327 GHz
 RBW 1 MHz RF Att 10 dB
 VBW 3 MHz
 SWT 600 s Unit dBm



Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: WCDMA Ch9400, 1880MHz, MaxP:All up bits, 12.2k RMC
 Date: 24.MAR.2009 19:24:23

PCS WCDMA Mode Channel 9262 Lower Band Edge

K/S
 Ref Lvl 35 dBm
 Marker 1 [T1] -21.29 dBm
 1.85000000 GHz
 RBW 50 kHz RF Att 10 dB
 VBW 200 kHz
 SWT 120 s Unit dBm

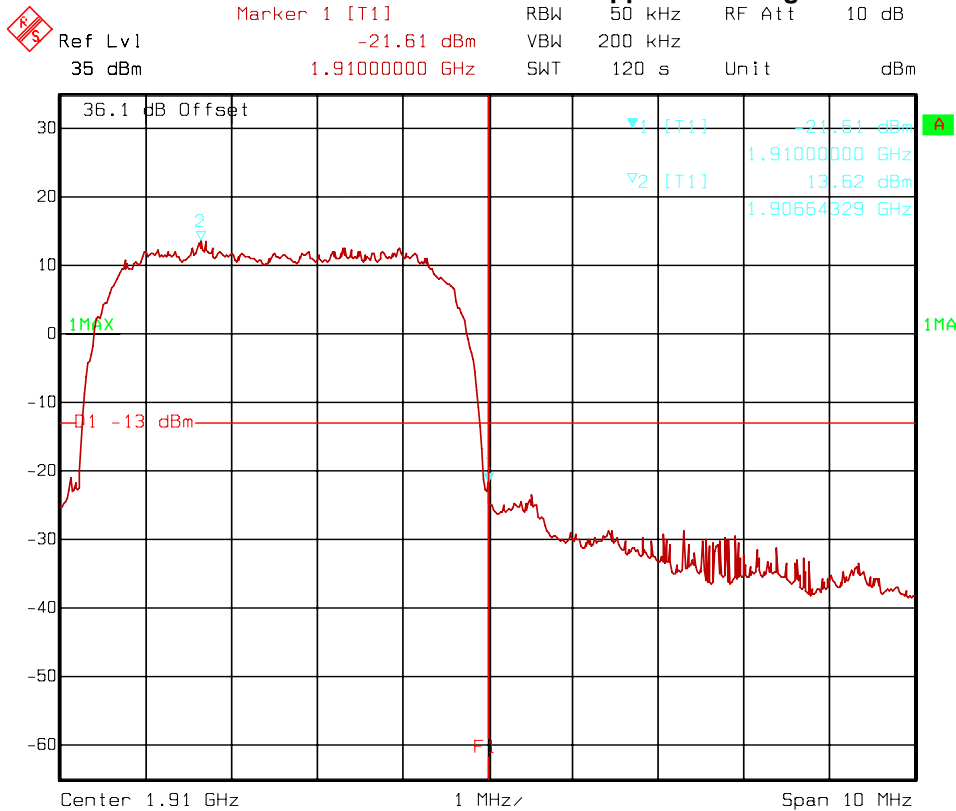


Title: CG-1161 NovAtel Wireless Atlantic
 Comment A: WCDMA Ch9262, 1852.4MHz, MaxP:All up bits, 12.2k RMC
 Date: 24.MAR.2009 17:34:09

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970

PCS WCDMA Mode Channel 9538 Upper Band Edge



Title: CG-1161 Novatel Wireless Atlantic
Comment A: WCDMA Ch9538, 1907.6MHz, MaxP:All up bits, 12.2k RMC+HSDPA
Date: 24.MAR.2009 17:46:04

D.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Deniz Demirci
Function: Senior EMC/Wireless Technologist

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX E: TX/RX RADIATED SPURIOUS EMISSIONS 30 MHZ – 20 GHZ

E.1. Base Standard & Test Basis

Base Standard	Cell Mode: FCC Part 22.917 - PCS Mode: FCC Part 24.238, RSS 129/133 (RSS GEN for Receiver Spurious emissions)
Test Basis	FCC 2.1053
Test Method	TIA/EIA 603-C

E.2. Specifications

TX Spurious emissions

Cell Mode:

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 100 kHz or greater. 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.* 100 kHz 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.

PCS Mode:

24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(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

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

RSS Gen Receiver Spurious Emissions:

The following receiver spurious emission limits shall be complied with:

If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

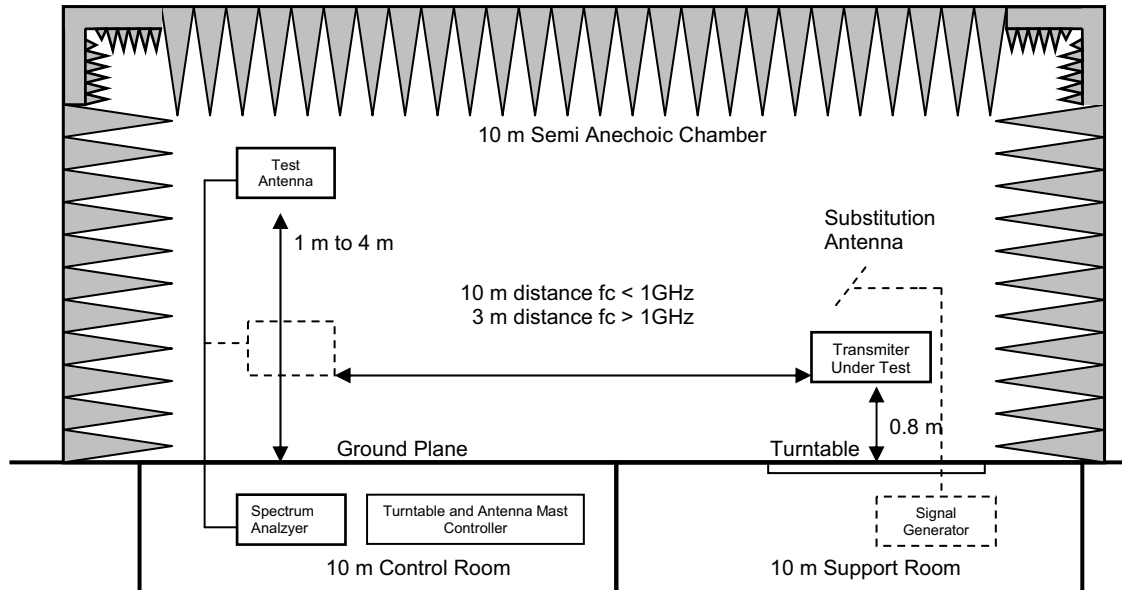
E.3. Test Method (Transmitter Spurious Emissions)

TIA 603-C-2004 using signal substitution. The carrier signal is maximized for worst case power level and the maximum field strength is recorded. The EUT is replaced with a ½ wave dipole tuned to the frequency of interest driven by a signal source. The signal generator level is adjusted until the field strength level is equal to the field strength measured from the EUT. The signal generator level is recorded and corrected for cable losses and antenna gain to arrive at the final ERP/EIRP value. For all radiated measurements the peak power was reported using the following instrument settings:

SA Settings:

RBW: 1 MHz
VBW: 3 MHz
Detector: Peak

E.4. Test Setup Diagram



E.5. Operating Mode During Test

The EUT was tested to determine worst case operating modes to produce maximum peak spurious emissions for the different modulation types. The following modes and associated configurations produced the highest power levels and spurious levels. The worst case results are reported in tables in section D.7

- WCDMA Mode - HSDPA Active at 12.2 kbps RMC and PC bits set to 1
- 850 GSM/GPRS/Edge Mode - Power control level set to 5, for Edge mode 8PSK Modulation on
- 1900 GSM/GPRS/Edge Mode - Power control level set to 0, for Edge mode 8PSK Modulation on

For Receiver spurious emissions the EUT was operated in all receive modes

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

E.6. Test Results

No Transmitter spurious emissions were detected within 20 dB of the limit in any operating mode or band. For Receiver spurious emissions the EUT was scanned and no emissions were detected. Detected emissions in transmit mode are reported below.

850 MHz Cell Band – GPRS Mode

Channel 251 GPRS	Frequency	Polarization	Measured level / Noise floor (dBuV/m)	Substitution signal generator level (dBm)	Substitute antenna gain (dBi)	Cable loss (dB)	EIRP level (dBm)	Limit (dBm)	Margin (dB)
	1697.60	H-pol	55.34	-51.41	8.54	1.25	-44.12	-13.00	31.12
	1697.60	V-pol	44.99	-61.85	8.54	1.25	-54.56	-13.00	41.56
	2546.40	H-pol	57.89	-49.34	9.56	1.58	-41.36	-13.00	28.36
	2546.40	V-pol	48.51	-58.85	9.56	1.58	-50.87	-13.00	37.87
	3395.20	Noise	40.52	-66.38	9.93	1.89	-58.34	-13.00	45.34
	4244.00	Noise	42.72	-64.50	10.28	2.17	-56.39	-13.00	43.39
	5092.80	H-pol	50.09	-55.93	11.17	2.39	-47.15	-13.00	34.15
	5092.80	V-pol	46.98	-60.57	11.17	2.39	-51.79	-13.00	38.79
	5941.60	H-pol	46.17	-60.44	11.66	2.59	-51.37	-13.00	38.37
	6790.40	Noise	45.96	-60.71	11.97	2.76	-51.50	-13.00	38.50
	7639.20	Noise	47.13	-58.91	11.63	2.92	-50.20	-13.00	37.20
8488.00	Noise	48.98	-57.59	11.46	3.04	-49.17	-13.00	36.17	

PCS Band – EGPRS Mode

Channel 661 EGPRS	Frequency	Polarization	Measured level / Noise floor (dBuV/m)	Substitution signal generator level (dBm)	Substitute antenna gain (dBi)	Cable loss (dB)	EIRP level (dBm)	Limit (dBm)	Margin (dB)
	3760.00	H-pol	52.89	-53.77	9.98	2.02	-45.81	-13.00	32.81
	3763.00	V-pol	51.48	-55.32	9.98	2.02	-47.36	-13.00	34.36
	5640.00	H-pol	50.36	-55.83	11.51	2.52	-46.84	-13.00	33.84
	5640.00	V-pol	47.07	-60.71	11.51	2.52	-51.72	-13.00	38.72
	7520.00	H-pol	47.00	-59.61	11.71	2.89	-50.79	-13.00	37.79
	7520.00	V-pol	50.46	-56.77	11.71	2.89	-47.95	-13.00	34.95
	9400.00	H-pol	59.10	-48.24	11.76	3.21	-39.69	-13.00	26.69
	9400.00	V-pol	59.68	-48.01	11.76	3.21	-39.46	-13.00	26.46
	11280.00	H-pol	62.33	-45.29	12.90	3.68	-36.07	-13.00	23.07
	11280.00	V-pol	64.33	-43.19	12.90	3.68	-33.97	-13.00	20.97
	13160.00	H-pol	62.77	-43.01	12.95	3.91	-33.97	-13.00	20.97
	15040.00	H-pol	53.47	-54.09	13.57	4.10	-44.62	-13.00	31.62
	16920.00	H-pol	53.51	-55.02	13.96	4.34	-45.40	-13.00	32.40
	18800.00	H-pol	54.30	-49.22	9.68	4.48	-44.02	-13.00	31.02

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

PCS Band WCDMA Mode

	Frequency	Polarization	Measured level / Noise floor (dBuV/m)	Substitution signal generator level (dBm)	Substitute antenna gain (dBi)	Cable loss (dB)	EIRP level (dBm)	Limit (dBm)	Margin (dB)
Channel 9262	3815.2	H-pol	43.96	-62.42	9.98	2.04	-54.48	-13	41.48
	5722.8	Noise	45.22	-61.15	11.55	2.54	-52.14	-13	39.14
	7630.4	Noise	46.71	-60.06	11.64	2.91	-51.33	-13	38.33
	9538.0	H-pol	48.21	-58.66	11.85	3.25	-50.06	-13	37.06
	11445.6	Noise	41.21	-65.43	12.93	3.70	-56.20	-13	43.20
	13353.2	Noise	40.88	-65.93	12.65	3.95	-57.23	-13	44.23
	15260.8	Noise	41.88	-66.27	14.27	4.13	-56.13	-13	43.13
	17168.4	Noise	42.82	-63.98	12.97	4.36	-55.37	-13	42.37
	19076.0	Noise	50.22	-55.23	9.80	4.50	-49.93	-13	36.93

E.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Deniz Demirci
Function: EMC Tester

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

APPENDIX F: TEST EQUIPMENT LIST

Manufacturer	Type/Model		Serial #	Cal Due	Cal Date
Test Receiver	Rohde & Schwarz	ESMI	CG0433 CG0434	02APR09	02APR08
Bilog Antenna	Teseq	CBL 6112D	CG1177	10OCT09	10OCT07
HPIB Extender	HP	37204	CG0181	N/A	N/A
Mast Controller	EMCO	2090	CG0179	N/A	N/A
Turntable Controller	EMCO	2090	CG0178	N/A	N/A
Digital Barometer / Thermometer	Cole-Parmer	1870	CG0728	30JUN09	30JUN08
Attenuator 40 dB 25 Watts	Pasternack	PE7017-40	CG0497	N/A	N/A
RF Termination, 50 Ohm	Huber + Suhner	65 I-50-0-17	N/A	N/A	N/A
Power Meter	Agilent	E4418B	CG0119	29JUL09	29JUL08
Power Meter Sensor	HP	8481A	CG0264	29JUL09	29JUL08
Temperature Chamber	Thermotron	SM-8C	CG0836	NA	NA
Data Logger	Fluke	2620A	CG0215	29JAN09	9OCT07
DC Power Supply	HP	6296A	CG0218	N/A	N/A
Multimeter	Fluke	Fluke 87	CG0383	12FEB10	12FEB09
Attenuator	Weinschel	30 dB	CG0751	N/A	N/A
Horn Antenna (RX)	EMCO	3115	CG0368	23AUG09	23AUG07
Horn Antenna (TX) 1 GHz – 18 GHz	EMCO	3115	CG0103	06MAR09	06MAR11
Standard Gain Horn (Rx) 18 GHz – 26.5 GHz	EMCO	3160-09	CG0075	N/A	N/A
High pass filter F > 1000 MHz	MicroTronics	HPM14576	CG0963	N/A	N/A
High pass filter F > 2800 MHz	MicroTronics	HPM50111	CG0964	N/A	N/A
LNA 1 GHz - 18 GHz	Miteq	JSD00121	CG0317	N/A	N/A
LNA 18 GHz - 26.5 GHz	Miteq	JSD00119	CG0482	N/A	N/A
Spectrum Analyzer 9 kHz – 40 GHz	Rohde & Schwarz	FSEK-20	CG0118	01JUL09	01JUL08
LNA DC Power Supply	Xantrex	LXO 30-2	CG0493	N/A	N/A
HPIB Extender	HP	37204	CG0110	N/A	N/A
Turntable and Mast Controller	EMCO	2090	CG0161	N/A	N/A
Agilent Wireless Communications test set	Agilent	E5515C	R-CG1254	27NOV10	27NOV08
Dipole Antenna Set	EMCO	3121C	CG-0104	18FEB10	18FEB09

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

END OF DOCUMENT

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

NTS Product Integrity Laboratory, 5151-47th Street N.E. Tel: 403-568-6605, Fax: 403-568-6970