



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

Novatel Wireless Inc
MiFi-2372R

FCC ID # NBZNRM-MIFI2372R
IC ID # 3229A-MIFI2372R
Project Code CG-1436
(Report CG-1436-RA-1-3)
Revision: 3
(This report supersedes CG-1436-RA-1-2)

February 16, 2010

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Test Facility:	National Technical Systems, Canada Product Integrity Laboratory 5151-47 th Street, N.E. Calgary Alberta T3J 3R2
Accreditation Numbers:	0214.22 Electrical 0214.23 Mechanical Accredited by A2LA The American Association for Laboratory Accreditation CLIENTS SERVED: All interested parties FIELDS OF TESTING: Electrical/Electronic, Mechanical/Physical ACCREDITATION DATE:: May 14, 2009 VALID TO: February 28, 2010
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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	2.1049/22.917	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

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Register of revisions

Revision	Date	Description of Revisions
1	January 22, 2010	Released for customer review
2	February 8, 2010	Changes after TCB review
3	February 16, 2010	Changes after TCB review

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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 2372R 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 2372R also has 802.11 b/g capability for which compliance test data is shown in report CG-1436-RA-2-1

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision / Description	Serial Number
EUT	MiFi 2372R	NRM-MIFI2372R	HW Rev G1	00101800-026433-4
	Power supply with Fair-Rite Part# 0461164281	KTEC KSAA0500120W 1UV-1	Input: 100-240VAC 50/60 Hz Output: 5.0V 1.2A	N/A
	Note: See section 2.2 which describes the sample variants			
Classification	Mobile			
TX Operating Frequency Range	GSM 850 824.2 - 848.8 MHz WCDMA Band V: 826.4 – 846.6 MHz PCS 1900 1850.2 -1909.8 MHz WCDMA Band II: 1852.4 -1907.6 MHz			
RX Operating Frequency Range	GSM 850 869.2 - 893.8 MHz WCDMA Band V: 871.4 – 891.6 MHz PCS 1900 1930.2 - 1989.8 MHz WCDMA Band II: 1932.4 – 1987.6 MHz			
Maximum Output Power	Cell band 1.16 Watts ERP in GSM 850 GPRS Mode Cell band 0.84 Watts ERP in GSM 850 EGPRS Mode Cell band 0.23 Watts ERP in WCDMA (Band V) Mode PCS band 1.64 Watts EIRP in PCS 1900 GPRS Mode PCS band 1.93 Watts EIRP in PCS 1900 EGPRS Mode PCS band 0.66 Watts EIRP in WDCMA (Band II) Mode			
Antenna Type/Gain	Manufacturer: See separate exhibit Peak Gain: 1.88 dBi for 850 MHz band 2.60 dBi for 1900 MHz band			

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Functional description	The equipment under test (EUT) is the MIFI2372R, a quad-band (850/900/1800/1900) GSM/GPRS, tri-band (850/1900/2100) WCDMA/HSPA diversity USB WWAN modem. The diversity support is in the 850, 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
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, 3.55 VDC end operating point
Voltage/current into final amplifier stage	The PAs are calibrated at a PA supply voltage of 4.0V. and have a current range of 10-500 mA for WCDMA operation and 500 – 2200 mA for GSM operation .
Tune up procedure	See separate exhibit
Composite device description	The MiFi2372R also contains an 802.11 b/g device which covered in a separate report
Emission Designators	GSM/GPRS 850 244K5GXW GSM/GPRS 1900 245K5GXW EDGE 850 244K5G7W EDGE 1900 244K5G7W WCDMA 850 4M21F9W WCDMA 1900 4M21F9W
Frequency Tolerance	2.5 ppm in all modes

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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

- Cell Mode GPRS/EDGE and PCS Mode GPRS/EDGE/WCDMA measurements were taken with NRM-MIFI2352R sample
- Cell Mode WCDMA measurements were taken with NRM-MIFI2372R sample.

The following table summarizes the radio bands of Atlantic Refresh and Arctic Refresh

Radio Bands	NRM-MiFi2352R	NRM-MiFi2372R
WCDMA Bands	Band 1 (2100 MHz)	Band 1 (2100 MHz)
	Band 2 (1900 MHz)	Band 2 (1900 MHz)
	Band 8 (900 MHz)	Band 5 (850 MHz)
GPRS Bands	GSM850	GSM850
	EGSM900	EGSM900
	DCS1800	DCS1800
	PCS1900	PCS1900
WIFI	802.11 b/g 2.4 GHz	802.11 b/g 2.4 GHz
GPS	L1 (1575.42 MHz)	L1 (1575.42 MHz)

In all other respects the NRM-MiFi2352R and NRM-MiFi2372R are identical.

This includes, but is not limited to the following:

- I/O (USB, SIM, microSD, Power button, Reset Button)
- Battery
- Antennas
- KTEC KSAA0500120W1UV-1 power supply with ferrite, Fair-Rite Part# 0461164281

See operational description exhibit for detailed description of model differences

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
Laptop	DELL	INSPIRON E1420	Novatel Wireless Test Bed 1	N/A
90W-AC Adapter	DELL	LA90PS0-00	Novatel Wireless Test Bed 1	N/A

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APPENDICES

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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 22.917, FCC PART 24.238 RSS GEN Issue 2, 4.6.1
Test Method	FCC PART 22.917, FCC PART 24.238 RSS GEN Issue 2, 4.6.1

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

A.3.1 FCC PART 22.917 and FCC PART 24.238

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.

A.3.2 IC:

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

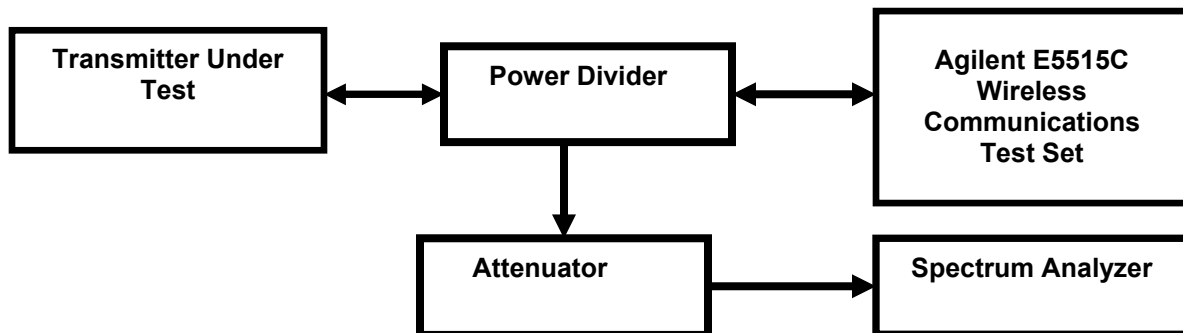
The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms.

The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded.

The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

A.4. Test Setup diagram



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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.

Note: Cell Mode GPRS/EDGE and PCS Mode GPRS/EDGE/WCDMA measurements were taken with MIFI2352R sample

Cell Mode WCDMA measurements were taken with MIFI2372R sample.

Please see EUT description, mode of operation section for details.

A.6. Test Results

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

A.6.1 Industry Canada 99% Bandwidth Summary of Results

Cell Mode

Modulation type	Channel	Frequency (MHz)	Occupied Bandwidth
GSM/GPRS	190	836.6	243.5 kHz
EDGE	190	836.6	244.5 kHz
WCDMA	4182	836.4	4.21 MHz

PCS Mode

Modulation type	Channel	Frequency (MHz)	Occupied Bandwidth
GSM/GPRS	661	1880	245.5 kHz
EDGE	661	1880	244.5 kHz
WCDMA	9400	1880	4.21 MHz

A.6.2 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	278.6 kHz
EDGE	190	836.6	280.6 kHz
WCDMA	4182	836.4	4.47 MHz

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	4.42 MHz

Note: Marker 1 (Trace 2) measurements in FCC 26dB Bandwidth plots show measured integrated output power with RBW set to 10 MHz and VBW set to 10 MHz (RBW >> EBW). These measurements were used as 0 dB reference point. D1 lines were set 26 dB below this reference point

A.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 Wireless/EMC Technologist

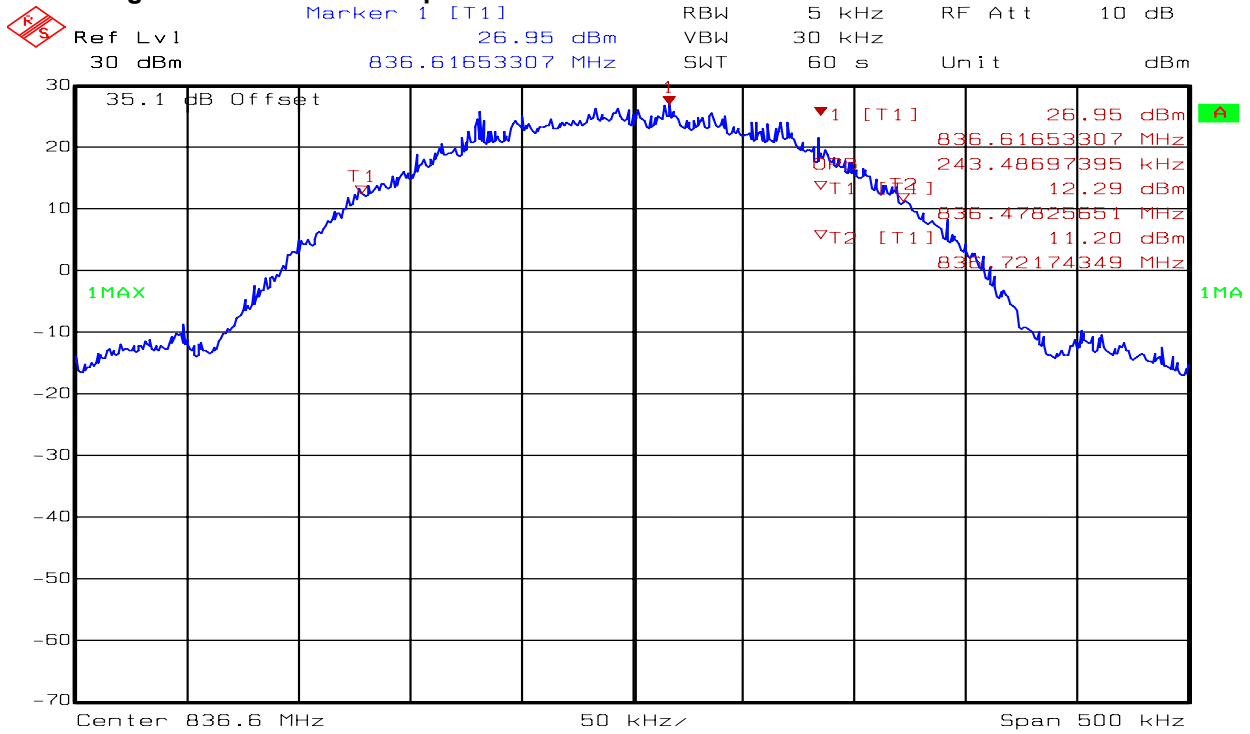
A.8. Test dates

Started: October 7, 2009

Completed: January 19, 2010

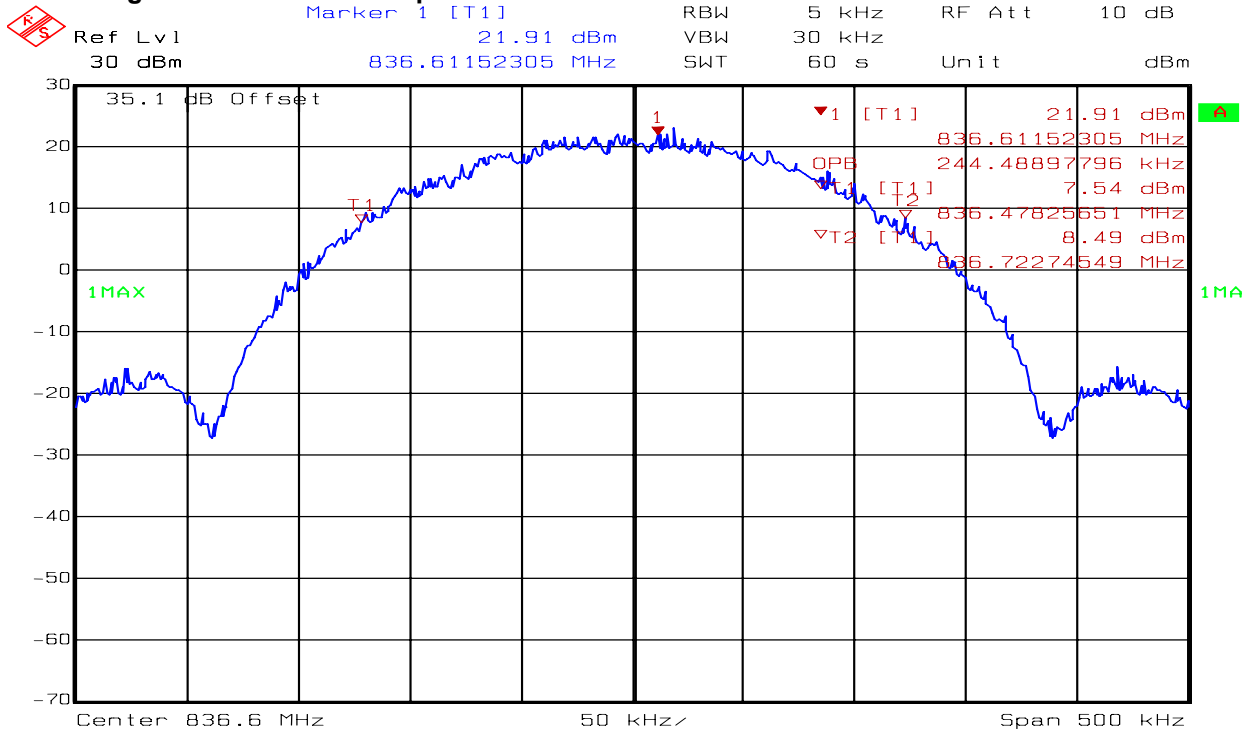
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Figure 1 IC 99 % Occupied Bandwidth Cell Band Channel 190 GSM/GPRS Mode



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) CELL GPRS CS-4 Ch190, 1up 1down, MSTxLB:5
Date: 6.NOV.2009 11:23:38

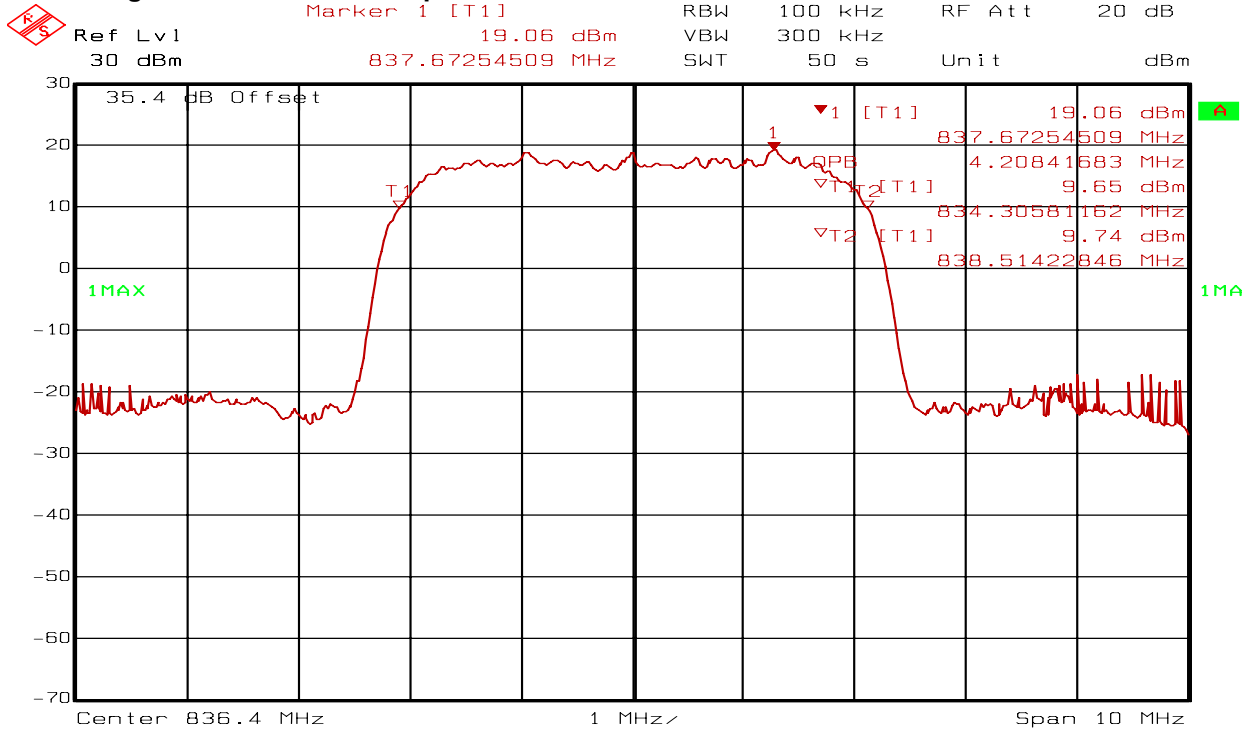
Figure 2 IC 99% Occupied Bandwidth Cell Band Channel 190 EDGE Mode



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) CELL EDGE 8PSK Ch190, 1up 1down, MSTxLB:5(8)
Date: 6.NOV.2009 11:27:45

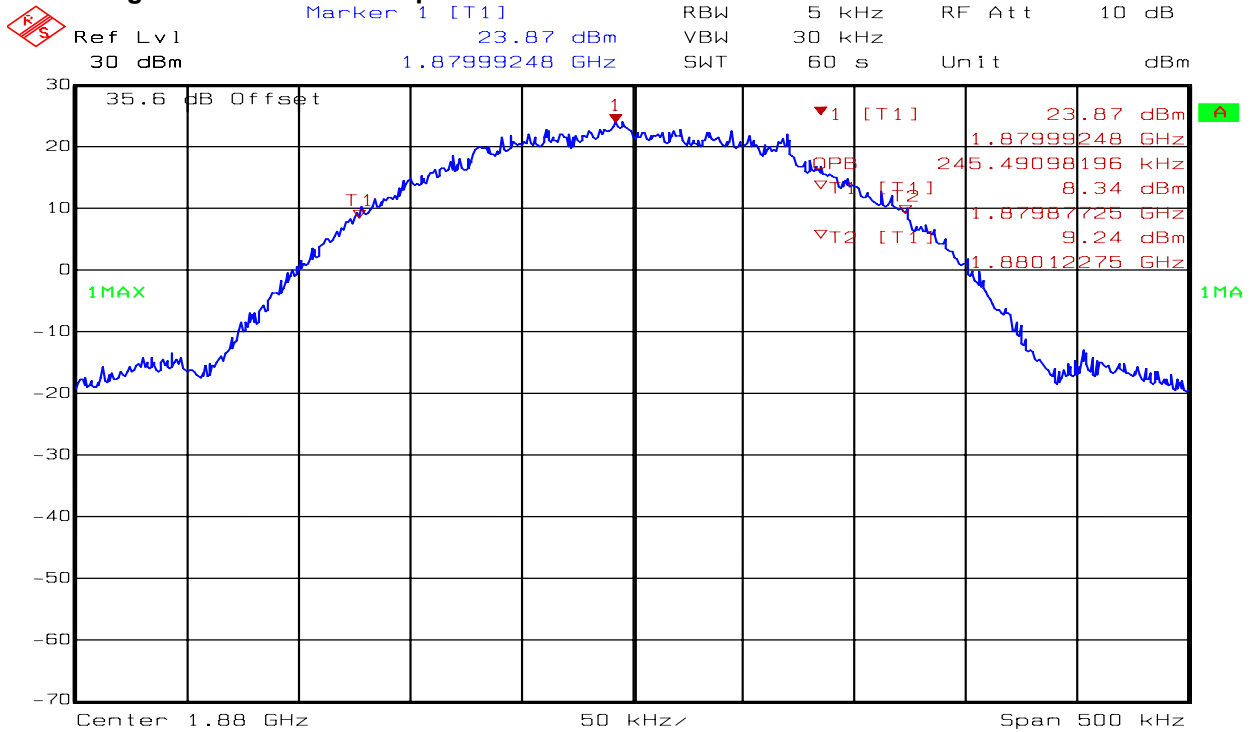
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Figure 3 IC 99 % Occupied Bandwidth Cell Band Channel 4182 WCDMA Mode



Title: CG-1436 Novatel Wireless MIFI 2372R Arctic
Comment A: WCDMA 850 Band V, Ch4182, AllUpBits,UICLPCA:2, 12.2k RMC
Date: 19.JAN.2010 14:00:25

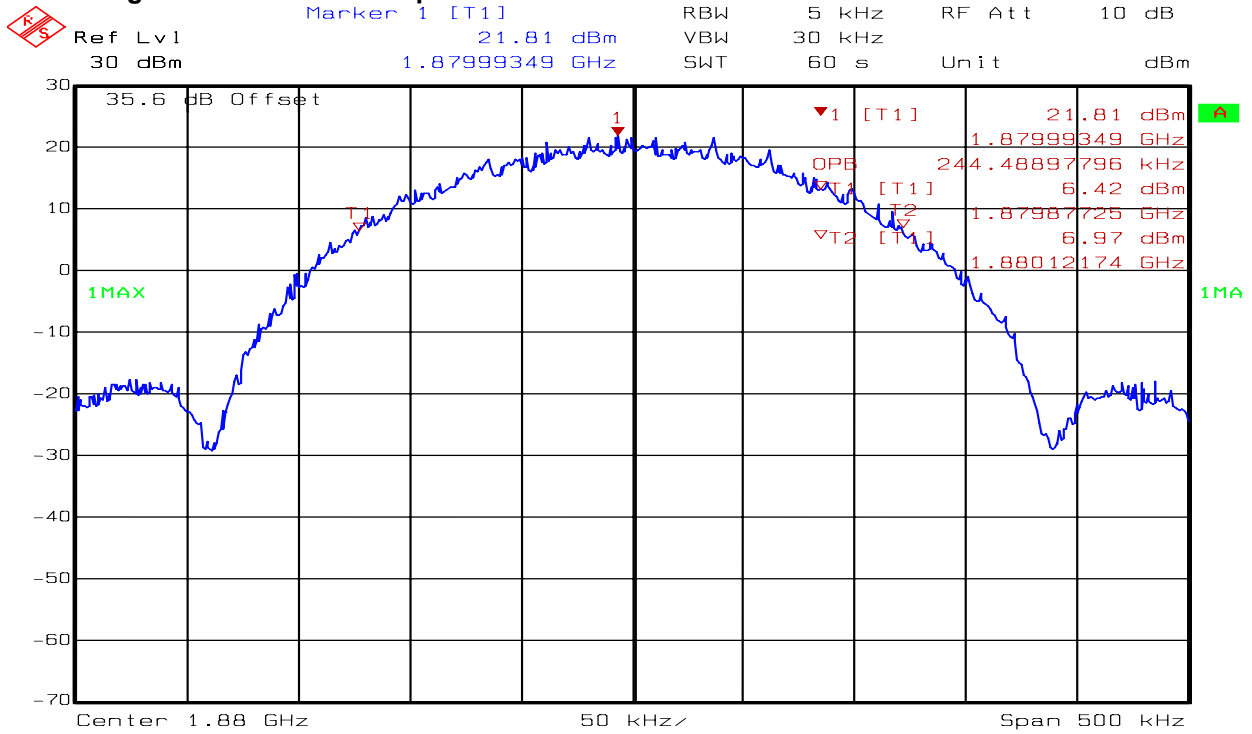
Figure 4 IC 99% Occupied Bandwidth PCS Band Channel 661 GSM/GPRS Mode



Title: CG-1290 Novatel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS GPRS CS-4 Ch661, 1up 1down, MSTxLB:0
Date: 6.NOV.2009 11:35:58

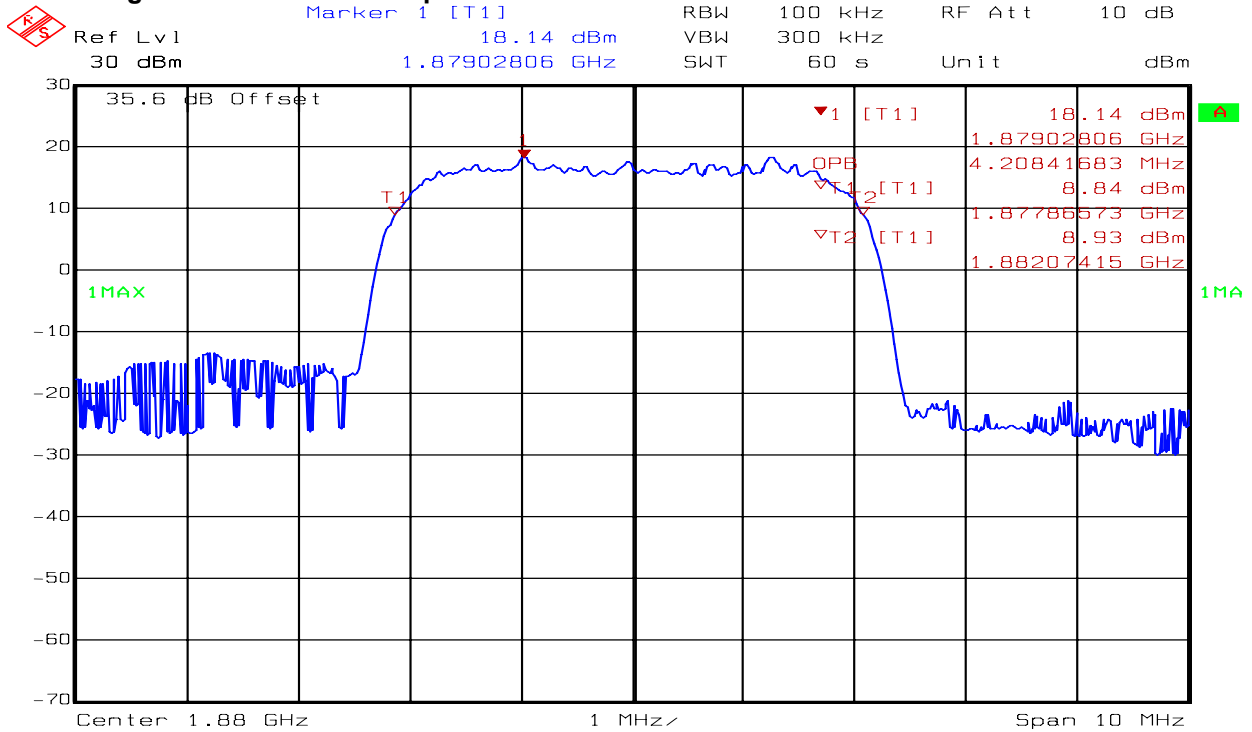
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Figure 5 IC 99% Occupied Bandwidth PCS Band Channel 661 EDGE Mode



Title: CG-1290 NovAtel Wireless MIFI2352R
 Comment A: Eng.S(PA Match) PCS EDGE 8PSK Ch661, 1up 1down, MSTxLB:0(2)
 Date: 6.NOV.2009 11:09:51

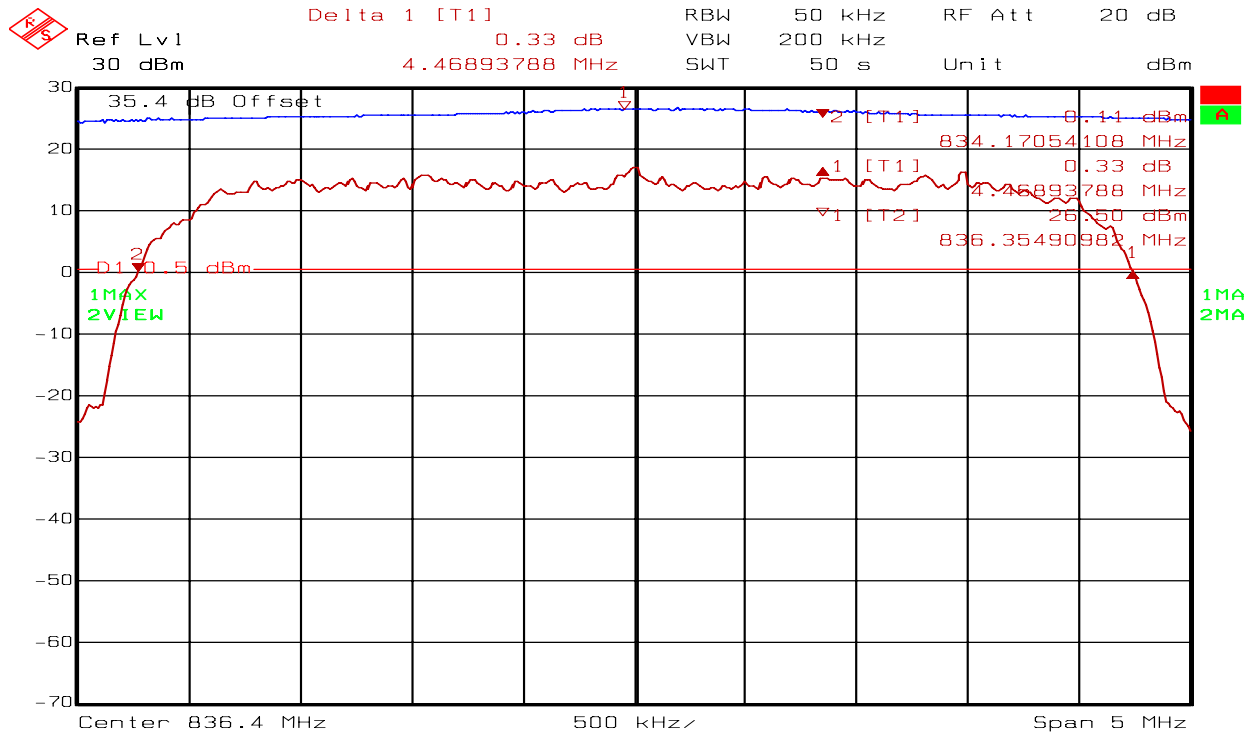
Figure 6 IC 99% Occupied Bandwidth PCS Band Channel 9400 WCDMA Mode



Title: CG-1290 NovAtel Wireless MIFI2352R
 Comment A: Eng.S(PA Match) WCDMA Ch9400, All up bits, 12.2RMC
 Date: 6.NOV.2009 11:53:56

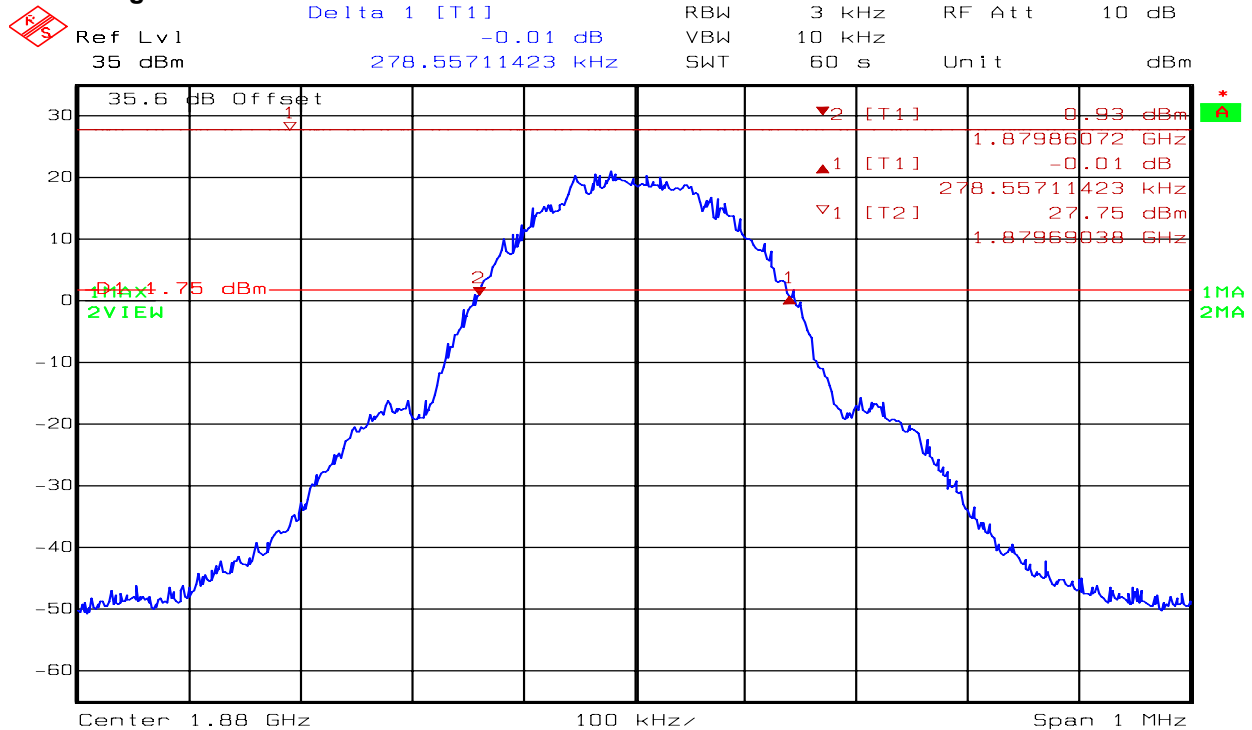
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Figure 9 FCC 26 dB Bandwidth Cell Band Channel 4182 WCDMA Mode



Title: CG-1436 Novatel Wireless MIFI 2372R Arctic
Comment A: WCDMA 850 Band V, Ch4182, AllUpBits,UICLPCA:2, 12.2k RMC
Date: 19.JAN.2010 14:18:31

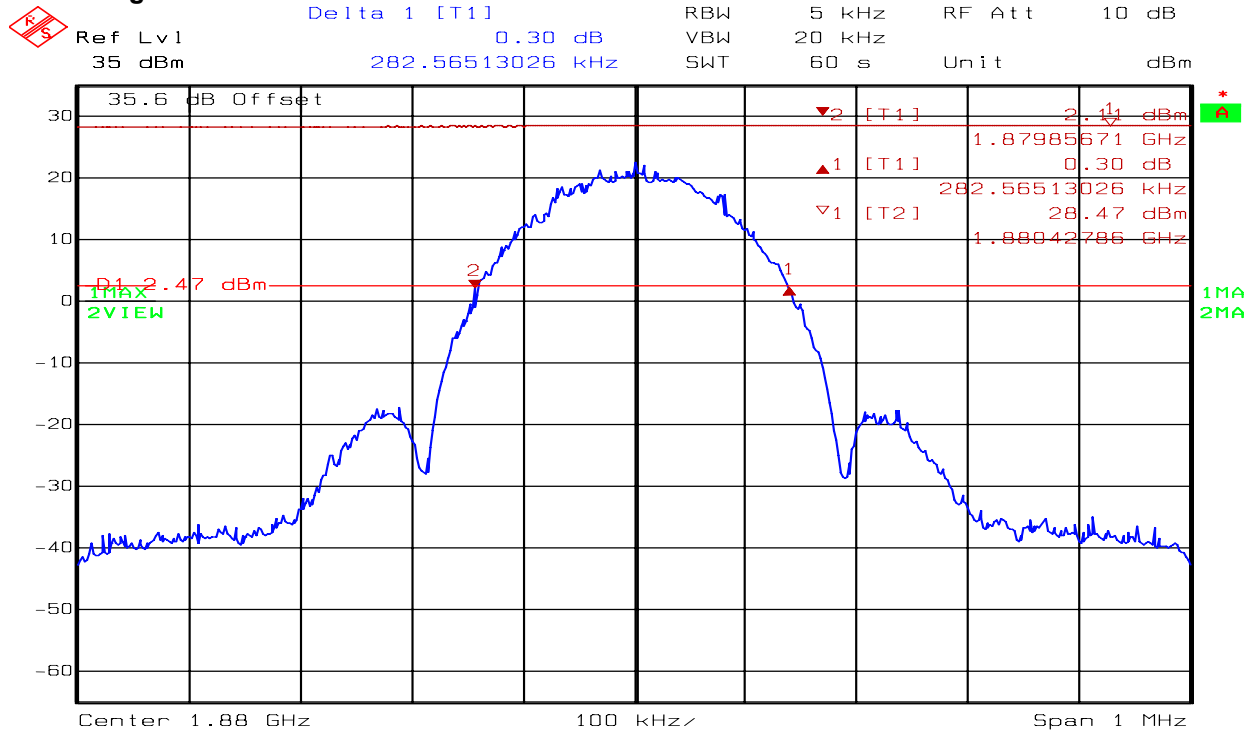
Figure 10 FCC 26 dB Bandwidth PCS Band Channel 661 GSM/GPRS Mode



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS GPRS Ch661, 1up 1down, MSTxLB:0
Date: 6.NOV.2009 9:36:47

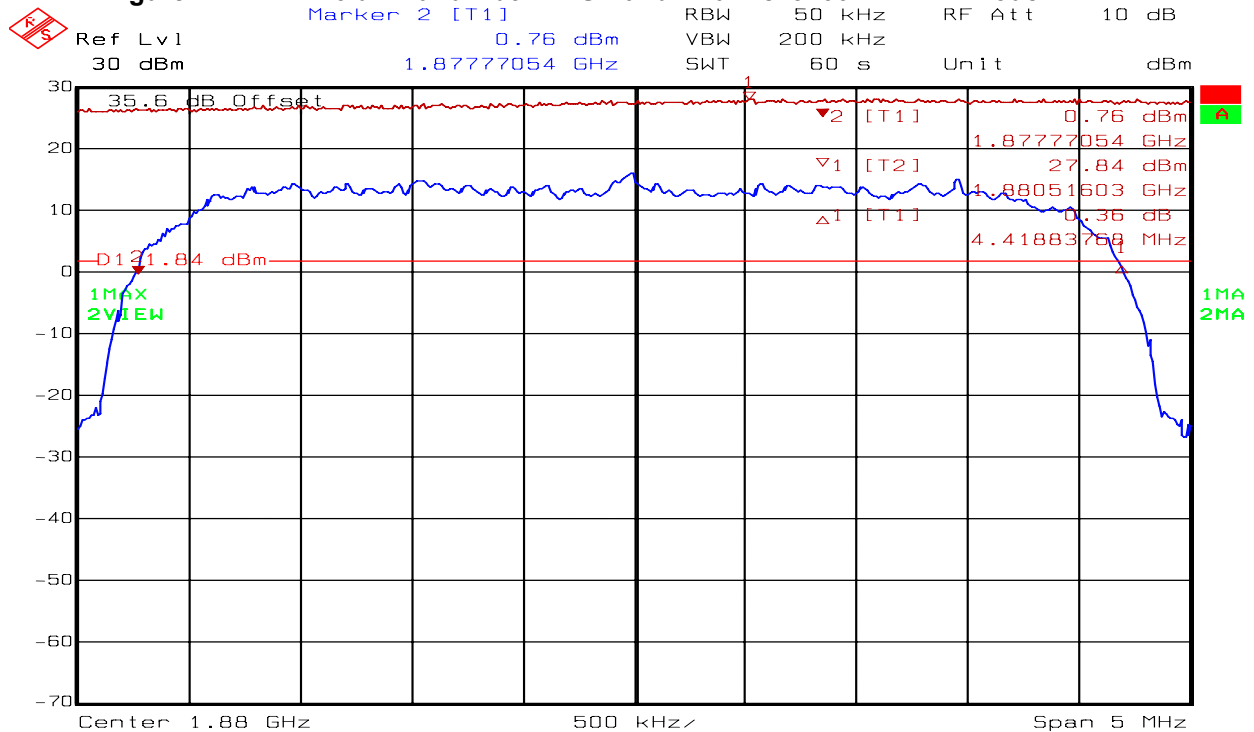
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Figure 11 FCC 26 dB Bandwidth PCS Band Channel 661 EDGE Mode



Title: CG-1290 NovAtel Wireless MIFI2352R
 Comment A: Eng.S(PA Match) PCS EDGE 8PSK Ch661, 1up 1down, MSTxLB:0(2)
 Date: 6.NOV.2009 9:58:20

Figure 12 FCC 26 dB Bandwidth PCS Band Channel 9400 WCDMA Mode



Title: CG-1290 NovAtel Wireless MIFI2352R
 Comment A: #001018000212036 WCDMA Ch9400, All Up Bits, 12.2RMC
 Date: 7.OCT.2009 15:58:31

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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

B.2.1 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.

B.2.2 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

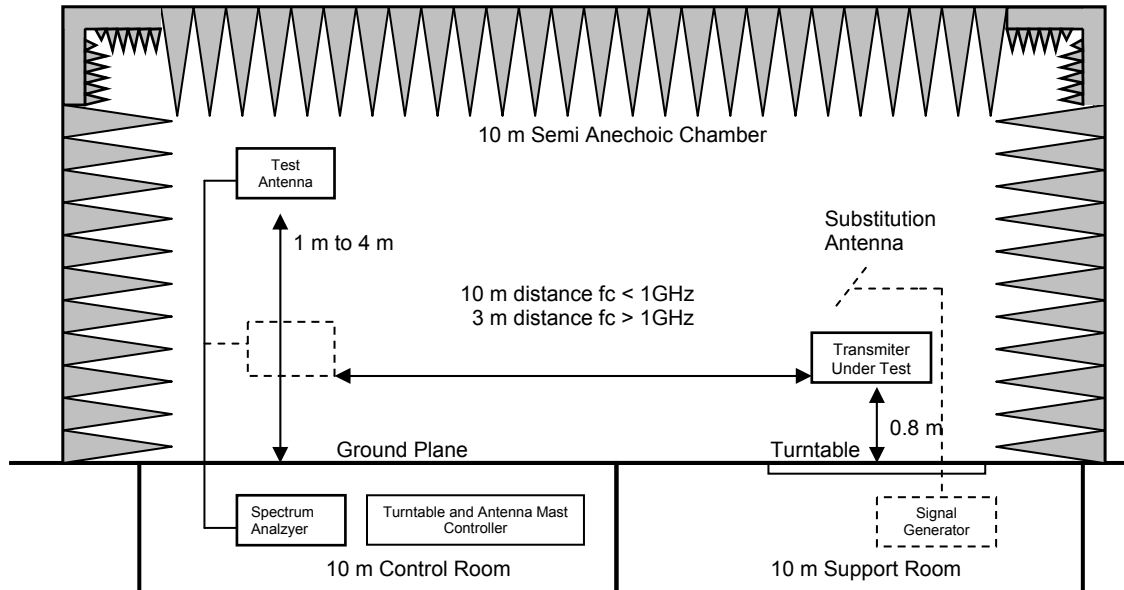
WCDMA Measurements:

RBW: 5 MHz
VBW: 5 MHz
Detector: Peak

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B.4. Test Setup Diagram



B.5. Operating Modes 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

CELL 850 GPRS – 1up 1down, Ms Tx level burst 5

CELL 850 EDGE – 1up 1down, Ms Tx level burst 8 (8 maximum. No change between 8 and 5)

CELL 850 WCDMA - All up bits, HSDPA active ULCLPCA: 2, 12.2 kbps RMC

PCS GPRS - 1up 1down, Ms Tx level burst 0

PCS EDGE - 1up 1down, Ms Tx level burst 2 (2 maximum. No change between 2 and 0)

PCS WCDMA – All up bits, HSDPA active at 12.2 kbps RMC

Note: Cell Mode GPRS/EDGE and PCS Mode GPRS/EDGE/WCDMA measurements were taken with MIFI2352R sample

Cell Mode WCDMA measurements were taken with MIFI2372R sample.

Please see EUT description, mode of operation section for details.

B.6. Test Results

Compliant

B.6.1 FCC Part 22- 850 MHz Radiated Power Measurement Test Data Summary

Compliant - The maximum ERP is 30.64 dBm or 1.16 Watts on channel 251 in GPRS Mode
Results are indicated for each channel in the table below

	GSM850 Channel #	Frequency (MHz)	Measured Field strength @ 10m (dBμV/m)	Substitution Signal generator level (dBm)	Antenna gain (dBd)	Cable loss (dB)	Measured ERP (dBm)
GPRS	128	824.2	122.33	32.05	-0.1	1.45	30.50
	190	836.6	122.01	31.87	-0.1	1.45	30.32
	251	848.8	122.29	32.19	-0.1	1.45	30.64
EDGE	128	824.2	120.45	30.17	-0.1	1.45	28.62
	190	836.6	120.51	30.37	-0.1	1.45	28.82
	251	848.8	120.87	30.77	-0.1	1.45	29.22
WCDMA	4132	826.8	114.69	24.37	-0.1	0.88	23.35
	4182	836.4	114.62	24.61	-0.1	0.88	23.59
	4233	846.8	114.69	24.63	-0.1	0.88	23.61

B.6.2 PCS Mode – FCC 24.232 Radiated Power Measurement Test Data Summary

Compliant – The maximum EIRP is 32.86 dBm or 1.93 Watts on channel 512 in Edge Mode
This is 0.14 dB below the limit. Results for each channel are indicated in the table below

	PCS Channel #	Frequency (MHz)	Measured Field strength @ 3m (dBμV/m)	Substitution Signal generator level (dBm)	Antenna gain (dBi)	Cable loss (dB)	Measured EIRP (dBm)
GPRS	512	1850.2	130.76	24.80	8.67	1.31	32.16
	661	1880.0	129.35	23.70	8.78	1.32	31.16
	810	1909.8	130.58	25.00	8.15	1.33	31.82
EDGE	512	1850.2	131.43	25.50	8.67	1.31	32.86
	661	1880.0	130.39	24.80	8.78	1.32	32.26
	810	1909.8	131.34	25.80	8.15	1.33	32.62
WCDMA	9262	1852.4	126.63	20.68	8.67	1.31	28.04
	9400	1880.0	126.34	20.72	8.78	1.32	28.18
	9538	1907.6	125.28	20.31	8.14	1.33	27.12

B.7. Tested By

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

Name: Deniz Demirci Senior Wireless/EMC Technologist Lixin Wang EMC Technologist
Function: Senior Wireless/EMC Technologist EMC Technologist

B.8. Test dates

Started: October 8, 2009

Completed: January 15, 2010

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 22.355 PCS Mode: FCC 24.235
Test Basis	FCC Part 2.1055
Test Method	FCC Part 2.1055

C.2. Specifications

2.1055 Measurements required: Frequency stability;

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

C.2.1 Cell Mode

22.355 Frequency Tolerance;

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 the Table

Frequency Tolerance for Transmitters in the Public Mobile Services

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

C.2.2 PCS Mode

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° Celsius.

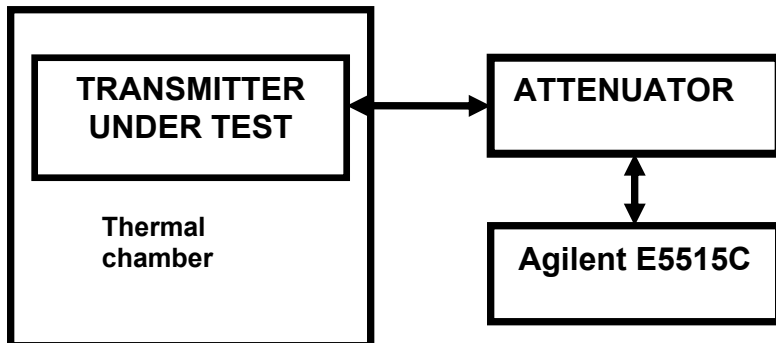
After a sufficient time of temperature stabilization with the EUT was attached to the callbox, the transmitter was set to transmit at full rated RF power output.

Maximum frequency drift was recorded over a 10 minute period using the appropriate technique in the case of digital modulations. Minimum 600 measurements were taken and the worst case drift for each modes were presented.

The input voltage was also varied to nominal and to 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.4. Test Setup diagram



C.5. Operating Mode During Test

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

Note: Cell Mode GPRS/EDGE, PCS Mode GPRS/EDGE/WCDMA measurements were taken with MIFI2352R sample
 Cell Mode WCDMA measurements were taken with MIFI2372R sample.
 Please see EUT description, mode of operation section for details.

C.6. Test Results

Compliant.

The maximum measured frequency drift in cell mode (Part 22 Subpart H – 2.5ppm limit) was 77 Hz.
 The maximum measured drift in PCS mode was -103 Hz (Part 24 subpart E), sufficient to stay within the frequency block.

Temperature (°C)	Voltage (V dc)	GSM 850 GPRS 836.6 MHz		WCDMA Band V 836.4 MHz		PCS GPRS 1880 MHz		WCDMA Band II 1880 MHz	
		Error (Hz)	Error (ppm)	Error (Hz)	Error (ppm)	Error (Hz)	Error (ppm)	Error (Hz)	Error (ppm)
21	3.75	-54	0.06	-20	0.02	-74	0.04	-28	0.01
21	4.20	-40	0.05	19	0.02	-95	0.05	-41	0.02
21	3.55	77	0.09	-25	0.03	-103	0.05	-49	0.03
-30	3.75	-53	0.06	22	0.03	-51	0.03	56	0.03
-20	3.75	30	0.04	-20	0.02	-43	0.02	-55	0.03
-10	3.75	-20	0.02	23	0.03	24	0.01	43	0.02
0	3.75	-22	0.03	32	0.04	-44	0.02	50	0.03
10	3.75	25	0.03	20	0.02	-38	0.02	31	0.02
30	3.75	36	0.04	16	0.02	40	0.02	-53	0.03
40	3.75	-50	0.06	-23	0.03	-55	0.03	-60	0.03
50	3.75	-33	0.04	-28	0.03	-65	0.03	-52	0.03

Note: 3.44 Volts was the battery end operating point

C.7. Tested By

Name: Deniz Demirci
 Function: Senior Wireless/EMC Technologist

C.8. Test date

Started: October 20, 2009 Completed: January 22, 2010

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 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.

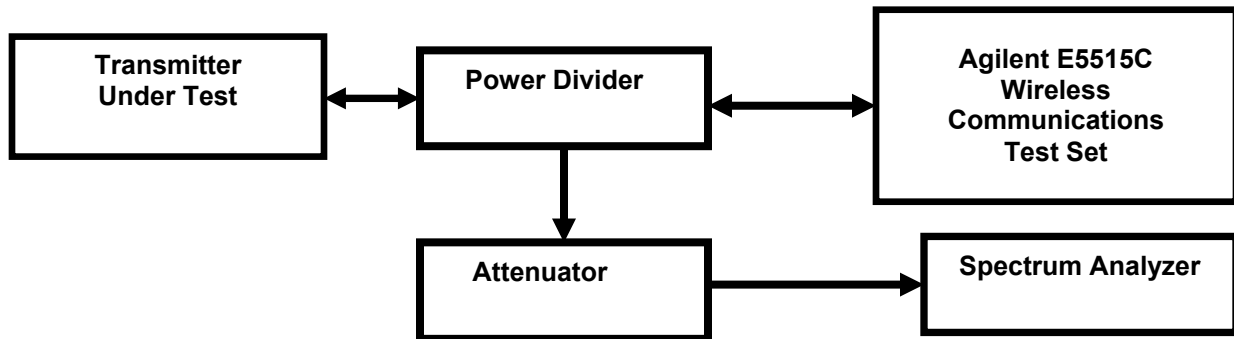
(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission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

Note: Cell Mode GPRS/EDGE and PCS Mode GPRS/EDGE/WCDMA measurements were taken with MIFI2352R sample
Cell Mode WCDMA measurements were taken with MIFI2372R sample.
Please see EUT description, mode of operation section for details.

D.4. Test Setup Diagram



D.5. Test Results Summary

Compliant see plots on following pages and summary tables below

D.5.1 Cell Band

Channel	Mode	Note	Emission Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
128	GPRS	Lower band edge	823.99	-13.72	-13	0.72
251	GPRS	Upper band edge	849.01	-13.67	-13	0.67
128	EDGE	Lower band edge	823.98	-19.34	-13	6.34
251	EDGE	Upper band edge	849.02	-19.88	-13	6.88
4132	WCDMA	Lower band edge	824.00	-21.89	-13	8.89
4233	WCDMA	Upper band edge	849.00	-22.83	-13	9.83

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.5.2 PCS Band

Channel	Mode	Note	Emission Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
512	GPRS	Lower band edge	1849.98	-16.37	-13	3.37
810	GPRS	Upper band edge	1910.00	-15.73	-13	2.73
512	EDGE	Lower band edge	1849.98	-20.05	-13	7.05
810	EDGE	Upper band edge	1910.03	-20.42	-13	7.42
9262	WCDMA	Lower band edge	1850.00	-19.01	-13	6.01
9538	WCDMA	Upper band edge	1910.47	-20.59	-13	7.59

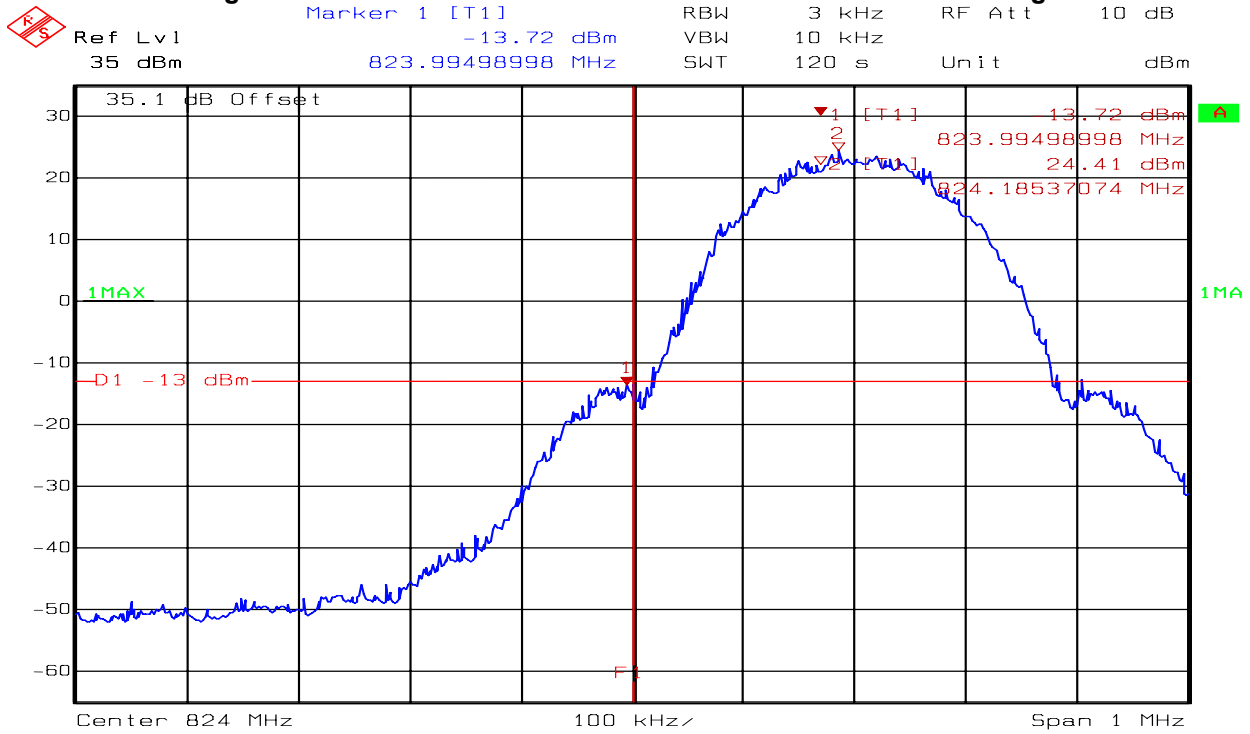
Note: The above are the worst case measurements, no other reportable emissions were detected in any of the modes. Therefore for spurious emissions noise floor readings are reported along with plots of the EUT operating at highest power mode

D.6. Test Data

See following pages for plots of band edge for all modes and spurious data to the 10th harmonic.

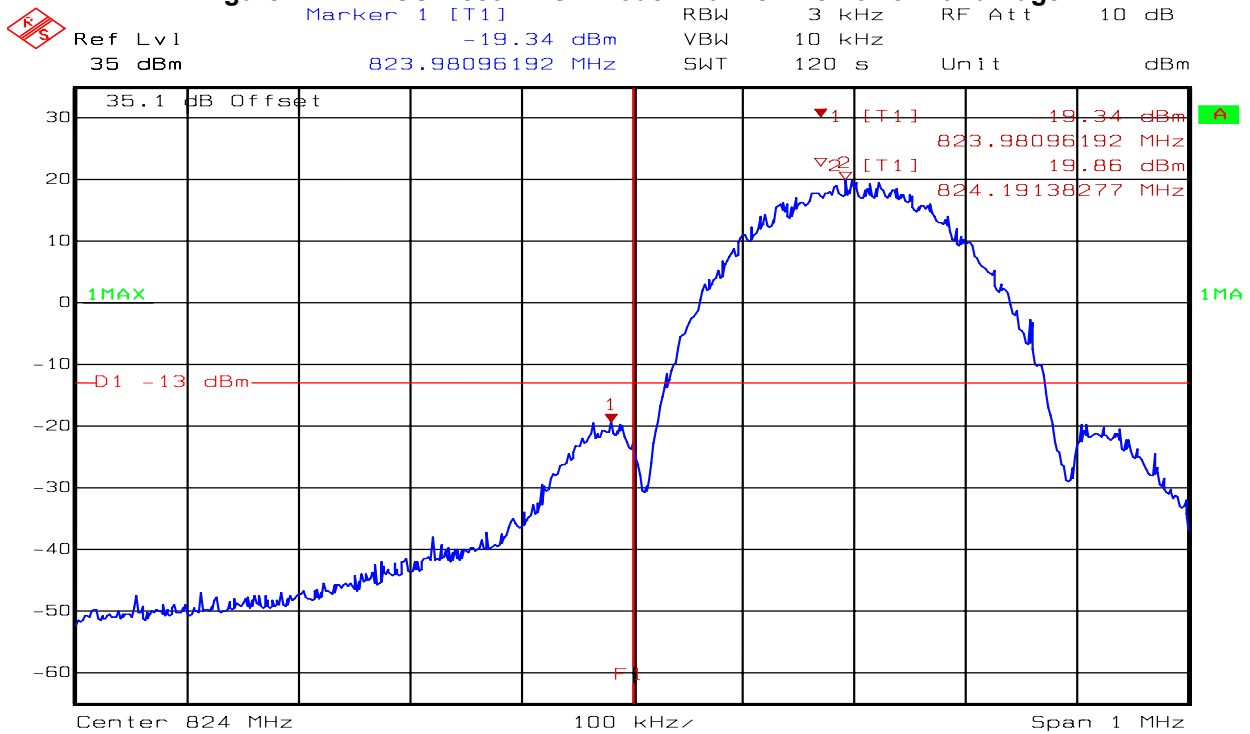
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 13 GSM 850 GPRS Mode Channel 128 Lower Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: #001018000212036 CELL GPRS Ch128, 1up 1down MSTxLB:5
Date: 7.OCT.2009 20:01:34

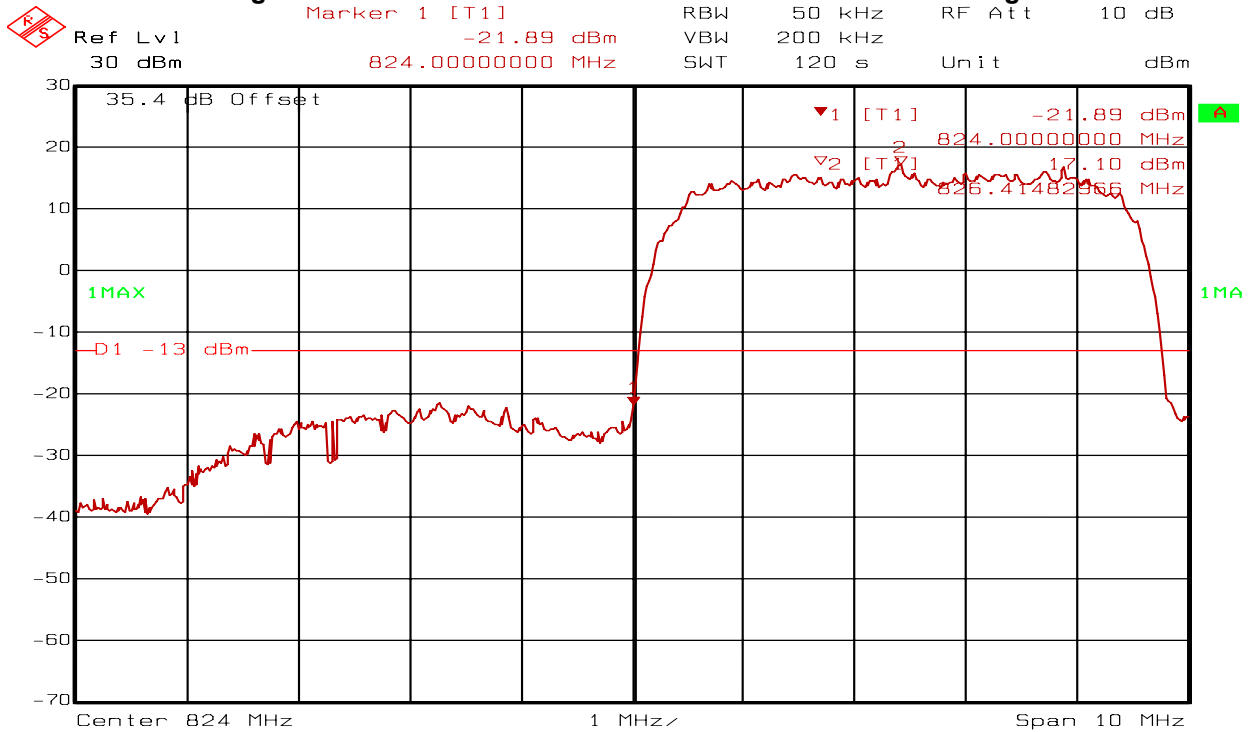
Figure 14 GSM 850 EDGE Mode Channel 128 Lower Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: #001018000212036 CELL EDGE 8PSK Ch128, 1up 1down MSTxLB:5(8)
Date: 7.OCT.2009 19:50:31

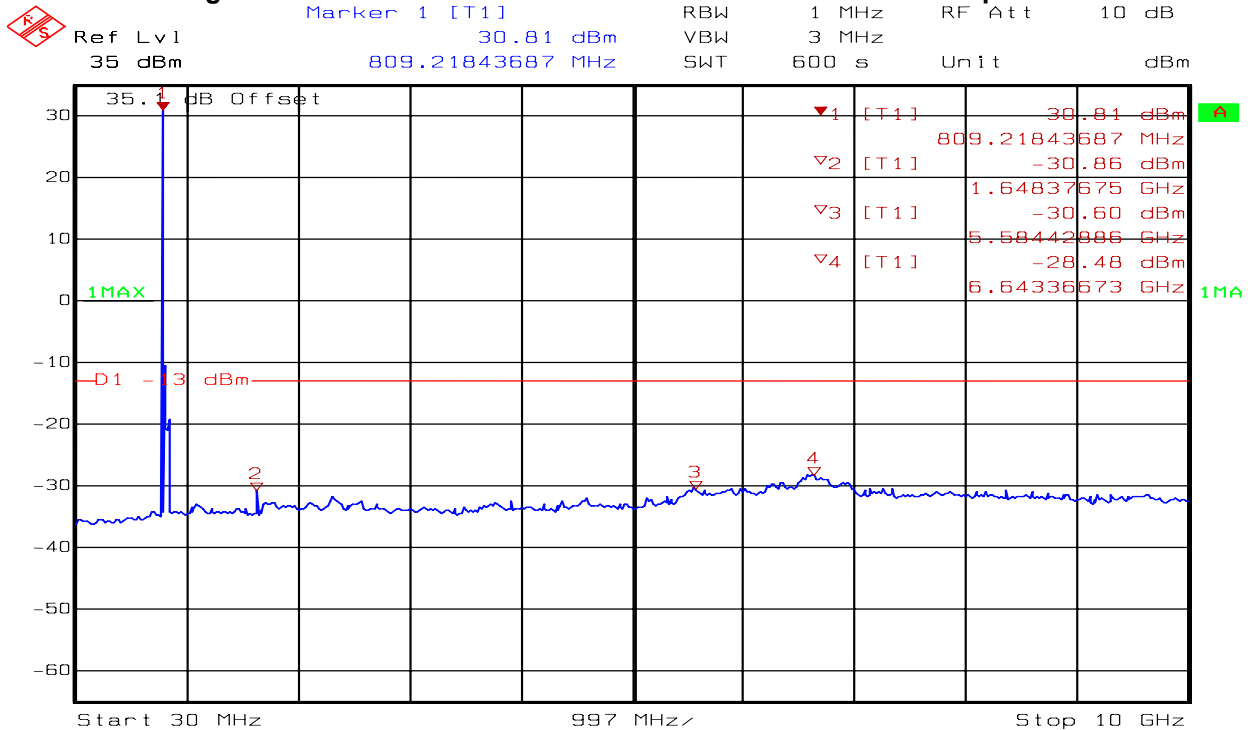
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 15 WCDMA Band V Channel 4132 Lower Band Edge



Title: CG-1436 Novatel Wireless MIFI 2372R Arctic
Comment A: WCDMA 850 Band V, Ch4132, AllUpBits,UICLPCA:2, 12.2k RMC
Date: 19.JAN.2010 14:41:22

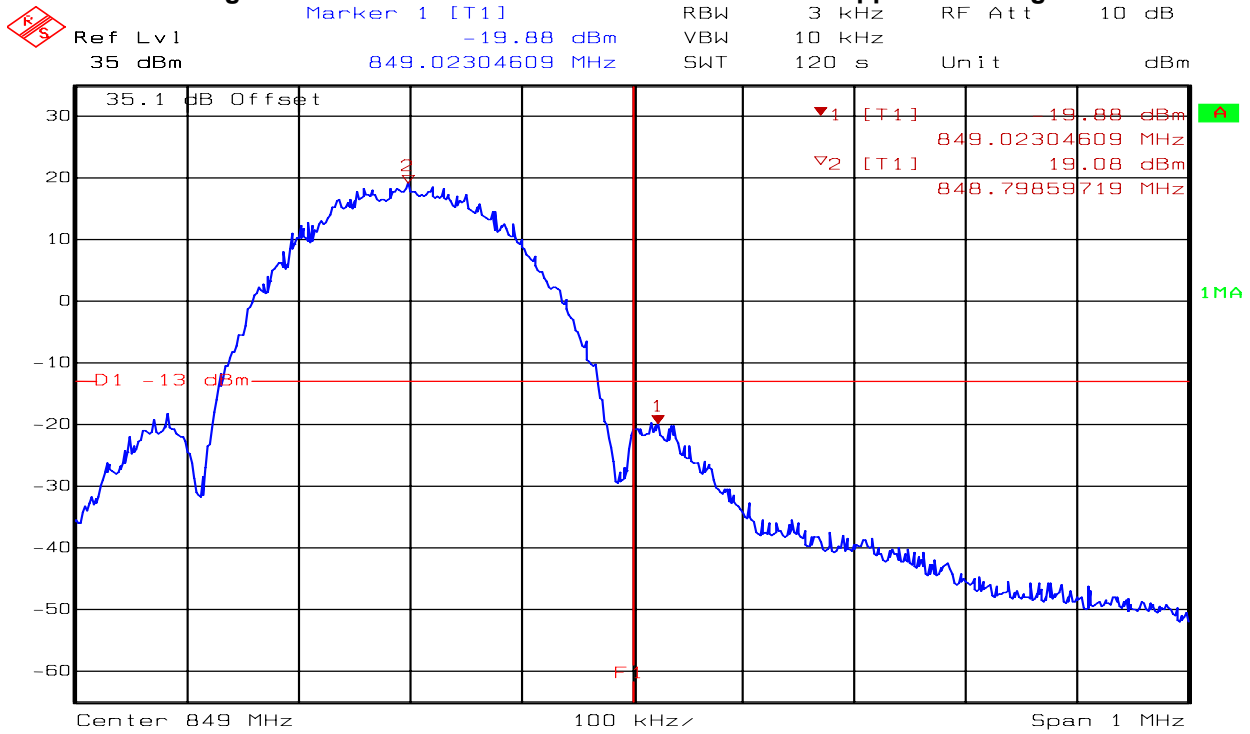
Figure 16 GSM 850 GPRS Mode Channel 128 Conducted Spurious



Title: CG-1290 Novatel Wireless MIFI2352R
Comment A: #001018000212036 CELL GPRS Ch128, 1up 1down MSTxLB:5
Date: 7.OCT.2009 18:19:43

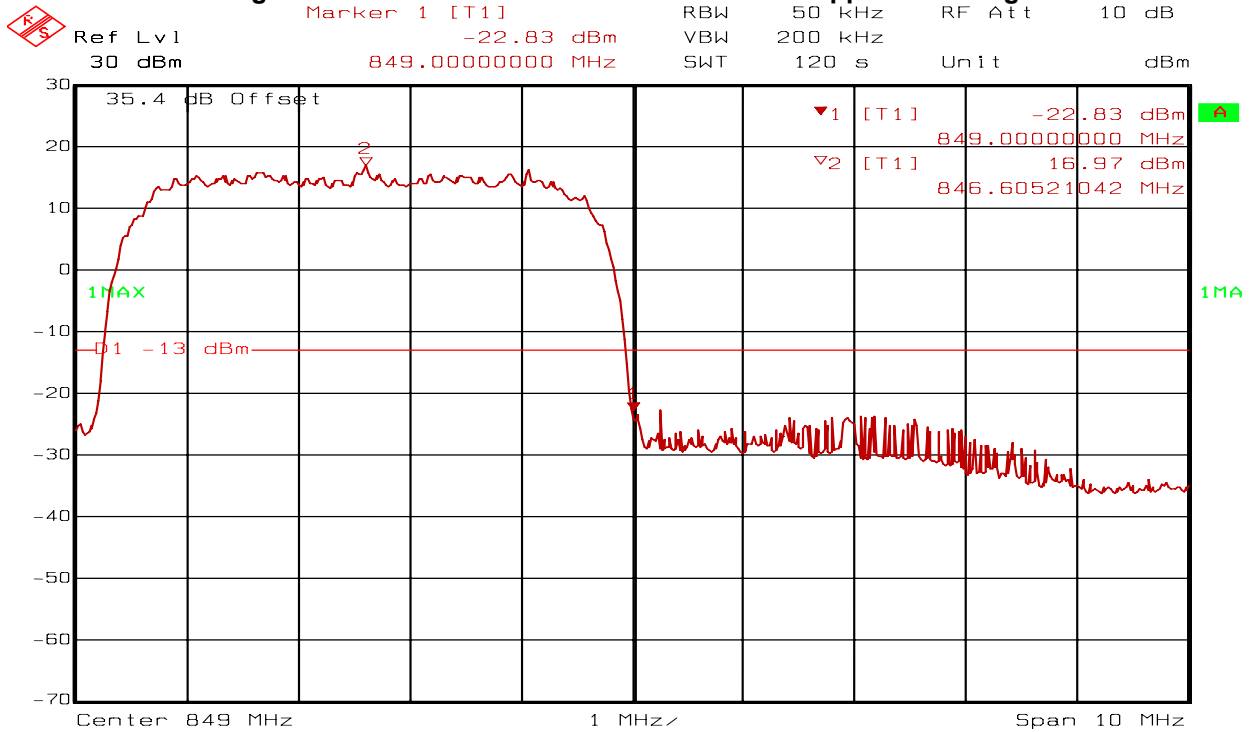
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 23 GSM 850 EDGE Mode Channel 251 Upper Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
 Comment A: #001018000212036 CELL EDGE 8PSK Ch251, 1up 1down MSTxLB:5(8)
 Date: 7.OCT.2009 20:14:56

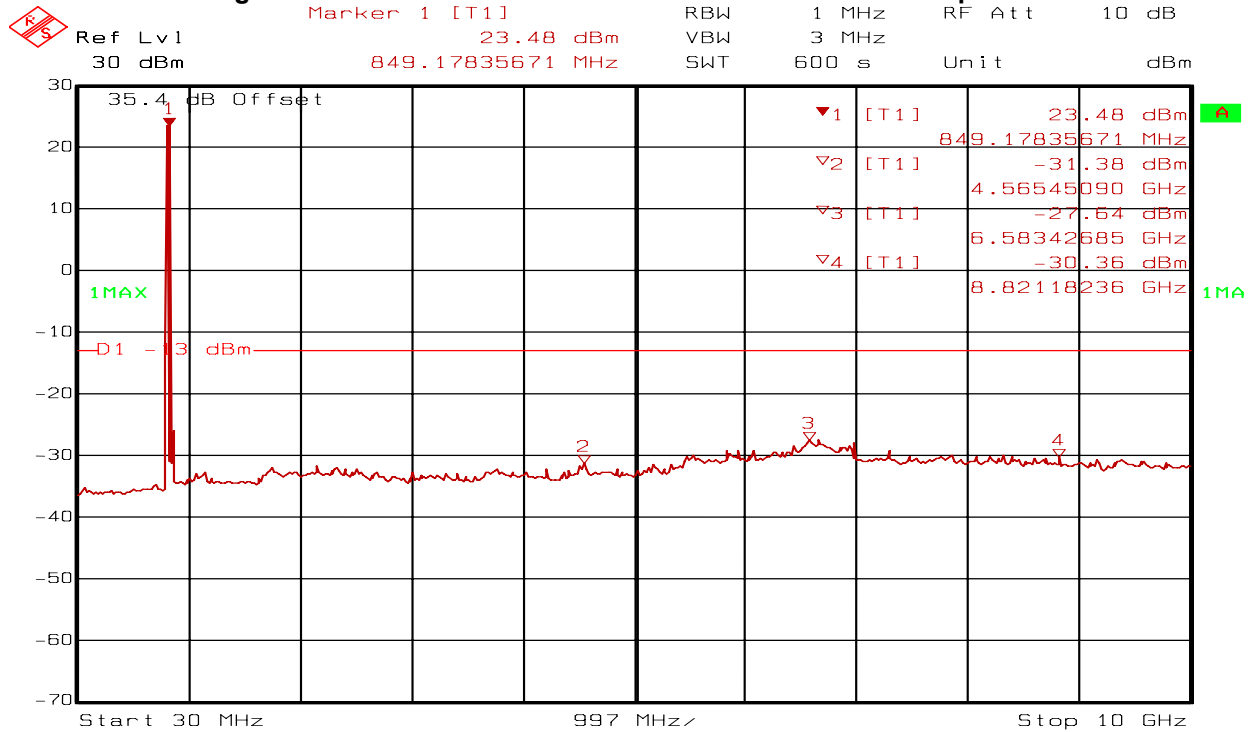
Figure 24 WCDMA Band V Channel 4233 Upper Band Edge



Title: CG-1436 Novatel Wireless MIFI 2372R Arctic
 Comment A: WCDMA 850 Band V, Ch4233, AllUpBits,UICLPCA:2, 12.2k RMC
 Date: 19.JAN.2010 14:46:19

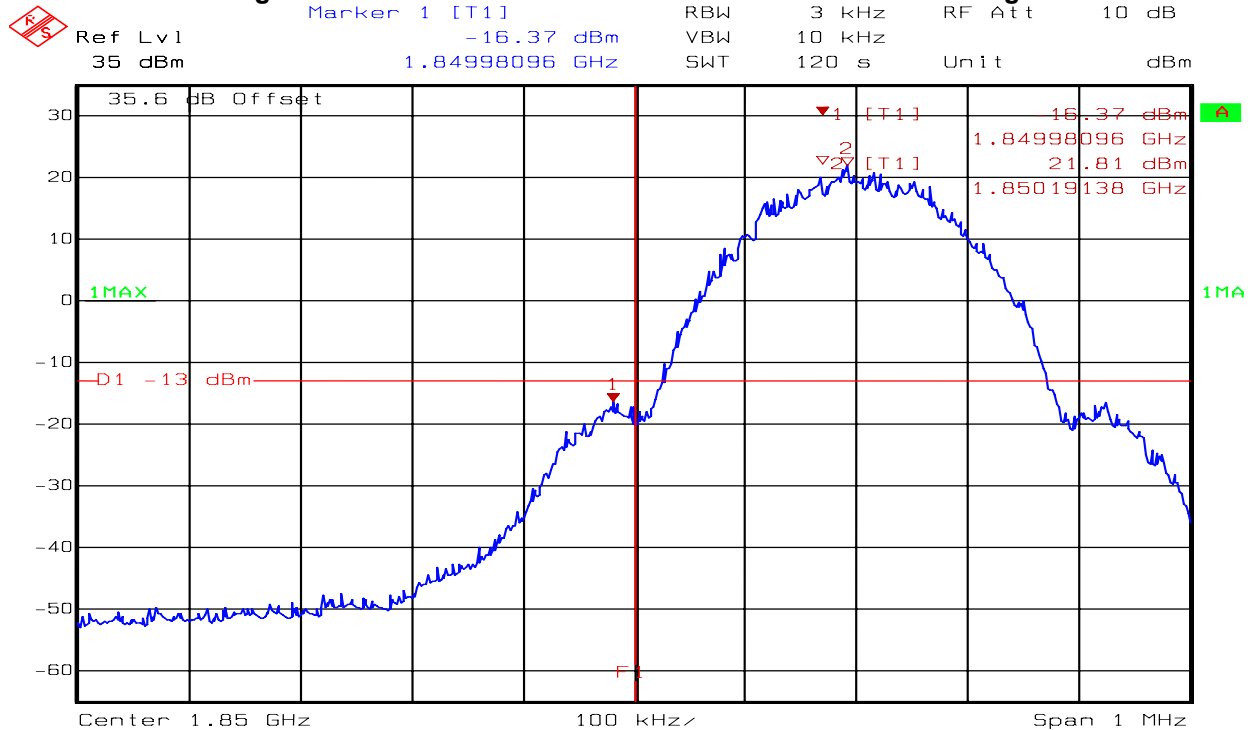
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 27 WCDMA Band V Channel 4233 Conducted Spurious



Title: CG-1436 Novatel Wireless MIFI 2372R Arctic
Comment A: WCDMA 850 Band V, Ch4233, AllUpBits,UICLPCA:2, 12.2k RMC
Date: 19.JAN.2010 15:00:45

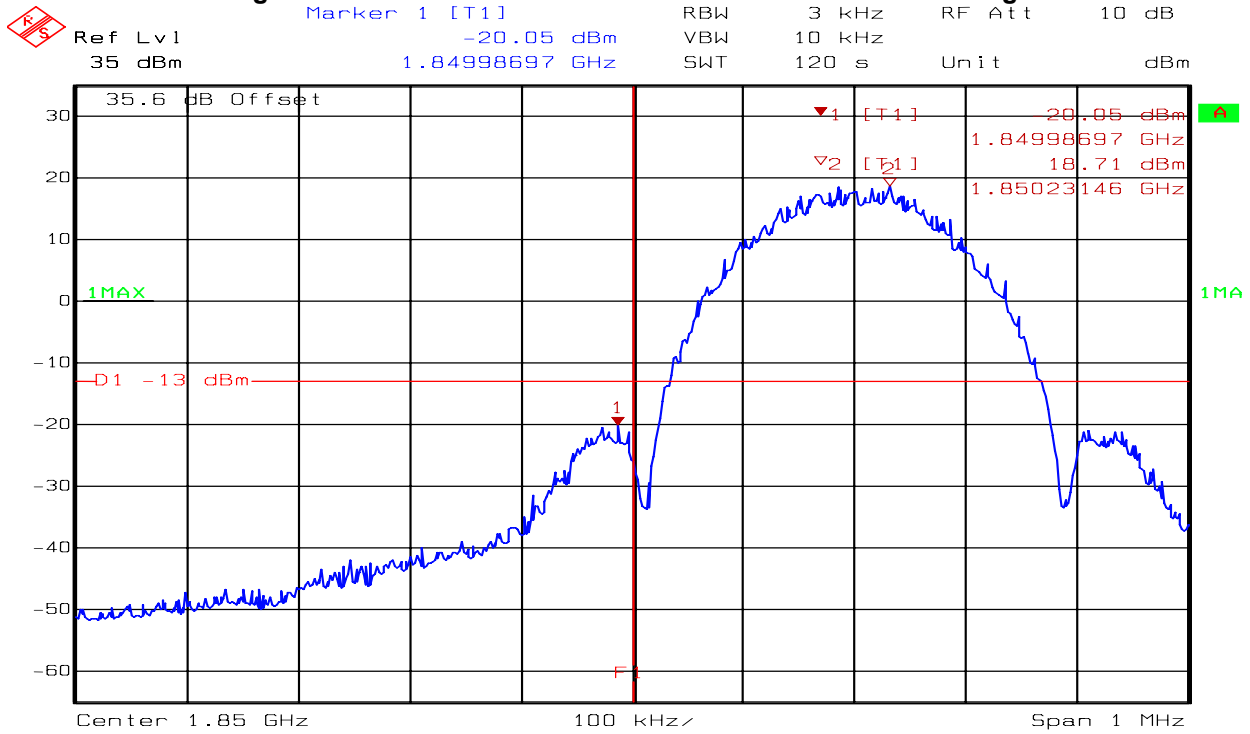
Figure 28 PCS GPRS Mode Channel 512 Lower Band Edge



Title: CG-1290 Novatel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS GPRS CS-4 Ch512, 1up 1Down, MSTxLB:0
Date: 6.NOV.2009 12:10:00

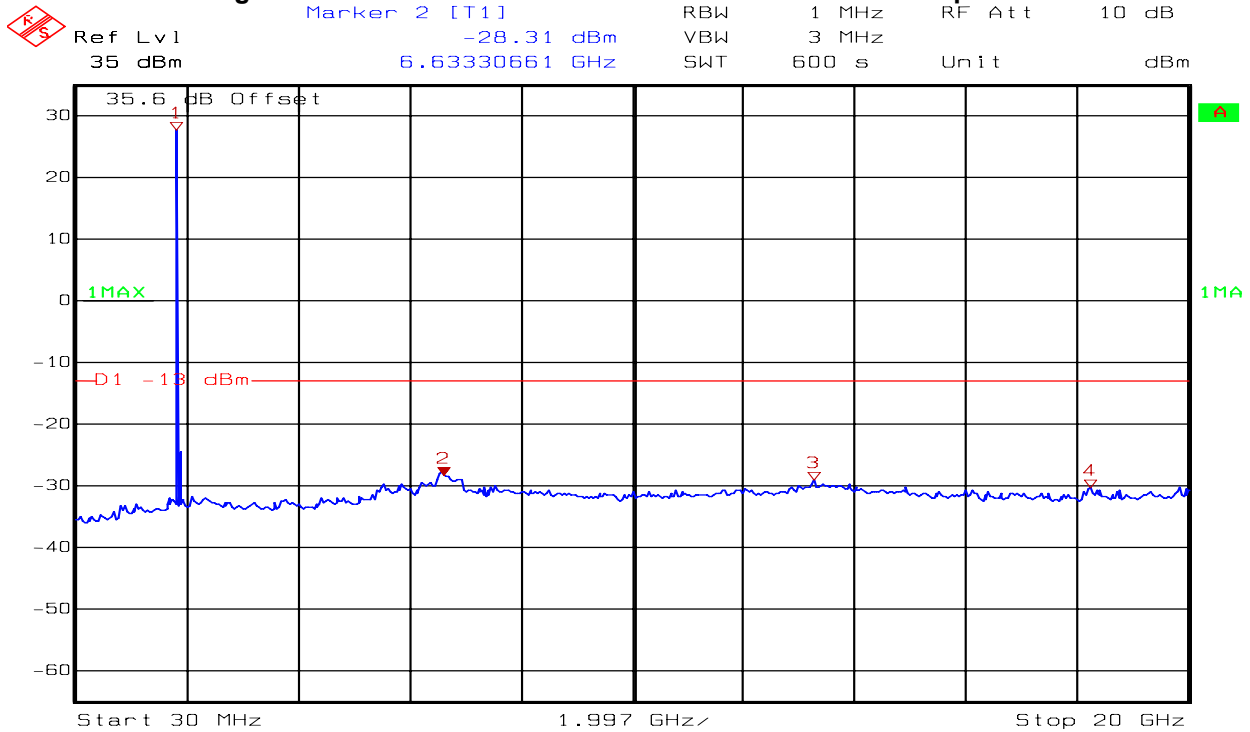
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 29 PCS EDGE Mode Channel 512 Lower Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS EDGE 8PSK Ch512, 1up 1Down, MSTxLB:0(2)
Date: 6.NOV.2009 12:16:35

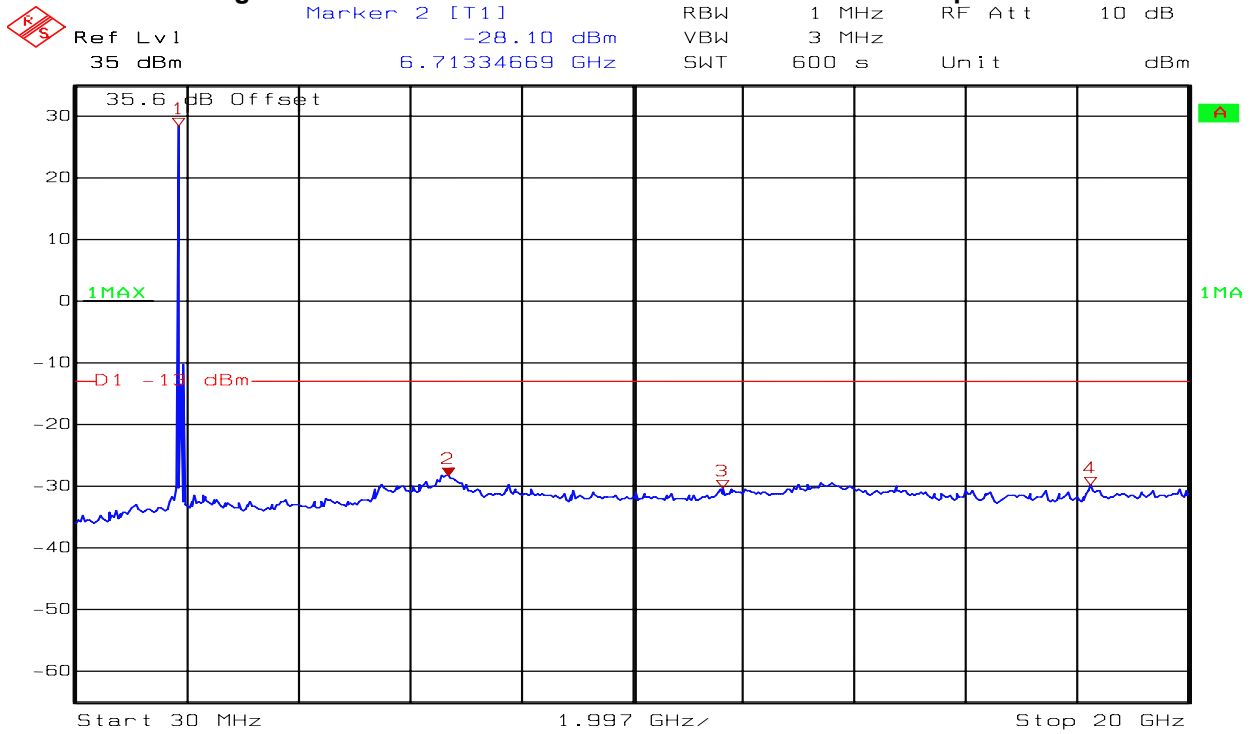
Figure 30 PCS GPRS Mode Channel 512 Conducted Spurious



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS GPRS CS-4 Ch512, 1up 1Down, MSTxLB:0
Date: 6.NOV.2009 14:10:09

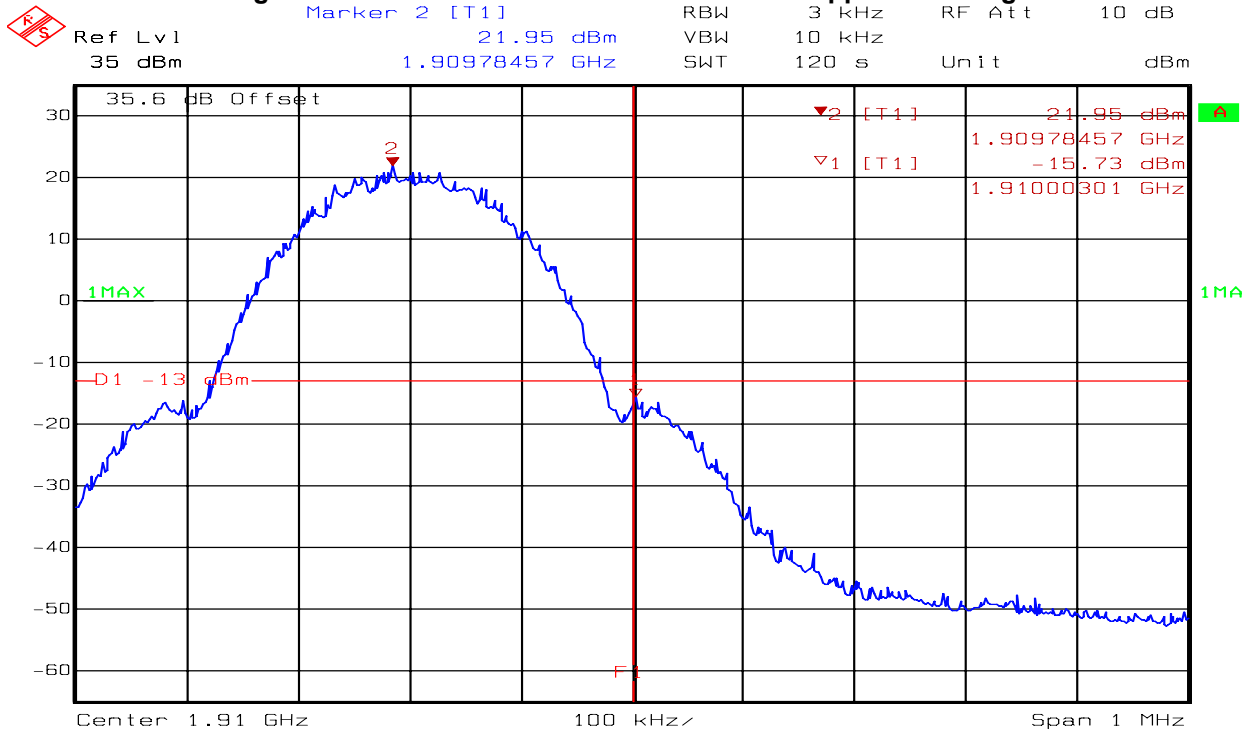
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 33 PCS EDGE Mode Channel 661 Conducted Spurious



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS EDGE 8PSK Ch661, 1up 1Down, MSTxLB:0(2)
Date: 6.NOV.2009 13:22:35

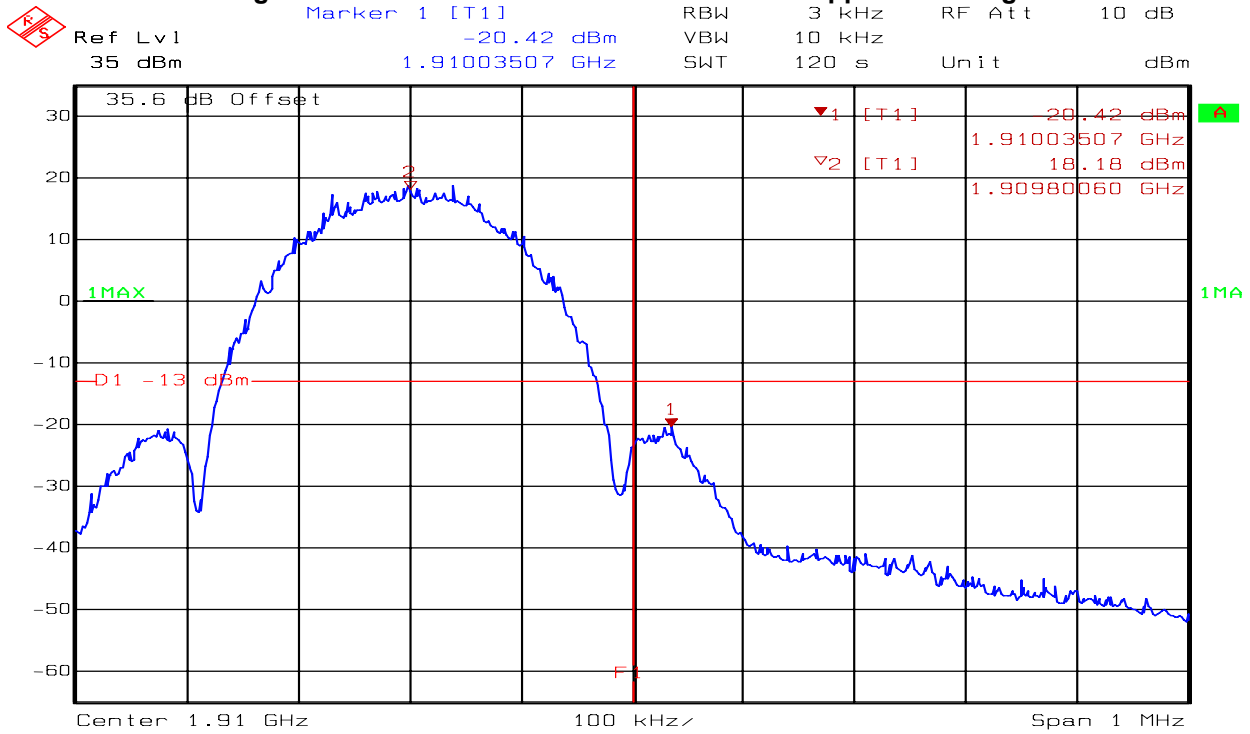
Figure 34 PCS GPRS Mode Channel 810 Upper Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS GPRS CS-4 Ch810, 1up 1Down, MSTxLB:0
Date: 6.NOV.2009 12:32:12

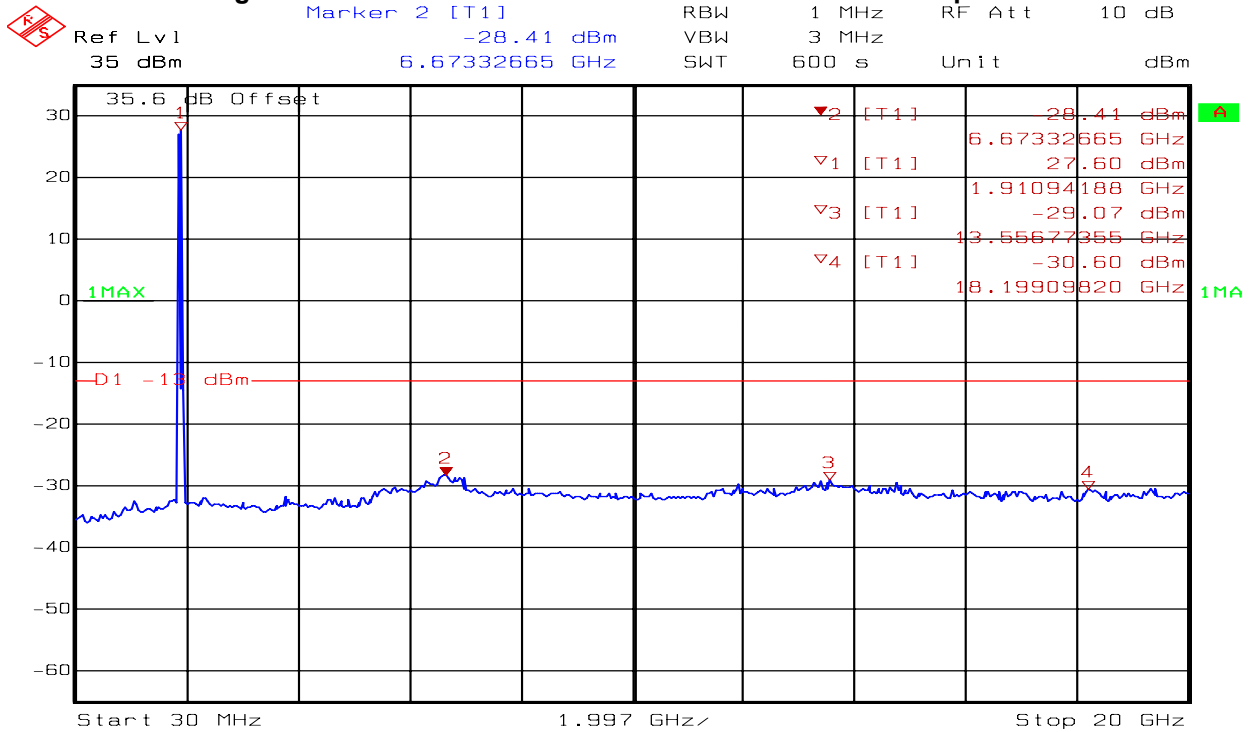
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 35 PCS EDGE Mode Channel 810 Upper Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
 Comment A: Eng.S(PA Match) PCS EDGE 8PSK Ch810, 1up 1Down, MSTxLB:0(2)
 Date: 6.NOV.2009 12:26:59

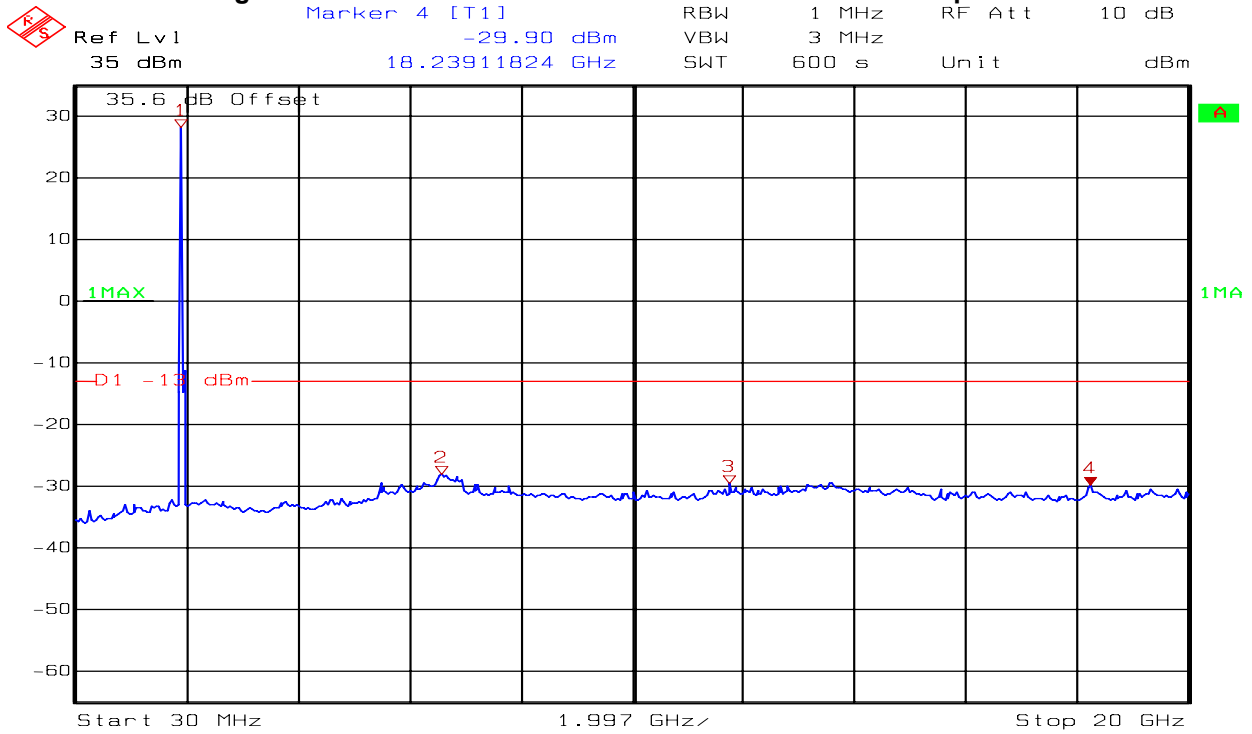
Figure 36 PCS GPRS Mode Channel 810 Conducted Spurious



Title: CG-1290 NovAtel Wireless MIFI2352R
 Comment A: Eng.S(PA Match) PCS GPRS CS-4 Ch810, 1up 1Down, MSTxLB:0
 Date: 6.NOV.2009 12:48:41

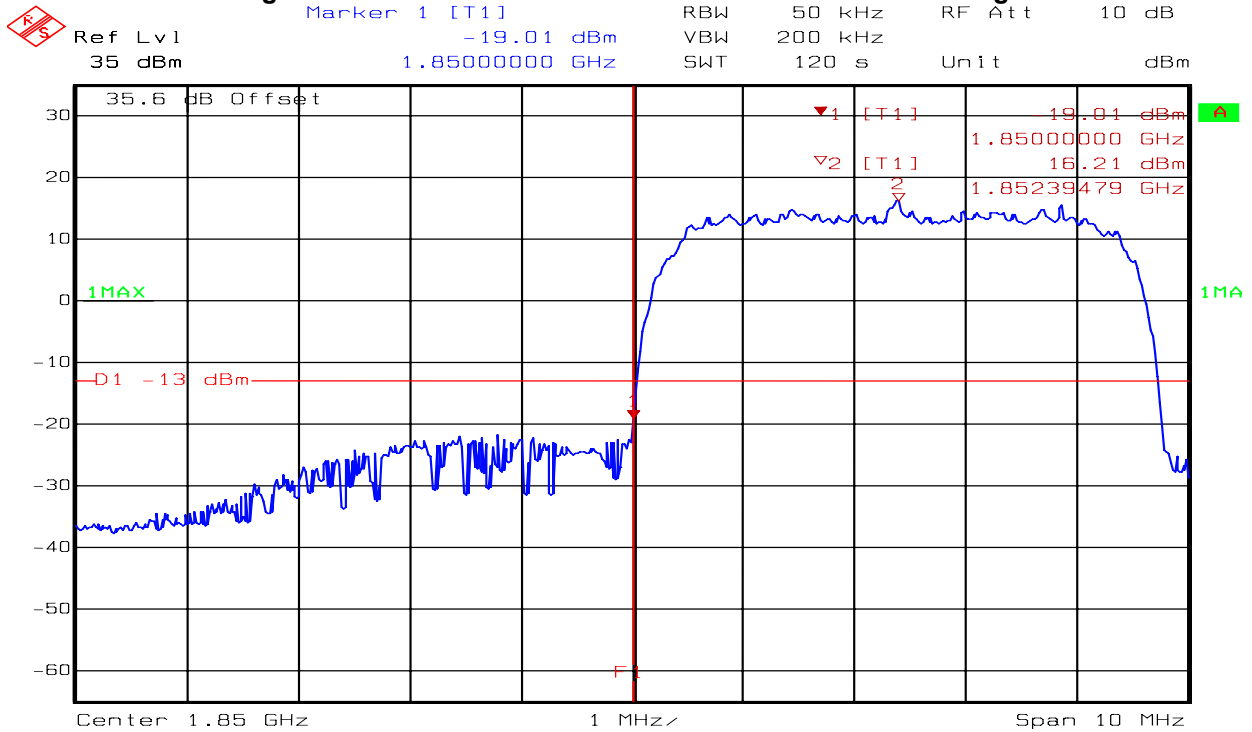
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 37 PCS EDGE Mode Channel 810 Conducted Spurious



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: Eng.S(PA Match) PCS EDGE 8PSK Ch810, 1up 1Down, MSTxLB:0(2)
Date: 6.NOV.2009 13:05:25

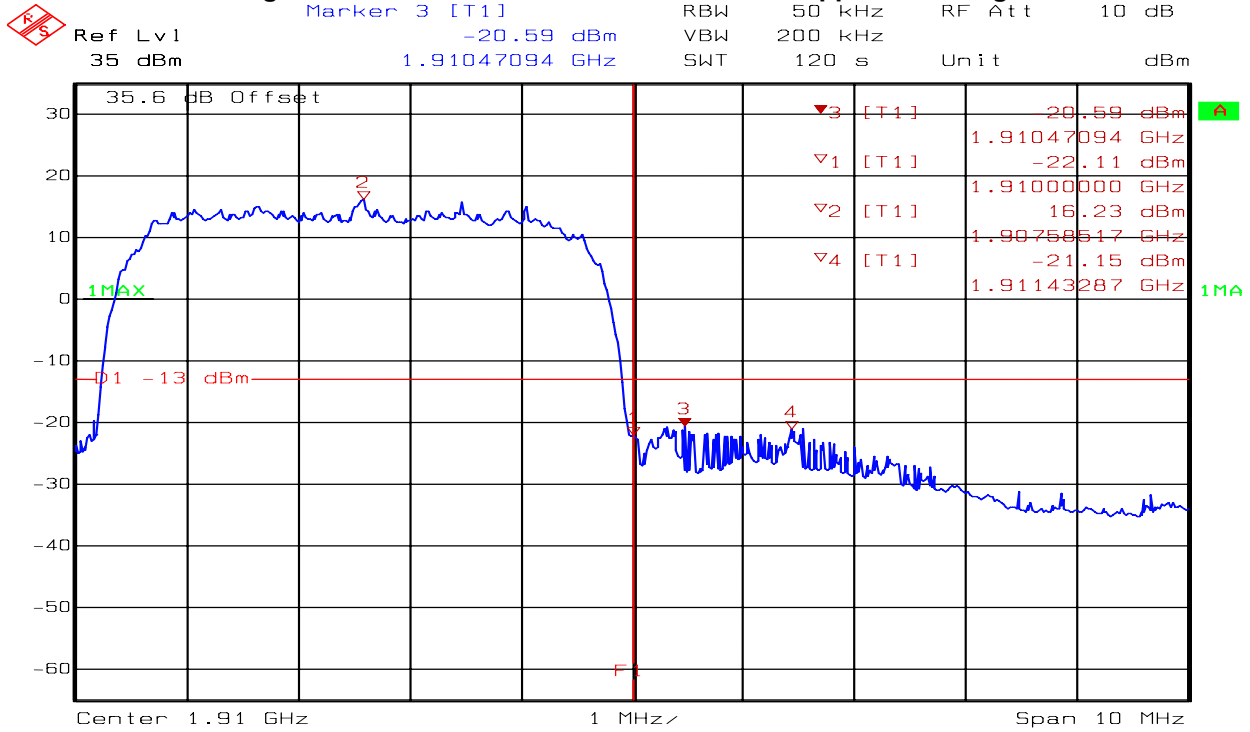
Figure 38 WCDMA Mode Channel 9262 Lower Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: #001018000212036 WCDMA Ch9262, All Up Bits 12.2k RMC
Date: 7.OCT.2009 22:59:16

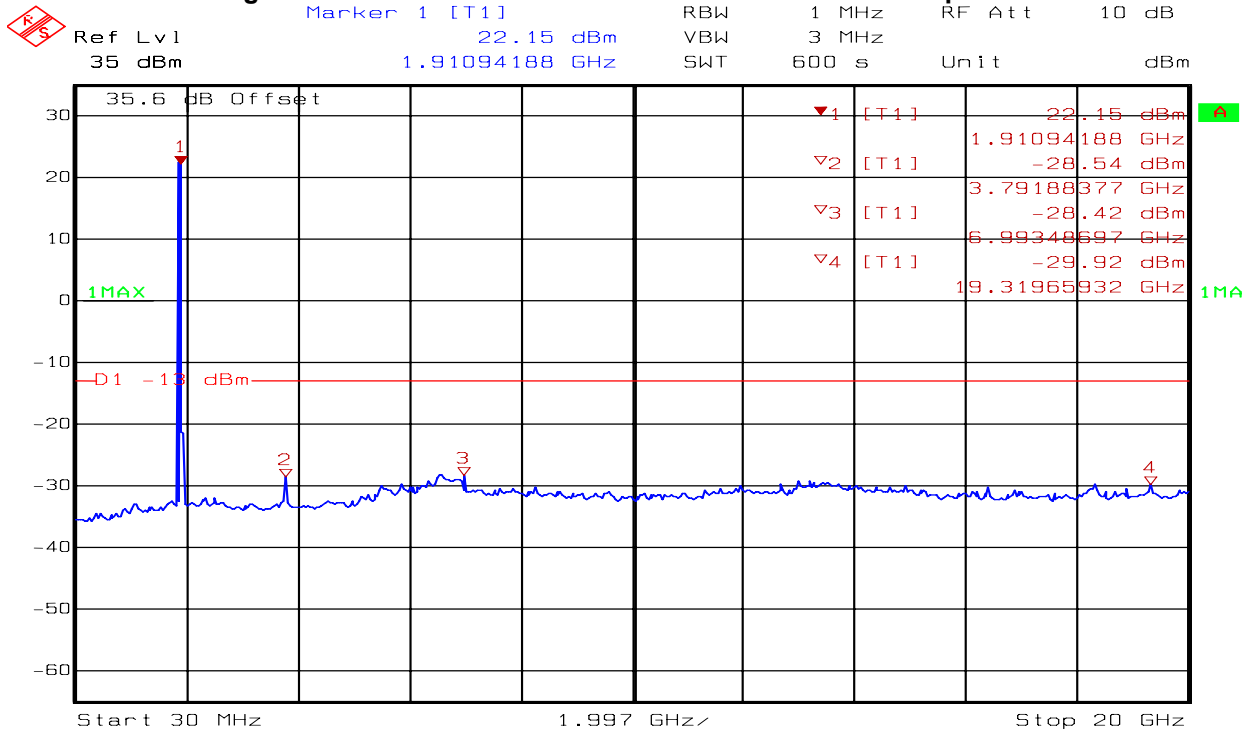
The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

Figure 41 WCDMA Mode Channel 9538 Upper Band Edge



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: #001018000212036 WCDMA Ch9538, All Up Bits 12.2k RMC
Date: 7.OCT.2009 23:08:06

Figure 42 WCDMA Mode Channel 9538 Conducted Spurious



Title: CG-1290 NovAtel Wireless MIFI2352R
Comment A: #001018000212036 WCDMA Ch9538, All Up Bits 12.2RMC
Date: 7.OCT.2009 22:20:46

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.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 Wireless/EMC Technologist

D.8. Test dates

Started: October 7, 2009

Completed: January 19, 2010

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 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:

FCC 22.917 Emission limitations for cellular equipment

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone 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 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:

FCC 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.

FCC 2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

RSS 129 / RSS 133 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

RSS Gen Receiver Spurious Emissions Test Method:

TIA/EIA 603-C-2004 (2.1.1) Radiated spurious emissions
RSS Gen; 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.

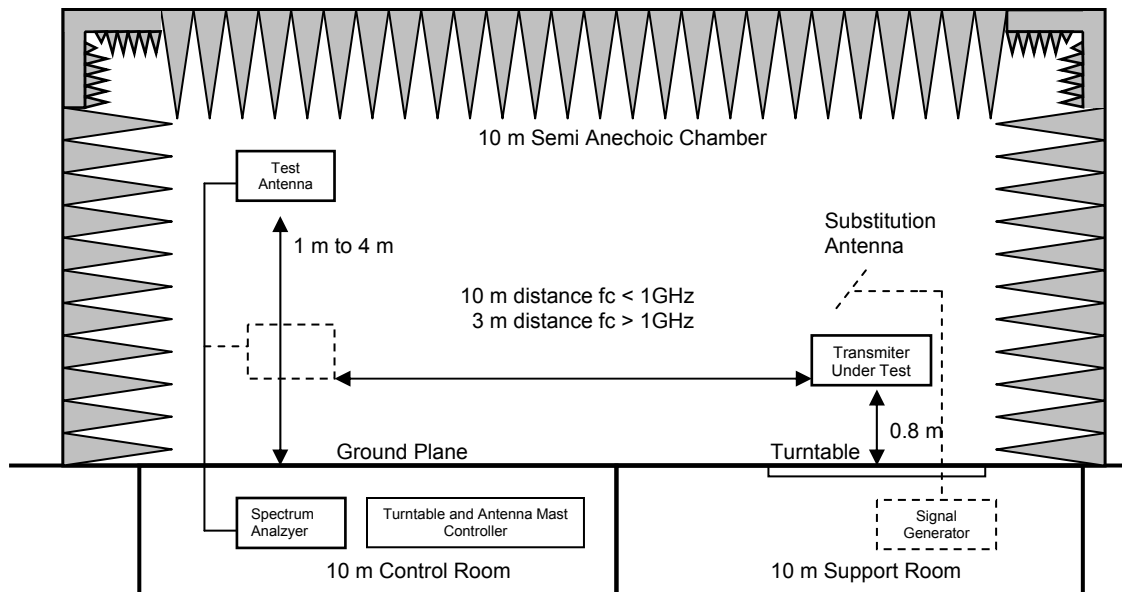
Table 1 - Spurious Emission Limits for Receivers

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.

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E.3. Test Setup Diagram



E.4. 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

CELL 850 GPRS – 1up 1down, Ms Tx level burst 5

CELL 850 EDGE – 1up 1down, Ms Tx level burst 8 (8 maximum. No change between 8 and 5)

CELL 850 WCDMA - All up bits, HSDPA active ULCLPCA: 2, 12.2 kbps RMC

PCS GPRS - 1up 1down, Ms Tx level burst 0

PCS EDGE - 1up 1down, Ms Tx level burst 2 (2 maximum. No change between 2 and 0)

PCS WCDMA – All up bits, HSDPA active at 12.2 kbps RMC

And All above modes with WLAN active (Co located with 802.11g 2440MHz 100% Duty cycle)

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

Note: Cell Mode GPRS/EDGE and PCS Mode GPRS/EDGE/WCDMA measurements were taken with MIFI2352R sample

Cell Mode WCDMA measurements were taken with MIFI2372R sample.

Please see EUT description, mode of operation section for details.

E.5. Test Results

E.5.1 Receiver Spurious Emissions

No Receiver spurious emissions were detected within 20 dB of the limit in any operating mode or band.

E.5.2 850 MHz CELL GPRS Tx Mode

Channel	Frequency (MHz)	Polarization	Measured level (dB μ V/m)	Substitution Signal Generator level (dBm)	*Substitution Antenna gain (dBd)	Cable loss (dB)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
128	1649.30	H	51.55	-54.00	6.26	1.23	-48.97	-13	35.97
	2474.95	H	49.11	-57.40	7.27	1.54	-51.67	-13	38.67
	6599.19	H	48.32	-56.00	9.49	2.72	-49.23	-13	36.23
190	1673.35	V	42.00	-63.60	6.30	1.24	-58.54	-13	45.54
	1673.35	H	43.58	-62.00	6.30	1.24	-56.94	-13	43.94
	2511.02	H	49.48	-57.00	7.30	1.57	-51.27	-13	38.27
251	2547.09	H	46.45	-60.00	7.33	1.58	-54.25	-13	41.25
	2547.10	V	41.61	-64.80	7.33	1.58	-59.05	-13	46.05

E.5.3 850 MHz CELL EDGE Tx Mode

Channel	Frequency (MHz)	Polarization	Measured level (dB μ V/m)	Substitution Signal Generator level (dBm)	*Substitution Antenna gain (dBd)	Cable loss (dB)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
128	1649.30	H	50.52	-55.00	6.26	1.23	-49.97	-13	36.97
	2474.95	H	45.20	-61.30	7.27	1.54	-55.57	-13	42.57
	1649.30	V	40.80	-64.80	6.26	1.23	-59.77	-13	46.77
190	1673.34	H	41.71	-63.90	6.26	1.23	-58.87	-13	45.87
	2511.00	H	42.88	-63.60	7.30	1.57	-57.87	-13	44.87
251	2547.10	H	45.22	-61.20	7.33	1.58	-55.45	-13	42.45
	2547.10	V	40.00	-66.40	7.33	1.58	-60.65	-13	47.65

E.5.4 850 MHz WCDMA Tx Mode Band V

Channel	Frequency (MHz)	Polarization	Measured level (dB μ V/m)	Substitution Signal Generator level (dBm)	Substitution Antenna gain (dBd)	Cable loss (dB)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
4132	1650.91	H	56.17	-49.50	6.22	1.23	-44.51	-13	31.51
	1655.33	V	56.25	-49.40	6.23	1.23	-44.40	-13	31.40
4182	1670.70	H	53.67	-52.00	6.25	1.23	-46.98	-13	33.98
	1674.98	V	54.90	-50.70	6.26	1.24	-45.68	-13	32.68
4233	1691.29	H	58.48	-47.10	6.28	1.24	-42.06	-13	29.06
	1695.34	V	54.62	-51.00	6.29	1.24	-45.95	-13	32.95

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E.5.5 PCS Band – GPRS Tx Mode

Channel	Frequency (MHz)	Polarization	Measured level (dBμV/m)	Substitution Signal Generator level (dBm)	*Substitution Antenna gain (dBd)	Cable loss (dB)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
512	3697.40	H	51.01	-52.70	7.77	2.00	-46.93	-13	33.93
	3697.40	V	48.72	-56.00	7.77	2.00	-50.23	-13	37.23
	5555.11	H	51.22	-53.70	9.12	2.50	-47.08	-13	34.08
	5555.11	V	49.46	-54.80	9.12	2.50	-48.18	-13	35.18
	12957.91	V	55.31	-50.00	10.77	3.88	-43.11	-13	30.11
661	3757.52	H	53.63	-50.00	7.77	2.02	-44.25	-13	31.25
	3757.51	V	49.79	-54.80	7.77	2.02	-49.05	-13	36.05
	9390.78	V	53.79	-50.40	9.57	3.21	-44.04	-13	31.04
	13158.31	V	57.74	-46.50	10.52	3.91	-39.89	-13	26.89
810	3817.63	H	52.82	-50.50	7.76	2.06	-44.80	-13	31.80
	3817.64	V	51.44	-53.00	7.76	2.06	-47.30	-13	34.30
	9541.08	V	53.85	-50.00	9.69	3.25	-43.56	-13	30.56
	11454.90	V	54.61	-51.10	10.58	2.70	-43.22	-13	30.22
	13368.73	V	56.75	-47.00	10.17	3.95	-40.78	-13	27.78

E.5.6 PCS Band – EDGE Tx Mode

Channel	Frequency (MHz)	Polarization	Measured level (dBμV/m)	Substitution Signal Generator level (dBm)	*Substitution Antenna gain (dBd)	Cable loss (dB)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
512	3697.39	H	51.36	-52.30	7.77	2.00	-46.53	-13	33.53
	3697.39	V	49.35	-55.40	7.77	2.00	-49.63	-13	36.63
	5555.11	H	50.33	-54.60	9.12	2.50	-47.98	-13	34.98
	5555.11	V	48.23	-56.00	9.12	2.50	-49.38	-13	36.38
	12957.91	V	55.20	-50.10	10.77	3.88	-43.21	-13	30.21
661	3757.52	H	53.98	-49.60	7.77	2.02	-43.85	-13	30.85
	3757.51	V	50.09	-54.50	7.77	2.02	-48.75	-13	35.75
	9400.00	V	53.00	-51.20	9.57	3.21	-44.84	-13	31.84
	13168.33	V	56.82	-47.40	10.50	3.91	-40.81	-13	27.81
810	3817.63	H	52.95	-50.40	7.76	2.06	-44.70	-13	31.70
	3817.64	V	51.64	-52.80	7.76	2.06	-47.10	-13	34.10
	9541.08	V	53.06	-50.80	9.69	3.25	-44.36	-13	31.36
	11454.90	V	54.80	-50.90	10.58	2.70	-43.02	-13	30.02
	13368.73	V	56.91	-46.80	10.17	3.95	-40.58	-13	27.58

* Substitution Antenna gain (dBd) = Substitution Antenna gain (dBi) – Dipole Antenna gain (dBi)

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E.5.7 PCS Band WCDMA Tx Mode Band II

Channel	Frequency (MHz)	Polarization	Measured level (dB μ V/m)	Substitution Signal Generator level (dBm)	Substitution Antenna gain (dBd)	Cable loss (dB)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
9262	3706.74	H	64.82	-39.45	7.77	2.00	-33.68	-13	20.68
	3706.66	V	55.40	-48.80	7.77	2.00	-43.03	-13	30.03
9400	3757.90	H	57.65	-47.00	7.77	2.02	-41.25	-13	28.25
	3757.74	V	49.66	-55.00	7.77	2.02	-49.25	-13	36.25
9538	3817.14	H	61.49	-43.00	7.77	2.04	-37.27	-13	24.27
	3817.18	V	50.75	-53.80	7.77	2.04	-48.07	-13	35.07

E.5.8 Co-located Tx with 802.11g, Ch6, 100% Duty cycle, 54mbps, Power setting: 13

Modes and Channels	Frequency (MHz)	Polarization	Measured level (dB μ V/m)	Substitution Signal Generator level (dBm)	Sub. Ant. gain (dBd)	Cable loss (dB)	ERP Level (dBm)	Limit (dBm)	Margin (dB)
PCS GPRS Ch512	583.56	H	53.04	-39.90	0.0	0.79	-40.69	-13	27.69
PCS GPRS Ch661	553.50	H	55.81	-37.30	0.1	0.76	-37.96	-13	24.96
PCS GPRS Ch810	519.83	H	57.41	-36.30	0.1	0.77	-36.97	-13	23.97
PCS EDGE Ch512	581.16	H	52.64	-40.80	0.0	0.79	-41.59	-13	28.59
PCS EDGE Ch661	551.40	H	55.73	-37.30	0.1	0.78	-37.98	-13	24.98
PCS EDGE Ch810	519.63	H	57.78	-36.00	0.1	0.76	-36.66	-13	23.66

Note: There were no Co-located spurious emission observed in Cell GPRS / EDGE / WCDMA modes and PCS WCDMA modes.

E.6. 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 Wireless/EMC Technologist

E.7. Test dates

Started: October 8, 2009

Completed: January 22, 2010

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APPENDIX F: TEST EQUIPMENT LIST

Manufacturer	Type/Model		Asset #	Cal Due	Cal Date
Bilog Antenna	Teseq	CBL 6112B	CG0314	21SEP10	29OCT08
Horn Antenna (Rx) 1 GHz – 18 GHz	EMCO	3115	CG0103	06MAR11	30SEP08
Standard Gain Horn (Rx) 18 GHz – 26.5 GHz	EMCO	3160-09	CG0075	N/A (1)	27NOV01
Dipole Antenna Set (Substitution)	EMCO	3121	CG0104	02FEB11	02FEB09
Horn Antenna (Substitution)	EMCO	3115	CG0368	08SEP11	08SEP09
Standard Gain Horn (Substitution)	EMCO	3160-09	CG0076	N/A (1)	27NOV01
LNA 1 GHz < f < 18 GHz	Miteq	JSD00121	CG0317	01DEC10	01DEC08
LNA 18GHz < f < 26.5GHz	Miteq	JSD00119	CG0482	02OCT11	02OCT09
High pass filter f > 1000 MHz	MicroTronics	HPM14576	CG0963	01DEC10	01DEC08
High pass filter f > 2800 MHz	MicroTronics	HPM50111	CG0964	N/A	N/A
Spectrum Analyzer 9 kHz – 40 GHz	Rohde & Schwarz	FSEK-20	CG0118	06AUG10	06AUG09
Test Receiver	Rohde & Schwarz	ESAI	CG0123 CG0124	26FEB10	26FEB09
Signal Generator	R & S	SMP-04	CG0435	22DEC10	22DEC08
Wireless Communication Test Set	Agilent	8960 E5515C	CG-R- 1286	02OCT11	24SEP09
Environmental Simulation Chamber	Thermotron	SM-8C	CG0001	N/A	N/A
Data Logger	Fluke	Fluke	CG0203	10FEB10	10OCT08
Voltmeter	Fluke	87	CG0383	17FEB10	17FEB09
DC Power Source	HP	6675A	CG1362	N/A	N/A
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

(1): As per manufacturer recommend, this item does not require periodic calibration. Its electromagnetic performance is almost exclusively depended on the physical dimension of the horn. A thorough mechanical check is all that is needed to guarantee the antenna performance.

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END OF DOCUMENT

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