Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

Sony Ericsson Mobile Communications

Nya Vattentornet
Lund, 221 83
Sweden

MODEL: CM52 (3W)
CDMA 800 & 1900 MHz/AMPS 800 MHz (Class I) Device

FCC ID: PY7BE001011

July 28, 2005

Standards Referenced For This Report	
Part 2: 2003	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2003	Radio frequency devices - §15.109: Radiated Emissions Limits
Part 22: 2004	Public Mobile Services: Subpart H – Cellular Radiotelephone Services
Part 24: 2004	Personal Communications Services: Subpart E – Broadband PCS
ANSI C63.4-2003	American National Standard for Methods of Measurement of Radio Noise Emissions from Low -Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
ANSI/TIA/EIA-603-2002	Land Portable FM or PM Communications Equipment - Measurement and Performance Standards
RSS-129; Issue 6; 1999	800 MHz Dual Mode CDMA Cellular Telephones
RSS-133; Issue 2, Rev. 1; 1999	2 GHz Personal Communications Services

Frequency Range (MHz)	Maximum Measured Output Power (W) Conducted	Measured Frequency Tolerance (ppm)	Emission Designator
824.04-848.97 (AMPS)	3.02	2.5	40K0F1D
824.04-848.97 (AMPS)	3.02	2.5	40K0F8W
824.7-848.31 (CDMA Cellular)	0.229	2.5	1M28F9W
1851.25-1908.75 (CDMA PCS)	0.204	2.5	1M28F9W

REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS

Document Number: 2005032/QRTL04-244

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1 GENERAL INFORMATION

The following report is prepared on behalf of **Sony Ericsson Mobile Communications, Inc**. in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was Model: **CM52 (3W); FCC ID: PY7BE001011**. The test results reported in this document relate only to the item that was tested.

FCC Rules Part 22.901: The rules in this subpart govern the licensing and operation of cellular radiotelephone systems.

FCC Rules Part 24 (E): The rules in this subpart govern Personal Communications Services – Broadband PCS.

IC RSS-129: This Radio Standards Specification (RSS) and the TIA/EIA-627 Compatibility Standard referred to in section 3.10 set out the minimum requirements for the certification (type-approval) of transmitters and receivers for the dual-mode (analog and digital CDMA) cellular telephone system in the 824-849 MHz and 869-894 MHz paired bands.

IC RSS-133: This Radio Standards Specification (RSS) sets out the minimum requirements for the certification (type-approval) of transmitters and receivers for the personal communications services in the 2 GHz band. The bands available are the 1850-1910 MHz and 1930-1990 MHz bands.

All measurements contained in this application were conducted in accordance with the FCC Rules and Regulations CFR47, Industry Canada RSS-129 and ANSI/TIA/EIA 603-2002 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is a new certification application.

1.3 PRODUCT DESCRIPTION

The CM52 (3W) dual band dual mode CDMA transceiver module is intended for mounting in a chassis to provide wireless communications capabilities. The module uses CDMA2000 1 x RTT and AMPS communication networks. The EUT was provided with client-based software to exercise the EUT.

Trade Name	CM52 (3W)
Use of Product	Voice and data communications
FCC Identifier	**PY7BE001011**
Type Modulation	CDMA, AMPS
Bit Rate	153 kbps
Max. RF Output	3 W (AMPS mode)
Frequency Range	800/1900 MHz and 800 MHz AMPS
Antenna Gain	</= 1 dBi
External Input	50 ohm antenna, AT command serial
Overall Dimensions	114.6 mm x 49.5 mm x 10 mm
Weight	65 g

2 CONFORMANCE STATEMENT

Standards Referenced For This Report	
Part 2: 2003	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2003	Radio frequency devices - §15.109: Radiated Emissions Limits
Part 22: 2004	Public Mobile Services: Subpart H – Cellular Radiotelephone Services
Part 24: 2004	Personal Communications Services: Subpart E – Broadband PCS
ANSI C63.4-2003	American National Standard for Methods of Measurement of Radio Noise Emissions from Low -Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
ANSI/TIA/EIA-603-2002	Land Portable FM or PM Communications Equipment - Measurement and Performance Standards
RSS-129; Issue 6; 1999	800 MHz Dual Mode CDMA Cellular Telephones
RSS-133; Issue 2, Rev. 1; 1999	2 GHz Personal Communications Services

Frequency Range (MHz)	Maximum Measured Output Power (W) Conducted	Measured Frequency Tolerance (ppm)	Emission Designator
824.04-848.97 (AMPS)	3.02	2.5	40K0F1D
824.04-848.97 (AMPS)	3.02	2.5	40K0F8W
824.7-848.31 (CDMA Cellular)	0.229	2.5	1M28F9W
1851.25-1908.75 (CDMA PCS)	0.204	2.5	1M28F9W

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to, or exclusions from, the above standards for certification methodology.

Signature: _____ Date: July 28, 2005
Typed/Printed Name: Desmond A. Fraser Position: President

Signature: _____ Date: July 28, 2005
Typed/Printed Name: Daniel W. Biggs Position: Test Engineer

3 TESTED SYSTEM DETAILS

The EUT was received at Rhein Tech Laboratories on March 15, 2005. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

Part	Manufacturer	Model	Serial Number/PN	FCC ID	Cable Type/Size	RTL Bar Code
Transceiver	Sony Ericsson Mobile Communications, Inc.	CM52 (3W)	231-16101518	PY7BE001011	39 pin ribbon	16593

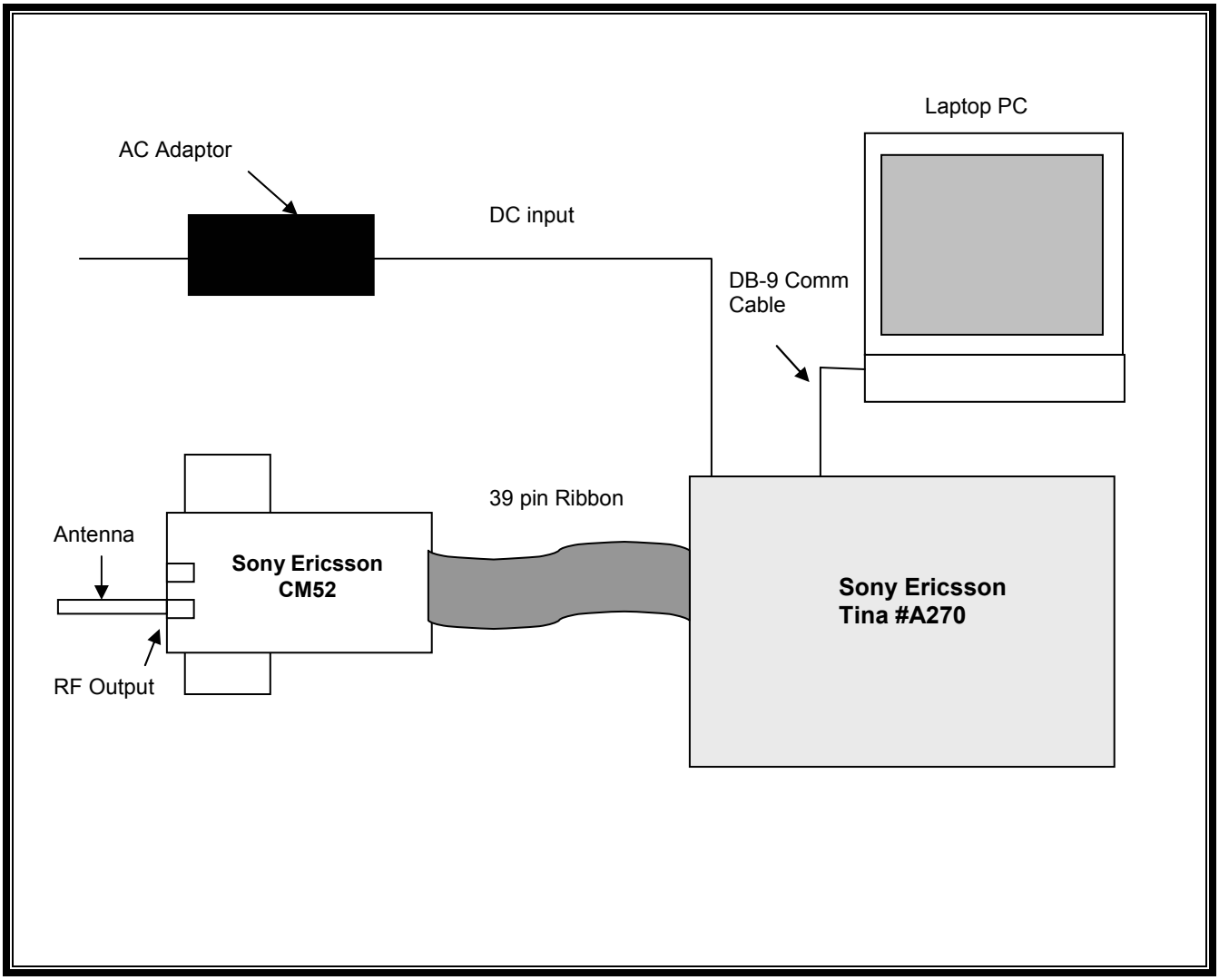
TABLE 3-2: SUPPORT EQUIPMENT

Part	Manufacturer	Model	Serial Number/PN	FCC ID	Cable Type/ Size	RTL Bar Code
Test Board	Sony Ericsson Mobile Communications, Inc.	Tina #A270	N/A	N/A	6' dB9 M/F Serial	16591
Test Board	Sony Ericsson Mobile Communications, Inc.	Tina #A269	N/A	N/A	6' dB9 M/F Serial	16587
Antenna	N/A	SMA	N/A	N/A	SMA	N/A
AC Adapter	Cincon Electronics Co., Ltd.	TR45A12	45120-0020842	N/A	1.2m unshielded DC; 1.8m unshielded AC	16589
Laptop PC	Dell	Latitude	N/A	N/A	N/A	16600

3.1 EXERCISING THE EUT

The CM52 (3W) was tested using client-based software to set all the parameters required for testing, such as power level, modulation type, frequency, and receive modes. There were no deviations from the test standard(s) and/or method(s).

FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM



4 NECESSARY BANDWIDTH AND EMISSION BANDWIDTH - §2.202

Type of Emission: F8W, F1D

Necessary Bandwidth and Emission Bandwidth:

40K0F1D
40K0F8W

Calculation for 40K0F1D (Wide Band Data)

1/ Voice + SAT
Modulation: Wideband Data is 10 kHz and SAT is 6 kHz, thus the maximum modulation is M = 10 kHz
Deviation: Wideband Data is 8 kHz and SAT is 2 kHz, thus the maximum deviation is D = 8+2 = 10 kHz
Bn = 2xM+2xDK with K = 1
Bn = 40 kHz

Calculation for 40K0F8W

1/ Voice + SAT
Modulation: Voice is 2.5 kHz and SAT is 6 kHz, thus the maximum modulation is M = 6 kHz
Deviation: Voice is 12 kHz and SAT is 2 kHz, thus the maximum deviation is D = 12+2 = 14 kHz
Bn = 2xM+2xDK with K = 1
Bn = 40 kHz

2/ Signaling Tone (ST) + SAT
Modulation: ST is 10 kHz and SAT is 6 kHz, thus the maximum modulation is M = 10 kHz
Deviation: ST is 8 kHz and SAT is 2 kHz, thus the maximum deviation is D = 8+2 = 10 kHz
Bn = 2xM+2xDK with K = 1
Bn = 40 kHz

5 DC VOLTAGES AND CURRENTS - PART §2.1033(C)(8); VOLTAGES AND CURRENTS THROUGH THE FINAL AMPLIFYING STAGE

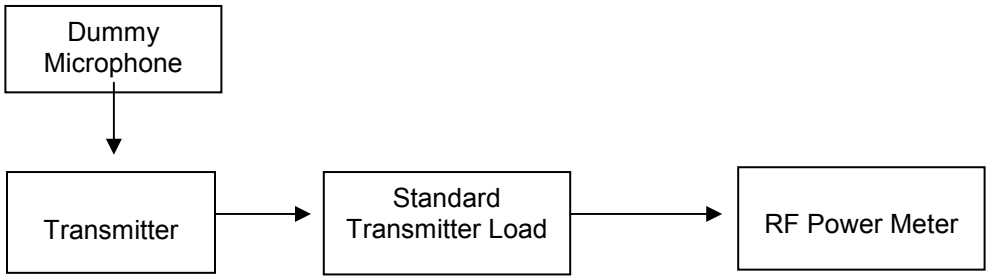
The dc voltages applied to, and dc currents into, the several elements of the final radio frequency amplifying device for normal operation over the power range are shown in the table below.

LABEL	LEVEL (VOLTS)	TOLERANCE	MAX. CURRENT
VCC_5V	5	+/-10%	
VCC_12V	13.8	+/-20%	
VDIG	2.9	+/-2%	150 mA
VCODEC	2.6	+/-2%	100 mA
VCORE	2.6	+/-2%	100 mA
VPA	4	+/-3%	1000 mA
VBT	3.1	+/-2%	150 mA
VBATTIN	5		
VTX	2.9		164 mA
VRX	2.9		80 mA
VSYNTH	2.9		150 mA
VGPS	3.3		
VRTC			
VRXRF	2.9	+/-2%	
12V_PA	13.8	+/-20%	1A
12V_SW	13.8	+/-20%	1A
VCC_10V	10	+/-20%	5 mA
VGRF	3.3		
VRXRF_PCS	2.9		
VTCXO	2.8	+/-2%	150 mA
VGCORE	3.3		

6 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED; PART 22 §22.913 – EFFECTIVE RADIATED POWER LIMITS; PART 24 §24.232 – POWER AND ANTENNA HEIGHT LIMITS; RSS-129 §7 – OUTPUT POWER; RSS-133 §6.2 – OUTPUT POWER TEST

6.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.1
The EUT was connected to a coaxial attenuator having a 50Ω load impedance.



6.2 EFFECTIVE RADIATED POWER LIMITS - §22.913

Maximum ERP – The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

6.3 POWER LIMITS - §24.232

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.

6.4 TEST CHANNELS

The following channels (in MHz) were tested:

AMPS Mode	991 (824.04 MHz)
	383 (836.49 MHz)
	799 (848.97 MHz)
800 MHz CDMA	1013 (824.7 MHz)
	384 (837 MHz)
	777 (848.31 MHz)
1900 MHz PCS CDMA	25 (1851.25 MHz)
	600 (1878.75 MHz)
	1175 (1908.75 MHz)

6.5 POWER OUTPUT TEST DATA

TABLE 6-1: RF POWER OUTPUT: CARRIER OUTPUT POWER – 800 MHZ AMPS MODE

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (dBm)	RF Power Measured (Watts)*
991	824.04	34.8	3.02
383	836.49	34.75	2.98
799	848.97	34.1	2.57

* Measurement accuracy: +/- .04 dB (logarithmic mode)

TABLE 6-2: RF POWER OUTPUT: CARRIER OUTPUT POWER – 800 MHZ CDMA MODE

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (dBm)	RF Power Measured (Watts)*
1013	824.70	23.6	0.229
384	836.52	23.5	0.224
777	848.31	23.5	0.224

* Measurement accuracy: +/- .04 dB (logarithmic mode)

TABLE 6-3: RF POWER OUTPUT: CARRIER OUTPUT POWER – 1900 MHZ PCS CDMA MODE

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (dBm)	RF Power Measured (Watts)*
025	1851.25	23.1	0.204
600	1878.75	23.1	0.204
1175	1908.75	23.1	0.204

* Measurement accuracy: +/- .02 dB (logarithmic mode)

TABLE 6-4: RF POWER OUTPUT (RATED POWER)

Mode	Rated Power (W)
800 MHZ AMPS Mode	3.2
800 MHz CDMA mode	0.25
1900 MHz PCS CDMA mode	0.25

TABLE 6-5: RADIATED POWER - AMPS

AMPS	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)
836.490	114.5	38.2	3.8	-1.2	33.2	2.1	7

TABLE 6-6: RADIATED POWER – CDMA CELLULAR

CDMA Cellular	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)
837.000	103.0	27.7	3.5	-1.4	22.8	0.191	7

TABLE 6-7: RADIATED POWER – CDMA PCS

CDMA PCS	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
1880.000	92.33	20.8	5.6	7.2	22.4	0.175	2

TABLE 6-8: TEST EQUIPMENT USED FOR RF POWER OUTPUT TESTING

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184/901186	Agilent	E4416A/E9323A	Power Meter/Sensor	GB41050573/US420.5 2510380	08/02/05
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	09/20/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	08/11/05
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 – 20 GHz)	3610A00866	09/05/05
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901231	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/01/05
901232	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/01/05
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cables	36"	9/01/05
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridged Guide Antenna (1 - 18 GHz)	2310	2/17/06

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	April 13, 2005
Test Technician/Engineer	Signature	Date Of Test

7 FCC RULES AND REGULATIONS PART 2 §2.1049(C)(1): OCCUPIED BANDWIDTH; PART 22 §22.917: EMISSIONS LIMITATIONS FOR CELLULAR EQUIPMENT; PART 24 §24.238: EMISSIONS LIMITATIONS FOR PCS EQUIPMENT

Occupied Bandwidth - Compliance with the Emission Masks

7.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.11 and TIA/EIA-102.CAAA-2002 section 2.2.5

Device with audio modulation: Transmitter was modulated with a 2,500 Hz sine wave at an input level of 16 dB greater than that required to produce 50% of rated system deviation at 1,000 Hz.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600 bps.

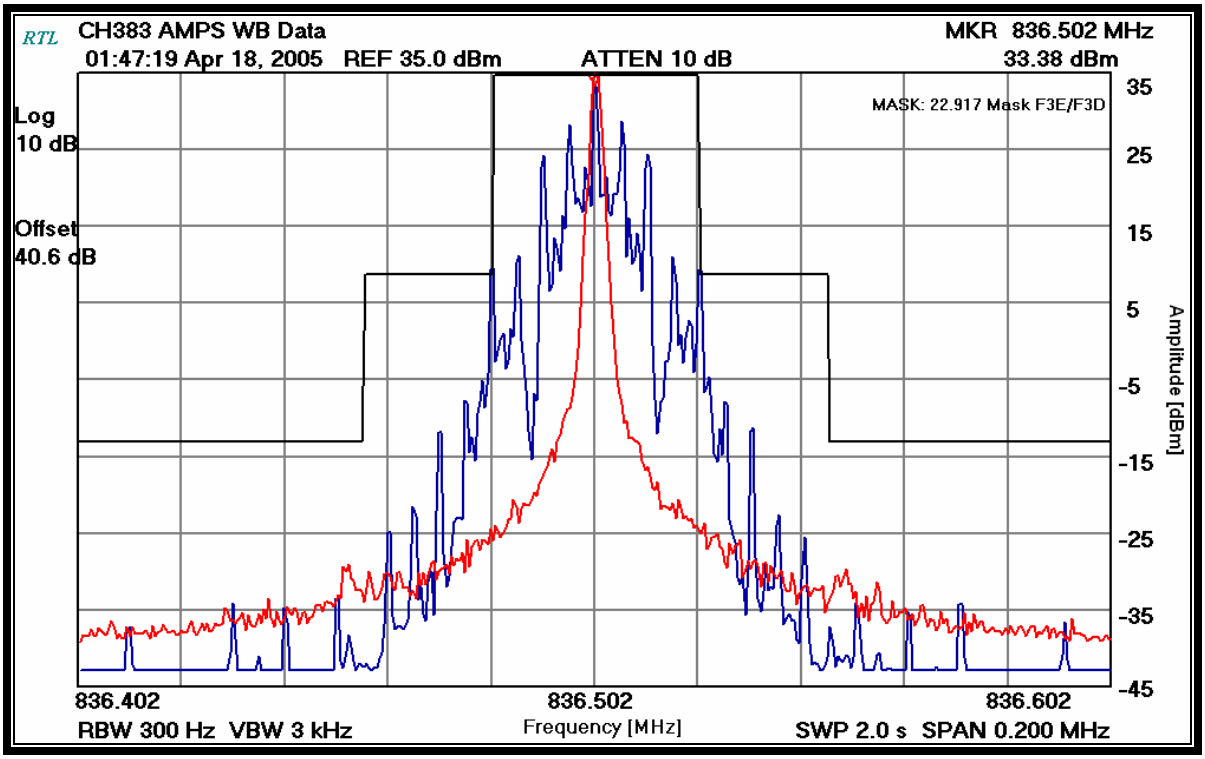
7.2 EMISSION LIMITS

100% of the in-band modulation was below the specified mask per §22.917(C):

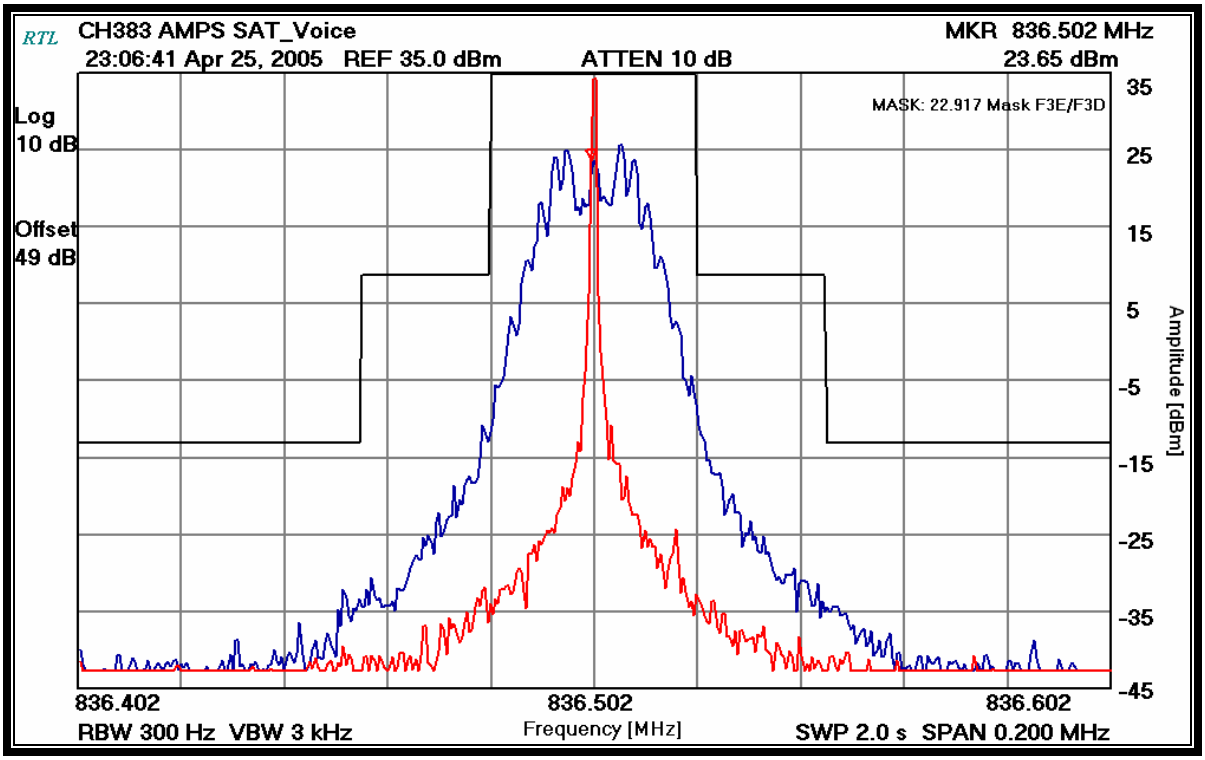
A. On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the sideband was at least 26 dB below the carrier.
B. On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to and including 90 kHz, the sideband was at least 45 dB below the carrier.
C. On any frequency removed from the assigned carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency, the sideband was at least 60 dB below the carrier of 43 + log10 (mean power output in Watts) dB, whichever was the smaller attenuation.

7.3 TEST DATA

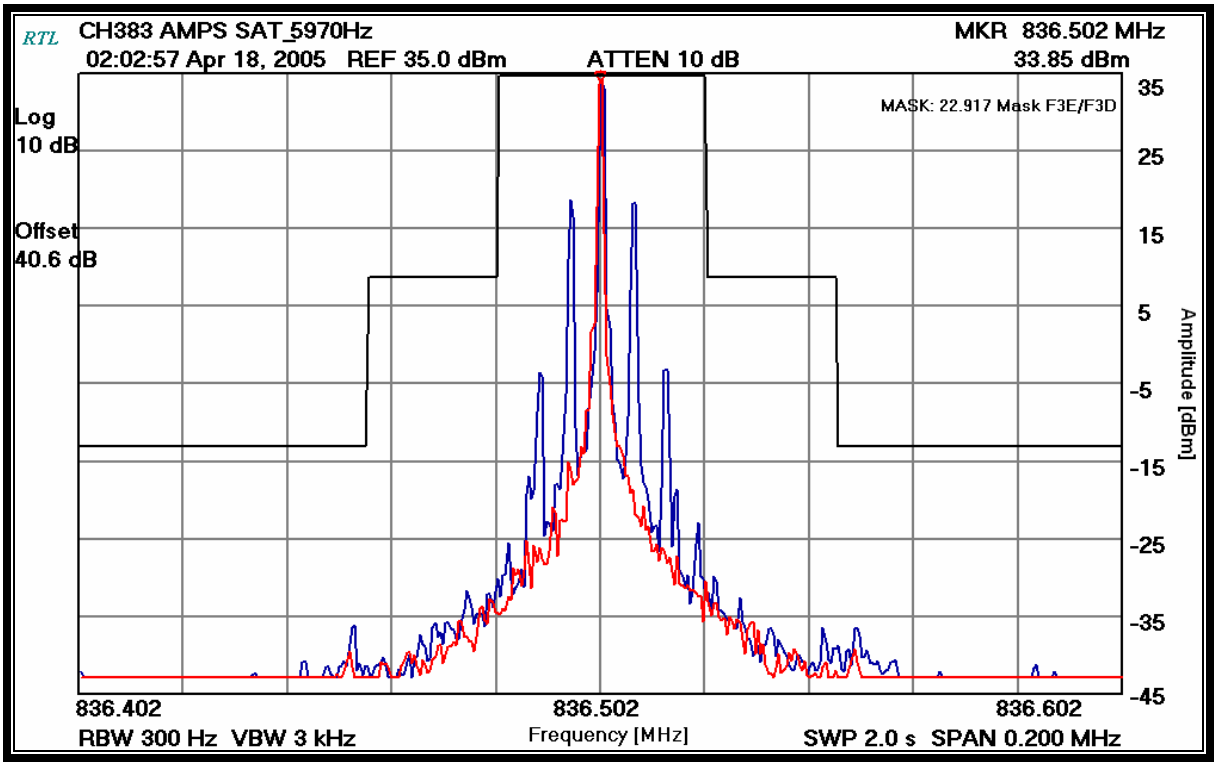
PLOT 7-1: OCCUPIED BANDWIDTH - 40 KHZ CHANNEL BANDWIDTH – WIDEBAND DATA 836.49 MHZ



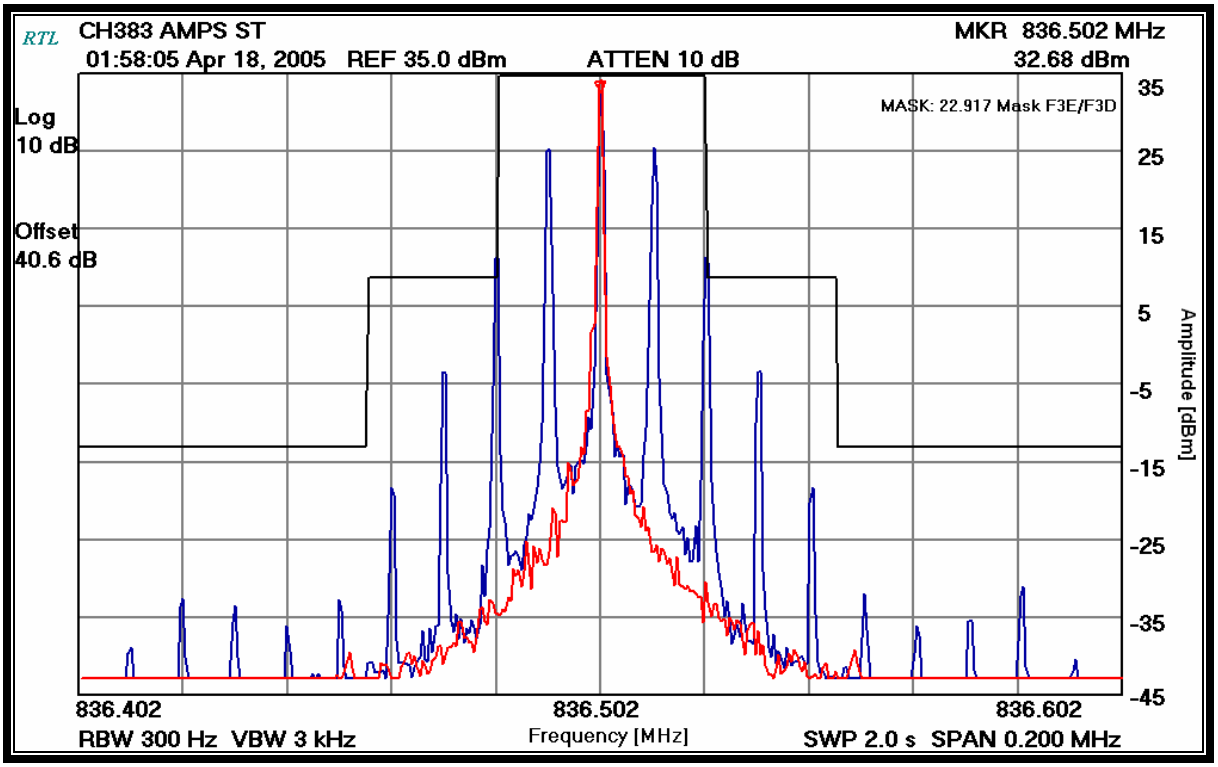
PLOT 7-2: OCCUPIED BANDWIDTH - AMPS VOICE/SAT - (MASK 22.917)



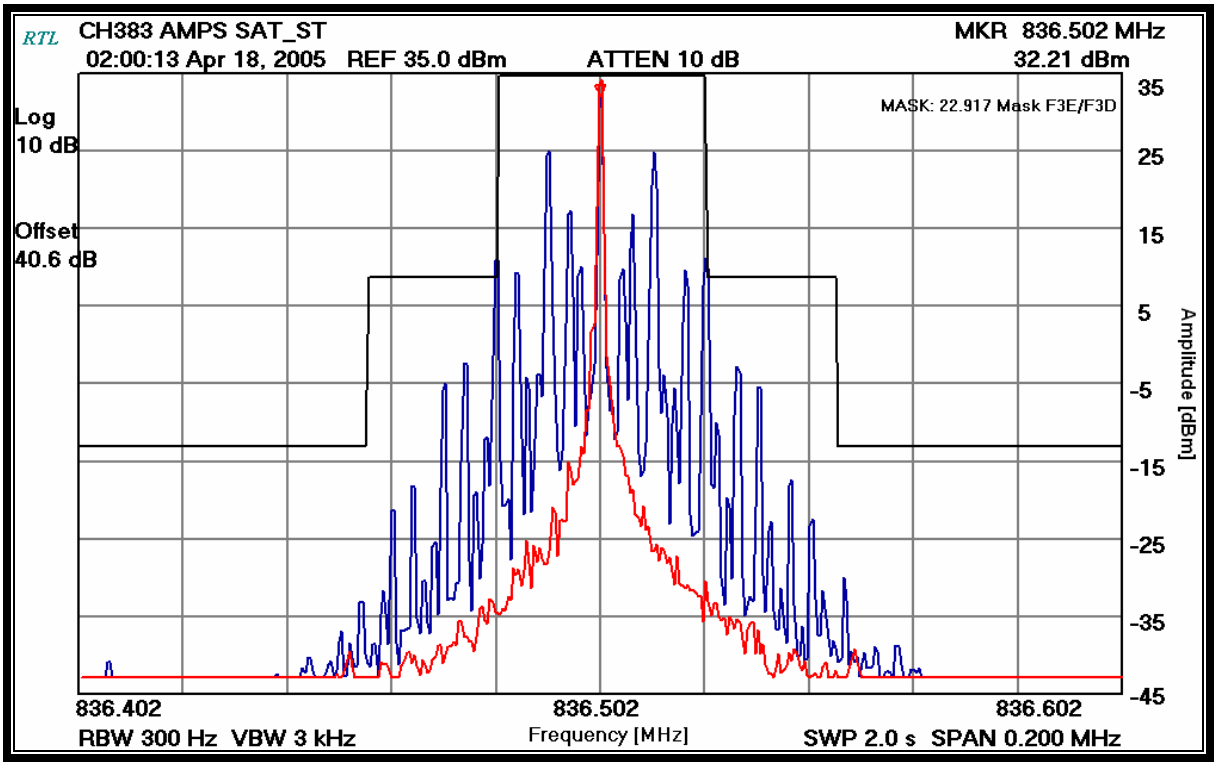
PLOT 7-3: OCCUPIED BANDWIDTH - AMPS SAT - (MASK 22.917)



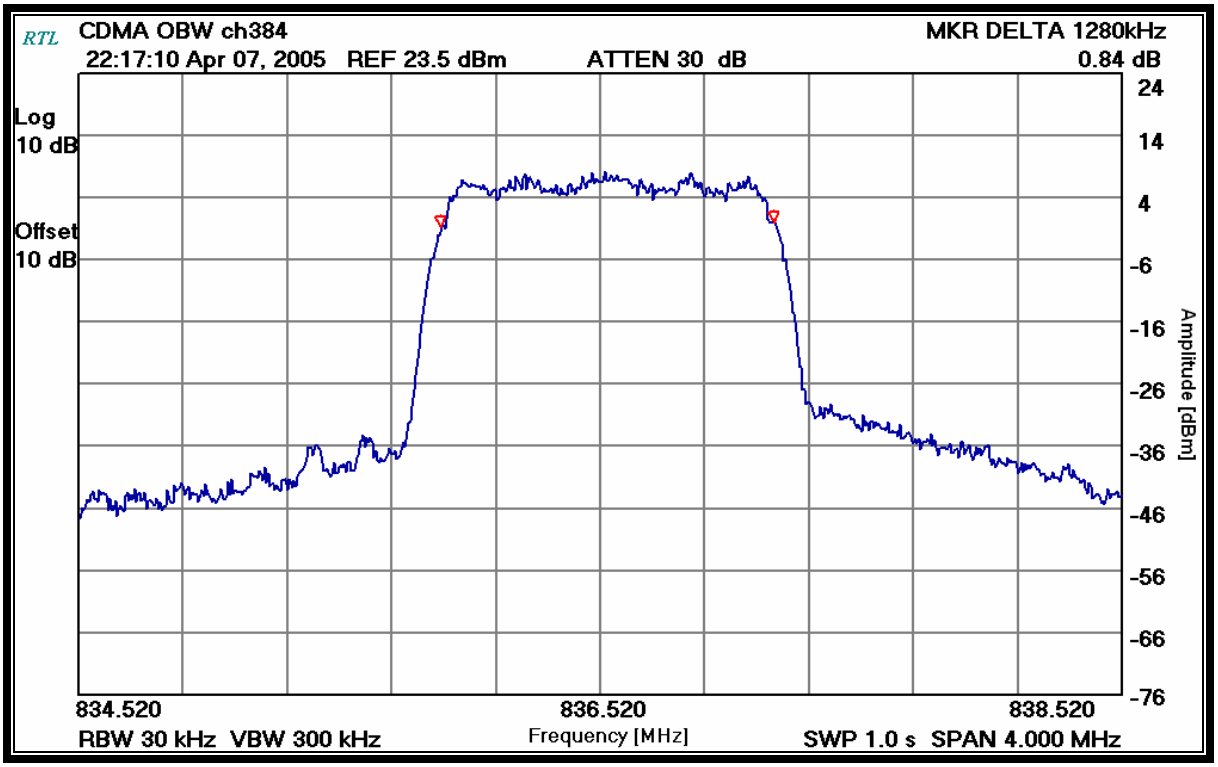
PLOT 7-4: OCCUPIED BANDWIDTH - AMPS ST - (MASK 22.917)



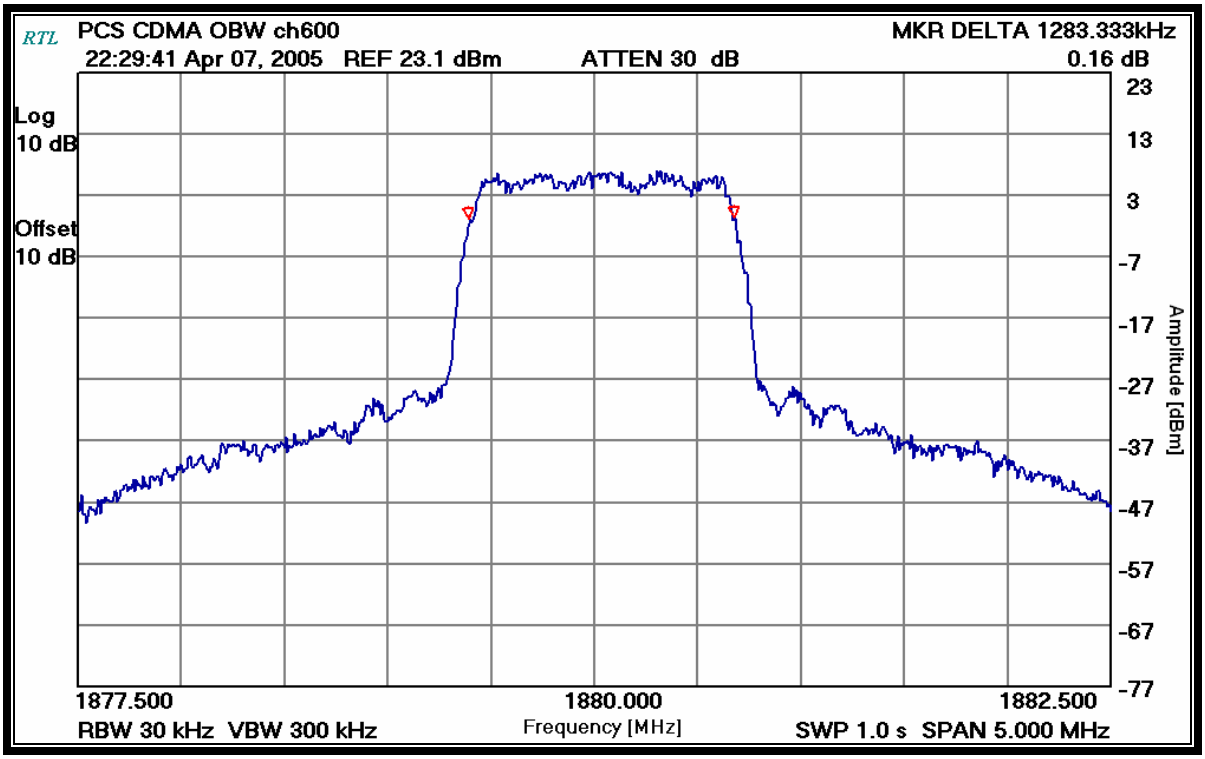
PLOT 7-5: OCCUPIED BANDWIDTH - AMPS SAT/ST - (MASK 22.917)



PLOT 7-6: 99% OCCUPIED BANDWIDTH – CDMA CELL BAND



PLOT 7-7: 99% OCCUPIED BANDWIDTH – CDMA PCS BAND



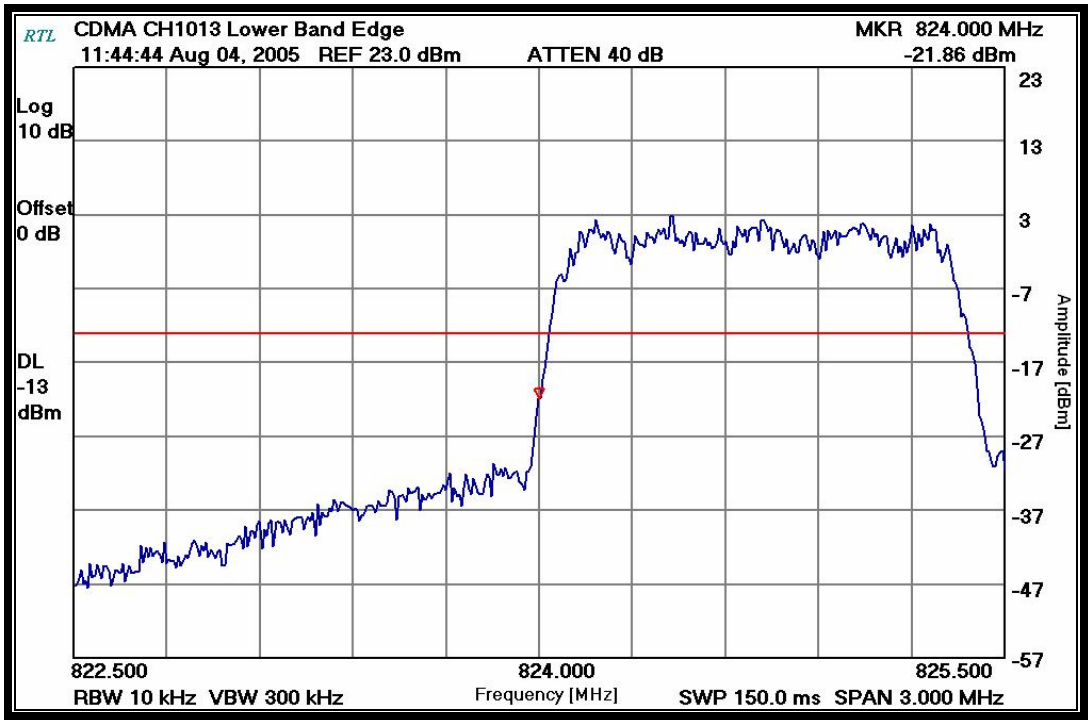
TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	April 7, 18, & 25, 2005
Test Technician/Engineer	Signature	Dates Of Test

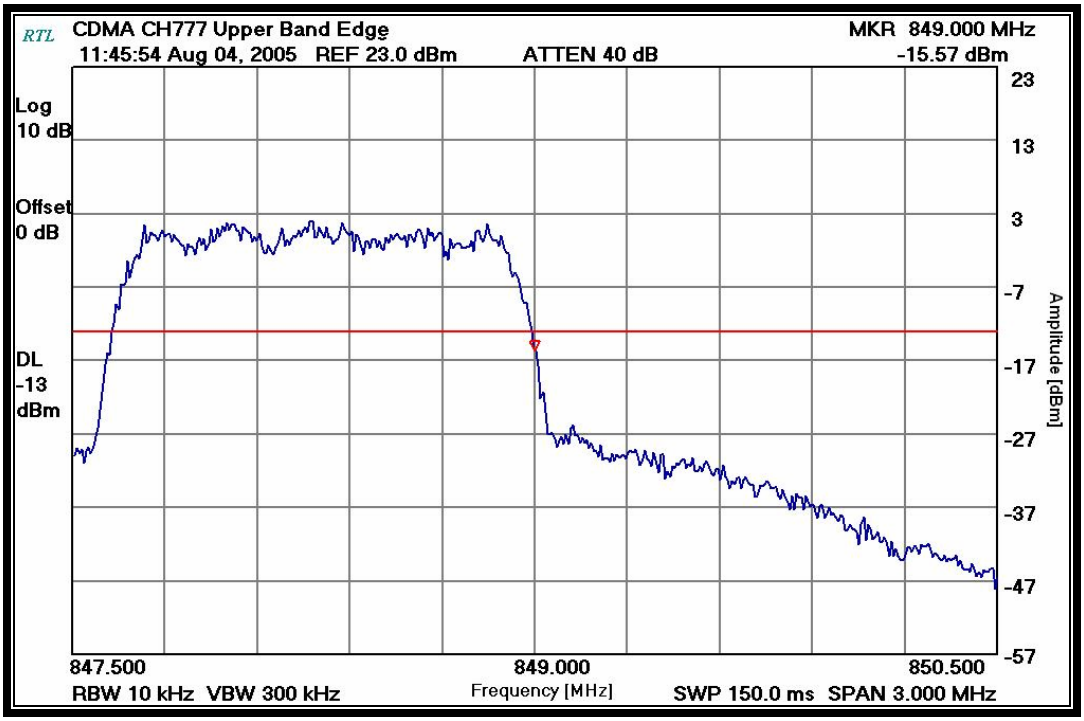
TABLE 7-1: TEST EQUIPMENT USED FOR TESTING OCCUPIED BANDWIDTH

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	08/11/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/07/05

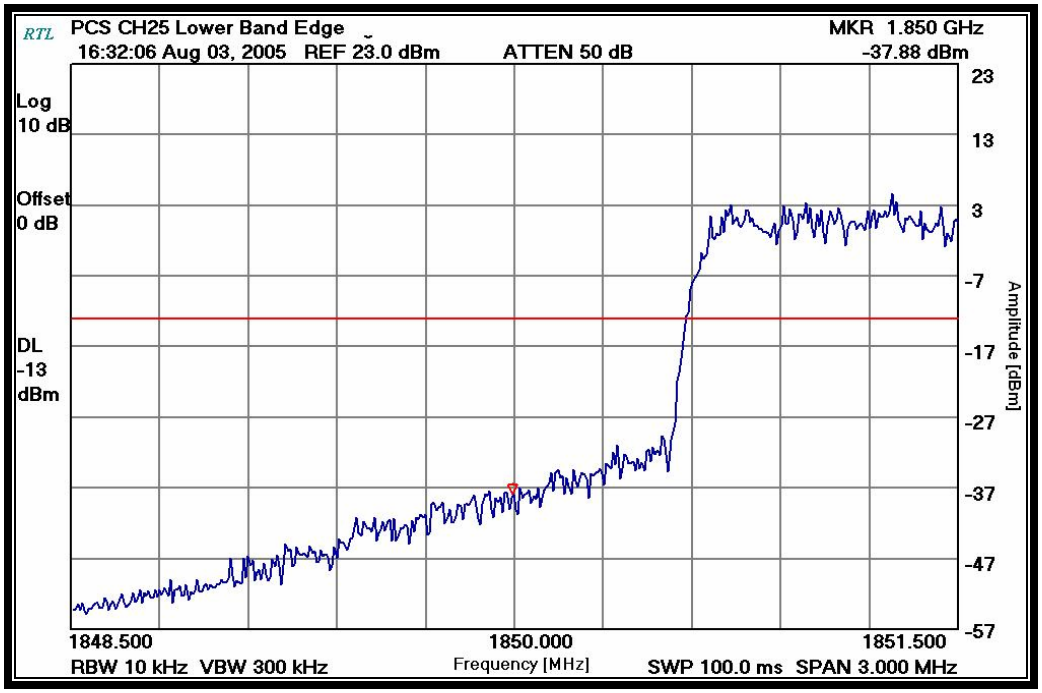
PLOT 7-8: LOWER BAND EDGE – CDMA 800 BAND



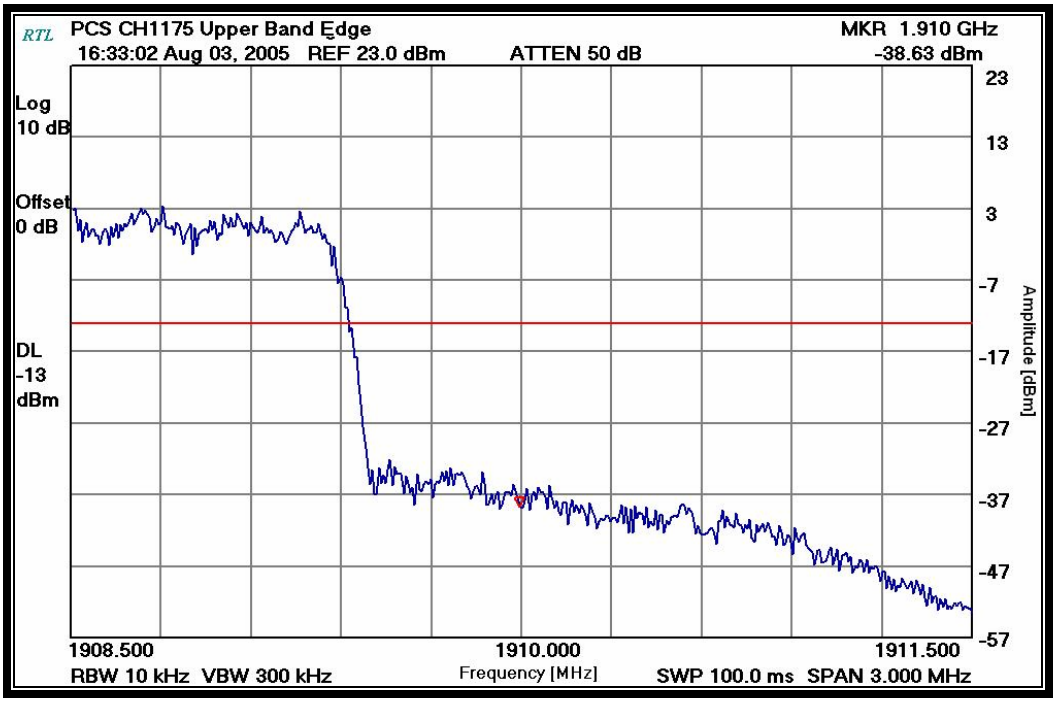
PLOT 7-9: UPPER BAND EDGE – CDMA 800 BAND



PLOT 7-10: LOWER BAND EDGE – CDMA PCS 1900 BAND



PLOT 7-11: UPPER BAND EDGE – CDMA PCS 1900 BAND



TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	August 3 & 4, 2005
Test Technician/Engineer	Signature	Dates Of Test

8 FCC RULES AND REGULATIONS PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS; PART 22 §22.917: EMISSIONS LIMITATIONS FOR CELLULAR EQUIPMENT; PART 24 §24.238: EMISSIONS LIMITATIONS FOR PCS EQUIPMENT

8.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, Section 2.2.13

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer. The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of the rated system deviation at 1,000 Hz.

Digital Modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600-bps.

Part 22.917(b): Emission limitations for cellular equipment – Measurement procedure.

8.2 EMISSION LIMITS

Part 22.917(a): Emission limitations for cellular equipment – Out of band emissions.

Part 24.133: Emissions limits.

8.3 TEST DATA

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc

Limits: (43+10xLOG P(W))

The worst case (unwanted emissions) channels are shown in following tables. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

TABLE 8-1: CONDUCTED SPURIOUS EMISSIONS CHANNEL 991 AMPS – 824.04 MHZ

40 kHz channel spacing; Conducted power = 3.02 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1648.080	90.4	47.80	-42.6
2472.120	88.7	47.80	-40.9
3296.160	88.0	47.80	-40.2
4120.200	89.9	47.80	-42.1
4944.240	96.2	47.80	-48.4
5768.280	95.9	47.80	-48.1
6592.320	95.6	47.80	-47.8
7416.360	96.7	47.80	-48.9
8240.400	95.6	47.80	-47.8

TABLE 8-2: CONDUCTED SPURIOUS EMISSIONS CHANNEL 383 AMPS – 836.49 MHZ

40 kHz channel spacing; Conducted power = 2.98 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1648.080	77.9	47.80	-30.1
2472.120	66.0	47.80	-18.2
3296.160	84.5	47.80	-36.7
4120.200	72.4	47.80	-24.6
4944.240	75.3	47.80	-27.5
5768.280	72.6	47.80	-24.8
6592.320	81.7	47.80	-33.9
7416.360	82.0	47.80	-34.2
8240.400	88.6	47.80	-40.8

TABLE 8-3: CONDUCTED SPURIOUS EMISSIONS CHANNEL 799 AMPS – 848.97 MHZ

40 kHz channel spacing; Conducted power = 2.57 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1672.980	72.4	47.1	-25.3
2509.470	68.3	47.1	-21.2
3345.960	77.9	47.1	-30.8
4182.450	73.0	47.1	-25.9
5018.940	74.8	47.1	-27.7
5855.430	73.5	47.1	-26.4
6691.920	88.3	47.1	-41.2
7528.410	90.8	47.1	-43.7
8364.900	90.3	47.1	-43.2

TABLE 8-4: CONDUCTED SPURIOUS EMISSIONS CHANNEL 1013 – 824.7 MHZ – CDMA CELL

40 kHz channel spacing; Conducted power = 0.229 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1649.400	90.5	36.6	-53.9
2474.100	83.4	36.6	-46.8
3298.800	89.4	36.6	-52.8
4123.500	90.9	36.6	-54.3
4948.200	92.9	36.6	-56.3
5772.900	92.8	36.6	-56.2
6597.600	82.1	36.6	-45.5
7422.300	87.1	36.6	-50.5
8247.000	81.0	36.6	-44.4

TABLE 8-5: CONDUCTED SPURIOUS EMISSIONS CHANNEL 384 – 836.52 MHZ – CDMA CELL

40 kHz channel spacing; Conducted power = 0.224 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1673.040	85.7	36.5	-49.2
2509.560	83.7	36.5	-47.2
3346.080	86.6	36.5	-50.1
4182.600	91.9	36.5	-55.4
5019.120	92.0	36.5	-55.5
5855.640	83.1	36.5	-46.6
6692.160	86.5	36.5	-50.0
7528.680	86.0	36.5	-49.5
8365.200	87.9	36.5	-51.4

TABLE 8-6: CONDUCTED SPURIOUS EMISSIONS CHANNEL 777 – 848.31 MHZ – CDMA CELL

40 kHz channel spacing; Conducted power = 0.224 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1696.620	86.8	36.5	-50.3
2544.930	89.8	36.5	-53.3
3393.240	90.7	36.5	-54.2
4241.550	92.2	36.5	-55.7
5089.860	92.5	36.5	-56.0
5938.170	82.9	36.5	-46.4
6786.480	86.2	36.5	-49.7
7634.790	86.8	36.5	-50.3
8483.100	88.3	36.5	-51.8

TABLE 8-7: CONDUCTED SPURIOUS EMISSIONS CHANNEL 025 – 1851.25 MHZ – CDMA PCS

40 kHz channel spacing; Conducted power = 0.204 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
3702.500	71.1	36.1	-35.0
5553.750	73.0	36.1	-36.9
7405.000	77.5	36.1	-41.4
9256.250	77.8	36.1	-41.7
11107.500	78.0	36.1	-41.9
12958.750	74.2	36.1	-38.1
14810.000	72.6	36.1	-36.5
16661.250	73.6	36.1	-37.5
18512.500	73.1	36.1	-37.0

TABLE 8-8: CONDUCTED SPURIOUS EMISSIONS CHANNEL 600 – 1878.75 MHZ – CDMA PCS

40 kHz channel spacing; Conducted power = 0.204 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
3760.000	75.0	36.1	-38.9
5640.000	81.1	36.1	-45.0
7520.000	77.0	36.1	-40.9
9400.000	77.9	36.1	-41.8
11280.000	77.9	36.1	-41.8
13160.000	73.3	36.1	-37.2
15040.000	72.1	36.1	-36.0
16920.000	73.7	36.1	-37.6
18800.000	68.4	36.1	-32.3

TABLE 8-9: CONDUCTED SPURIOUS EMISSIONS CHANNEL 1175 – 1908.75 MHZ – CDMA PCS

40 kHz channel spacing; Conducted power = 0.204 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
3817.500	71.3	36.1	-35.2
5726.250	73.5	36.1	-37.4
7635.000	67.8	36.1	-31.7
9543.750	67.6	36.1	-31.5
11452.500	68.1	36.1	-32.0
13361.250	62.9	36.1	-26.8
15270.000	62.9	36.1	-26.8
17178.750	63.7	36.1	-27.6
19087.500	58.5	36.1	-22.4

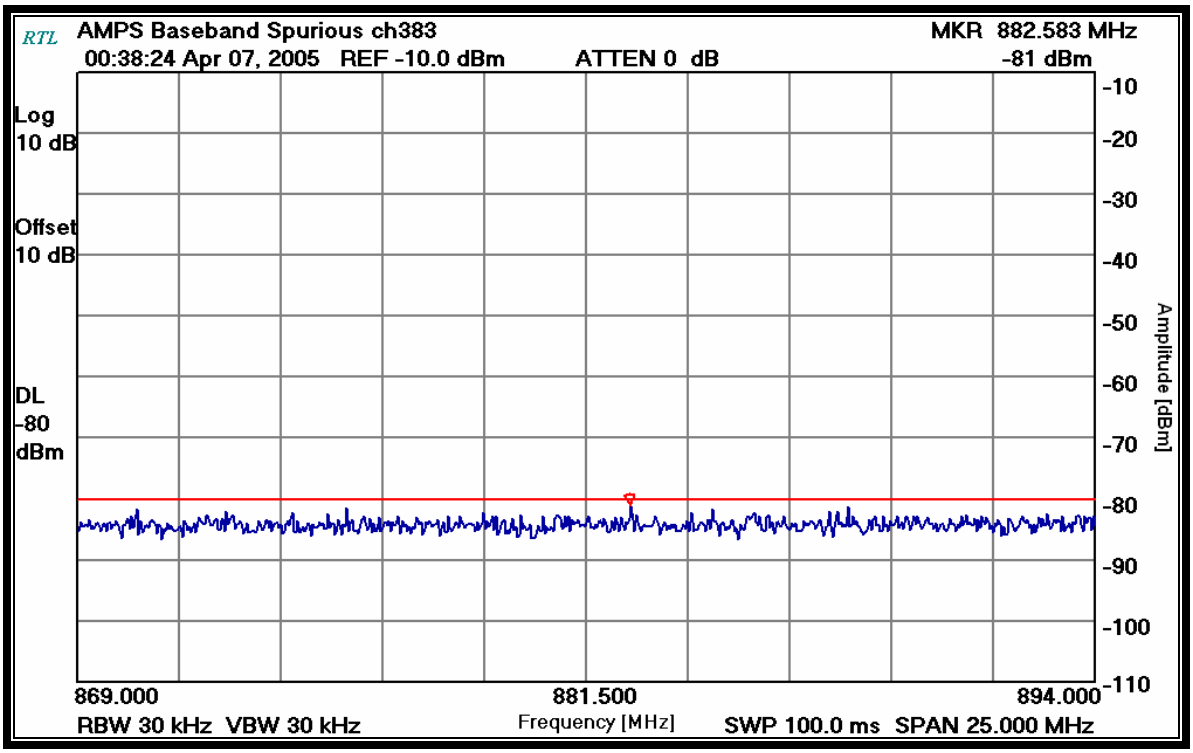
TEST PERSONNEL:

Daniel Biggs		April 6, 2005
Test Technician/Engineer	Signature	Date Of Test

8.4 FCC PART 22.917(F) MOBILE EMISSIONS IN BASE FREQUENCY RANGE

Mobile emissions in base frequency range: The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed 80 dBm at the transmit antenna connector.

PLOT 8-1: MOBILE EMISSIONS IN BASE FREQUENCY RANGE – AMPS CH 383



PLOT 8-2: MOBILE EMISSIONS IN BASE FREQUENCY RANGE – CDMA CH 384

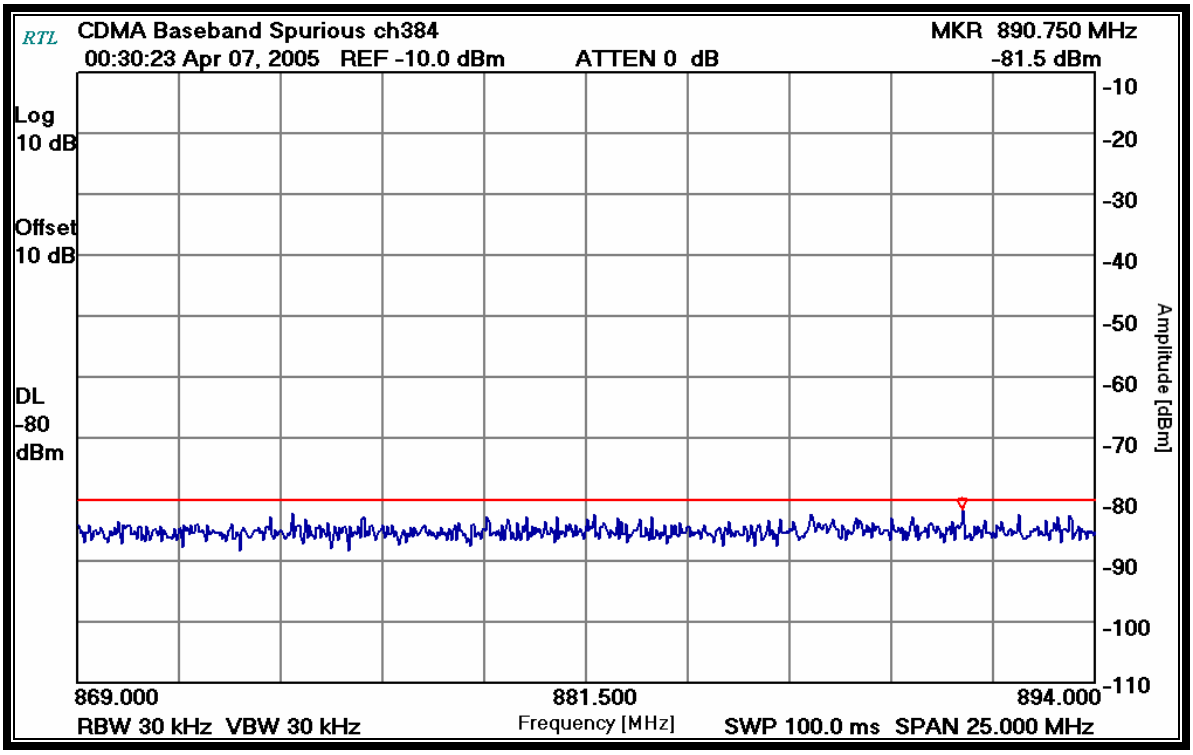


TABLE 8-10: TEST EQUIPMENT USED FOR TESTING SPURIOUS EMISSIONS AT ANTENNA TERMINAL

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	8/6/04
901128	Par Electronics	806-902 (25 W)	UHF Notch Filter	N/A	5/13/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	April 7, 2005
Test Technician/Engineer	Signature	Date Of Test

9 FCC RULES AND REGULATIONS PART 2 §2.1053(A): FIELD STRENGTH OF SPURIOUS RADIATION; PART 22 §22.917: EMISSIONS LIMITATIONS FOR CELLULAR EQUIPMENT; PART 24 §24.133: EMISSIONS LIMITS

9.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

Digital Modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600-bps.

The spurious emissions levels were measured from a 3 meter distance, 360 degrees, while the receive antenna was raised and lowered from 1 to 4 meters in both vertical and horizontal polarities. The EUT was replaced by a transmitting antenna connected to a signal generator. This signal generator level was lowered or raised until the receive level matched that of the original measured level of the EUT. The signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole for ERP measurement or to an isotropic radiator for EIRP measurements.

9.2 TEST DATA

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

9.3 FIELD STRENGTH OF SPURIOUS RADIATION TEST DATA - §2.1053

TABLE 9-1: FIELD STRENGTH DATA §2.1053 (CELLULAR AMPS); 836.49 MHZ, CHANNEL 383

Limit = 43 + 10 Log P = 47.75 dBc
Conducted Power = 34.75 dBm = 2.98 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1672.98	43.8	-30.7	5.5	5.0	66.0	-18.3
2509.47	51.8	-38.2	7.1	7.0	73.2	-25.4
3345.96	40.8	-47.7	8.4	7.6	83.4	-35.7
4182.45	46.3	-37.2	9.8	7.5	74.4	-26.7
5018.94	45.8	-38.0	10.8	7.7	76.0	-28.3
5855.43	43.7	-39.3	11.3	8.5	77.0	-29.3
6691.92	38.0	-46.5	12.2	8.6	85.0	-37.2
7528.41	34.7	-45.8	12.7	8.9	84.5	-36.7
8364.90	34.3	-42.7	12.9	8.1	82.4	-34.7

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the transmit antenna.

TABLE 9-2: FIELD STRENGTH DATA §2.1053 (CELLULAR CDMA); 836.52 MHZ, CHANNEL 384

Limit = 43 + 10 Log P = 36.5 dBc
Conducted Power = 23.5 dBm = 0.224 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1674.000	26.83	-47.0	4.9	5.0	70.9	-34.4
2511.000	31.30	-58.8	6.3	7.0	82.1	-45.6
3348.000	30.67	-56.2	7.4	7.6	80.0	-43.5
4185.000	33.17	-50.5	8.5	7.5	75.5	-39.0
5022.000	34.0	-49.5	9.2	7.7	75.0	-38.5
5859.000	33.5	-49.3	9.5	8.5	74.3	-37.8
6696.000	35.0	-49.3	10.6	8.6	75.3	-38.8
7533.000	35.83	-45.3	10.9	8.8	71.4	-34.9
8370.000	33.0	-44.5	11.2	8.1	71.6	-34.7

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the transmit antenna.

TABLE 9-3: FIELD STRENGTH DATA §2.1053 (PCS CDMA); 1878.75 MHZ, CHANNEL 600

Limit = 43 + 10 Log P = 36.5 dBc
Conducted Power = 23.5 dBm = 0.224 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
3758.750	28.8	-69.0	8.3	9.5	92.1	-55.6
5638.750	31.8	-63.8	10.0	10.4	87.7	-51.2
7518.750	34.3	-45.7	11.4	11.0	70.4	-33.9
9398.750	32.2	-43.1	12.0	11.1	68.3	-31.8
11278.750	33.7	-41.6	12.8	11.8	66.9	-30.4
13158.750	33.3	-33.2	14.5	12.0	60.0	-23.5
15038.750	34.7	-34.8	15.3	12.4	62.0	-25.5
16918.750	34.8	-32.7	16.0	13.6	59.4	-22.9
18798.750	32.5	-31.2	16.5	12.9	59.1	-22.6

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the transmit antenna.

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	April 11, 2005
Test Technician/Engineer	Signature	Date Of Test

TABLE 9-4: TEST EQUIPMENT USED FOR TESTING RADIATED SPURIOUS EMISSIONS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	09/20/05
900151	Rohde and Schwarz	HFH2-Z2	Antenna (Loop antenna, (9 kHz - 30 MHz)	827525/019	8/25/06
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	5/5/05
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	08/11/05
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 – 20 GHz)	3610A00866	09/05/05
900811	Rhein Tech Labs	PR-1040	Amplifier	1003	03/08/06
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901231	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/01/05
901232	IW Microwave Products	KPS-1503-2400-KPS	High frequency RF cables	240"	9/01/05
901235	IW Microwave Products	KPS-1503-360-KPS	High frequency RF cables	36"	9/01/05
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	5/20/07
900321	EMCO	3161-03	Horn Antennas (4 - 8,2 GHz)	9508-1020	5/20/07
900323	EMCO	3160-7	Horn Antennas (8,2 - 12,4 GHz)	9605-1054	5/20/07
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	5/20/07
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051	5/20/07
901218	EMCO	3301B	Horn Antenna (18 - 26.5 GHz)	960281-003	5/20/07
900392	Hewlett Packard	1197OK	Harmonic Mixer (18 – 26.5 GHz)	3525A00159	11/27/07
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridged Guide Antenna (1 - 18 GHz)	2310	2/17/06

10 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY; PART 22 §22.355: FREQUENCY TOLERANCE; PART 24 §24.235: FREQUENCY STABILITY; RSS-129 – FREQUENCY STABILITY §7

10.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +50°C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½ hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied ±15% voltage variation from the nominal 12V supplied to the test board. (10.2 – 13.8 VDC).

The worst-case test data are shown in the tables below.

10.2 TEST DATA

10.2.1 FREQUENCY STABILITY/TEMPERATURE VARIATION

Limit is 2.5 ppm. Worst-case deviation was found to be -.018 ppm at -30°C.

PLOT 10-1: TEMPERATURE FREQUENCY STABILITY

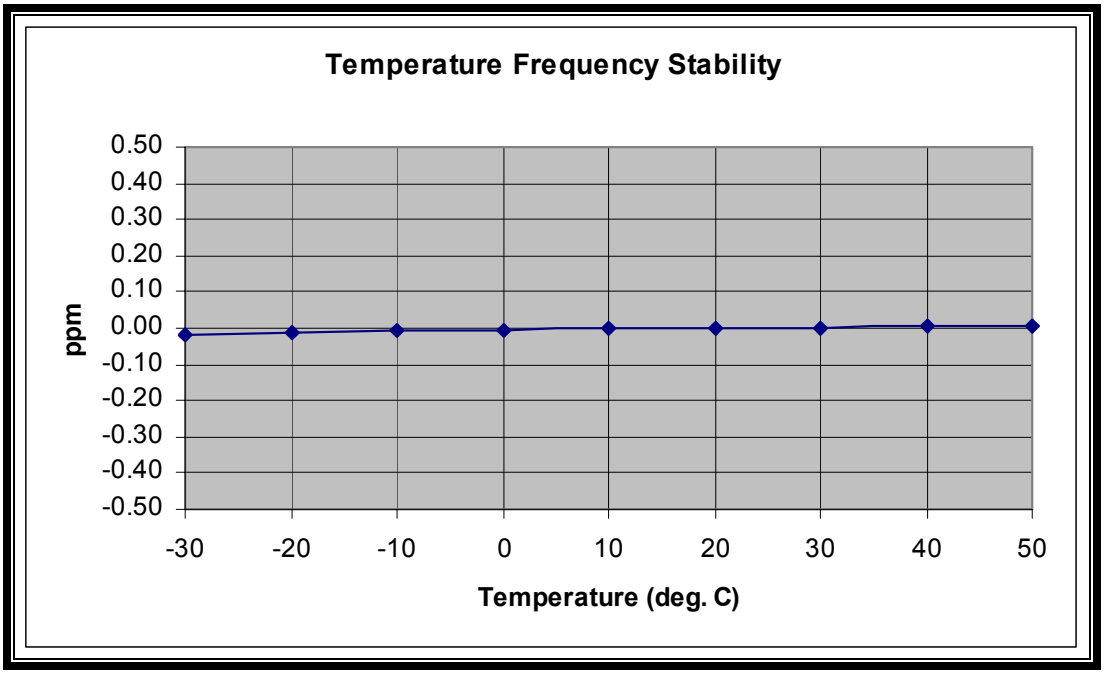


TABLE 10-1: TEMPERATURE FREQUENCY STABILITY CHANNEL 383, 836.49 MHZ

Temperature C	Measured Frequency (MHz)	ppm
-30	836.489532	-0.018
-20	836.489537	-0.012
-10	836.489541	-0.007
0	836.489543	-0.005
10	836.489545	-0.002
20	836.489547	0.000
30	836.489547	0.000
40	836.489550	0.004
50	836.489550	0.004

TABLE 10-2: TEST EQUIPMENT USED FOR TESTING FREQUENCY STABILITY/TEMPERATURE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	02/04/06
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	08/11/05

TEST PERSONNEL:

DANIEL BIGGS		APRIL 25, 2005
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

10.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION

Worst-case variation is .01 ppm.

PLOT 10-2: VOLTAGE FREQUENCY STABILITY

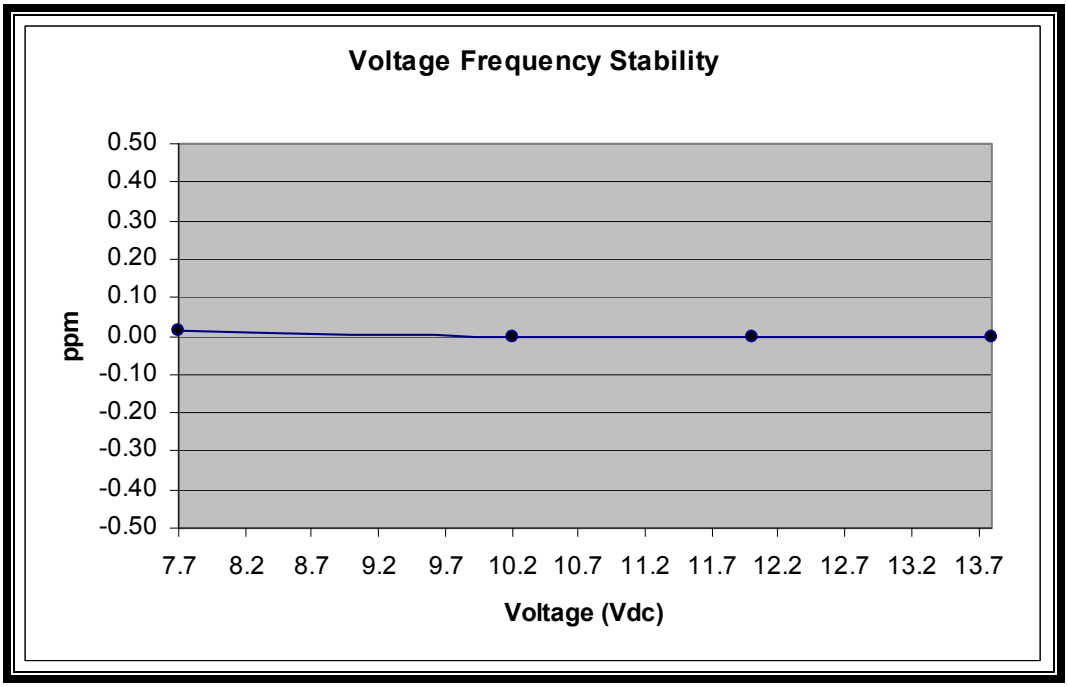


TABLE 10-3: FREQUENCY STABILITY/VOLTAGE VARIATION CHANNEL 383, 836.49 MHZ

Voltage (VDC)	Measured Frequency (MHz)	ppm
7.7 (Battery End-point)	836.489531	0.01
10.2	836.489521	0.00
12	836.489521	0.00
13.8	836.489518	0.00

TABLE 10-4: TEST EQUIPMENT USED FOR TESTING FREQUENCY STABILITY/VOLTAGE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	08/11/05
901247	Wavetek	DM25XT	Multimeter	40804098	3/3/06

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	April 26, 2005
Test Technician/Engineer	Signature	Date Of Test

11 FCC PART 2 §2.1047(A): MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER; RSS-129 §6.2 – AUDIO LOW PASS FILTER

11.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, 2.2.15

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

11.2 TEST DATA

PLOT 11-1: MODULATION CHARACTERISTICS – AUDIO LOW PASS FILTER

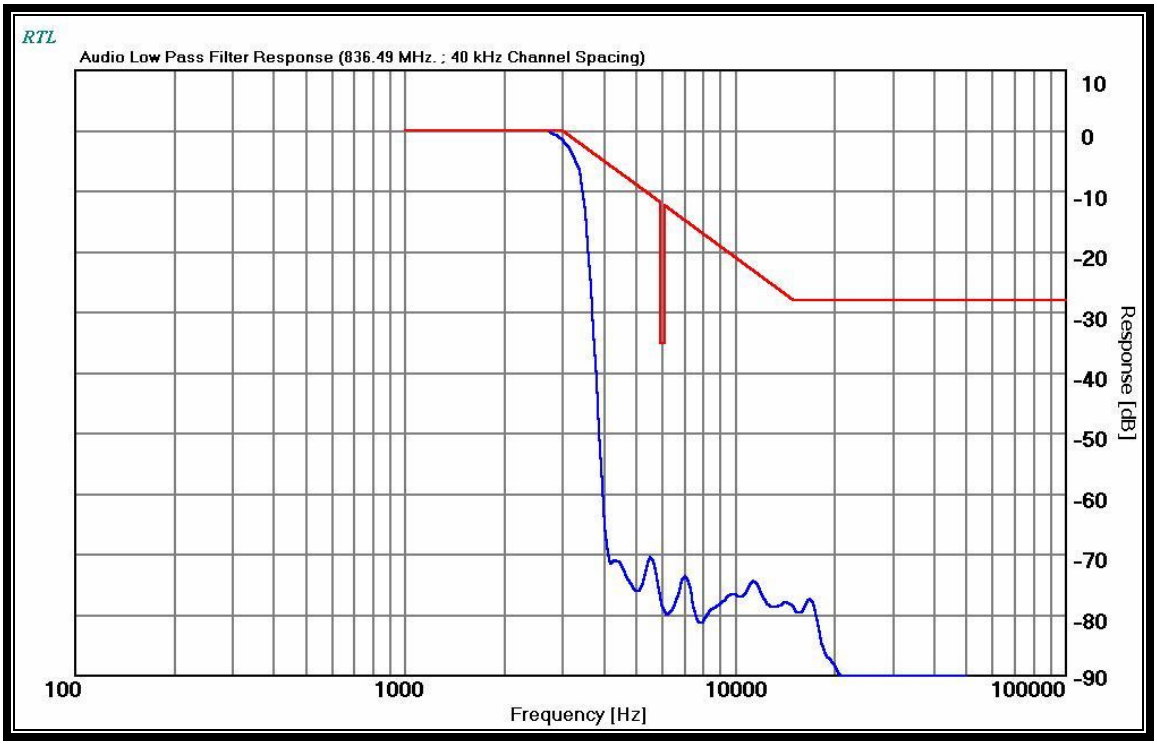


TABLE 11-1: TEST EQUIPMENT USED FOR TESTING (AUDIO LOW PASS FILTER RESPONSE)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/13/06
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	April 12, 2005
Test Technician/Engineer	Signature	Date Of Test

12 FCC RULES AND REGULATIONS PART 2 §2.1047(B): MODULATION CHARACTERISTICS - MODULATION LIMITING; RSS-129 §6.1 – MODULATIUON DEVIATION LIMITING

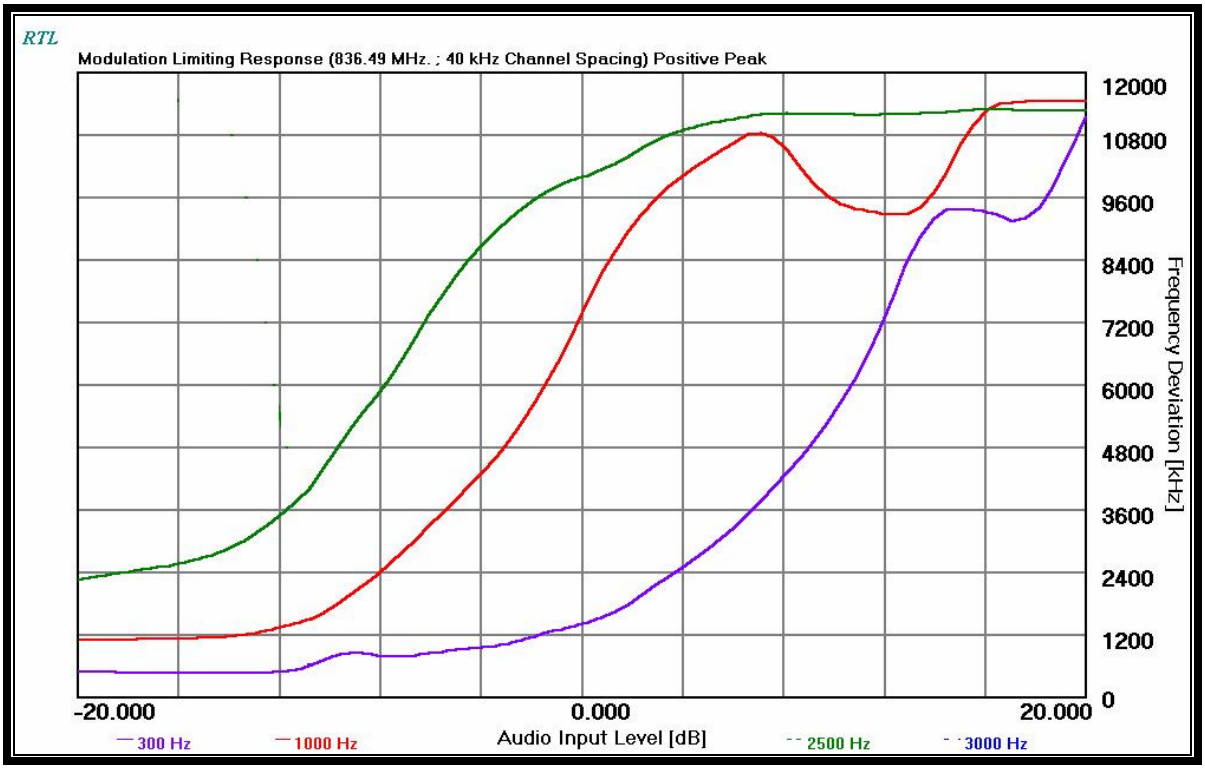
12.1 TEST PROCEDURE

ANSI/TIA/EIA-603-2002, section 2.2.3

The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0dB) the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

12.2 TEST DATA

PLOT 12-1: MODULATION CHARACTERISTICS – MODULATION LIMITING: WIDE BAND; POSITIVE PEAK



PLOT 12-2: MODULATION CHARACTERISTICS – MODULATION LIMITING: WIDE BAND; NEGATIVE PEAK

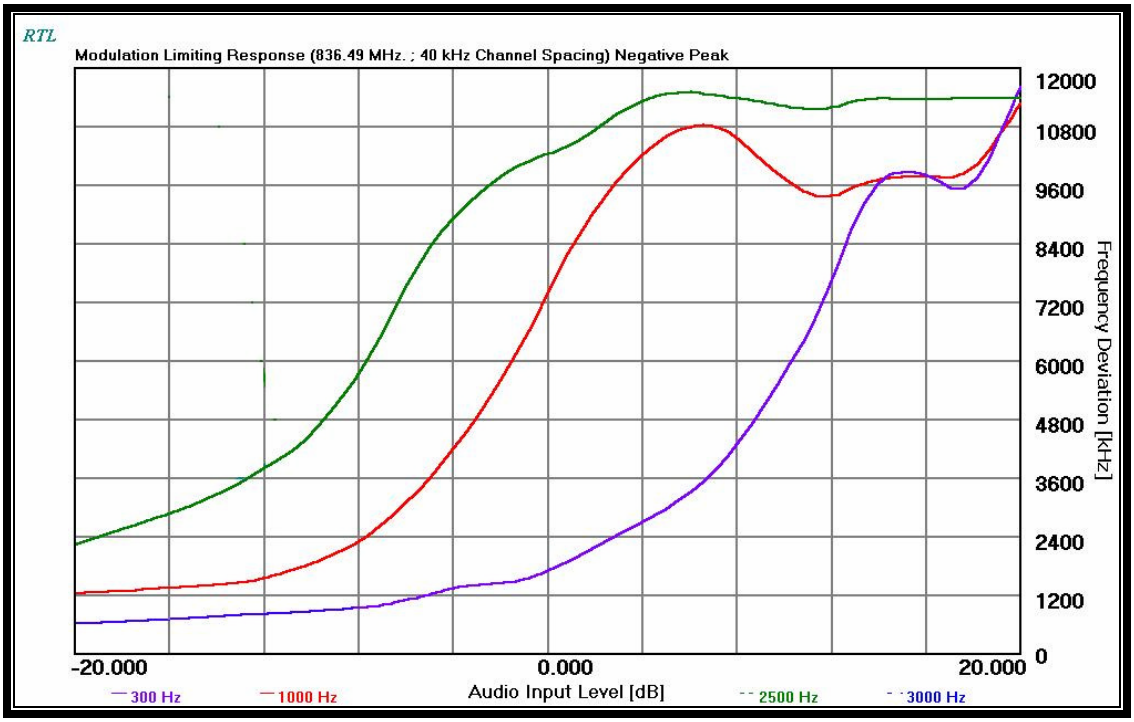


TABLE 12-1: TEST EQUIPMENT USED FOR TESTING (MODULATION LIMITING)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/08/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/13/06
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	09/08/05

TEST PERSONNEL:

Daniel Biggs	Daniel Biggs	April 12, 2005
Test Technician/Engineer	Signature	Date Of Test

13 CONCLUSION

The data in this measurement report shows that the Sony Ericsson Mobile Communications Model: CM52 (3W), FCC ID: PY7BE001011 complies with all the requirements of Parts 2, 22.901(d) and 24E of the FCC Rules, and Industry Canada RSS-129 and RSS-133.