EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22 and 24

RIM Testing Services (RTS)

A division of Research In Motion Limited

REPORT NO.: RTS-0279-0602-02

PRODUCT MODEL NO.: RBA41GW
TYPE NAME: BlackBerry
FCC ID: L6ARBA40GW
IC: 2503A-RBA40GW

DATE: 13 April 2006

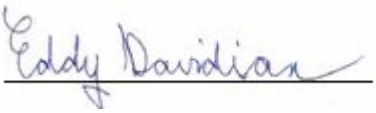
Statement of Performance:

The BlackBerry Wireless Handheld, model RBA41GW ASY-10132-xyz Rev M_ASY-10045-001 Rev 1A and accessories when configured and operated per RIM's operation instructions, performs within the requirements of the test standards.

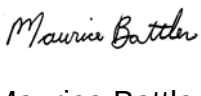
Declaration:

We hereby certify that:
The test data reported herein is an accurate record of the performance of the sample(s) tested.
The test results are valid for the tested unit (s) only.
The test equipment used was suitable for the tests performed and within manufacturer's published specifications and operating parameters.
The test methods were consistent with the methods described in the relevant standards.

Tested by:



Edward A. Davidian
Compliance Specialist
Date: April 12, 2006



Maurice Battler
Compliance Specialist
Date: April 12, 2006

Tested and Reviewed by:

Masud S. Attayi, P.Eng.
Senior Compliance Engineer,
Date: April 12, 2006

Approved by:

Paul G. Cardinal, Ph.D.
Manager
Date: April 17, 2006

Table of Contents

A. Scope

This report details the results of compliance tests which were performed in accordance to the requirements of:
FCC CFR 47 Part 2, Oct. 1, 2000
FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, Oct. 1, 2000
FCC CFR 47 Part 24 Subpart E, Broadband PCS, Oct 1. 2000
Industry Canada, RSS-132 Issue 2, September 2005, Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz.
Industry Canada, RSS-133 Issue 3, June 2005, 2 GHz Personal Communications Services.

B. Associated Documents

None.

C. Product Identification

The equipment under test (EUT) was tested at the RIM Testing Services (RTS) EMI test facility, located at:

305 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906

The testing was performed March 14-March 22, 2006 & March 28–April 4, 2006. The sample EUT included:

1a. BlackBerry model number RBA41GW, ASY-10132-xyz Rev M_ASY-10045-001 Rev 1A, BSN 1008955882, LCD-09151-001.
1b. BlackBerry model number RBA41GW, ASY-10132-xyz Rev M_ASY-10045-001 Rev 1A, BSN 1009157140, LCD-09151-001.
1c. BlackBerry model number RBA41GW, ASY-10132-xyz Rev M_ASY-10045-001 Rev 1A, BSN 1009158372, LCD-09151-002.

The transmit frequency bands operating in North America for the Handheld are: GSM 824 to 849 MHz, PCS 1850 to 1910 MHz and Bluetooth 2402 to 2480 MHz.

D. Support Equipment Used for the Testing of the EUT

1) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 100251
2) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 102204
3) DC Power Supply, H/P, model 6632B, serial number US37472178

E. Test Voltage

The ac input voltage was 120 volts, 60 Hz where applicable. This configuration was per RIM's specifications.

F. Test Results Chart

SPECIFICATION	TEST TYPE	MEETS REQUIREMENTS	PERFORMED BY
FCC CFR 47 Part 22, Subpart H IC RSS-132	Radiated Spurious/harmonic Emissions, ERP, LO	Yes	Edward Davidian and Masud Attayi
FCC CFR 47 Part 2, Subpart J, Part 22, Subpart H IC RSS-132	Conducted Output Power Conducted Emissions, Occupied Bandwidth, Frequency Stability	Yes	Maurice Battler
FCC CFR 47 Part 24, Subpart E IC RSS-133	Radiated Spurious/harmonic Emissions, EIRP, LO	Yes	Edward Davidian and Masud Attayi
FCC CFR 47 Part 24, Subpart E IC RSS-133	Conducted Emissions, Occupied Bandwidth, Frequency Stability	Yes	Maurice Battler

G. Modifications to EUT

No modifications were required on the EUT.

H. Summary of Results

1) The EUT met the requirements of the Conducted Spurious Emissions requirements in the GSM850 band as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d) and RSS-132. The EUT was measured on the low, middle and high channels. The frequency range investigated was from 10 MHz to 10 GHz. (See APPENDIX 1 for test data)

2) The EUT met the requirements of the Tx Conducted Spurious Emissions requirements in the PCS band as per 47 CFR 2.1051, CFR 24.238(a) and RSS-133. The EUT was measured on the low, middle and high channels. The frequency range investigated was from 10 MHz to 20 GHz. (See APPENDIX 1 for test data)

3) The EUT met the requirements of the Occupied Bandwidth and channel mask requirements in the GSM850 band as per 47 CFR 2.202, CFR 22.917 and RSS-132. The EUT was measured on the low, middle and high channels. (See APPENDIX 1 for test data)

4) The EUT met the requirements of the Occupied Bandwidth and channel mask requirements in the PCS band as per 47 CFR 2.202, CFR 24.238 and RSS-133. The EUT was measured on the low, middle and high channels. (See APPENDIX 1 for test data)

5) The EUT met the requirements of the Conducted RF Output Power requirements for both the GSM850 and PCS bands as per 47 CFR 2.1046(a). The EUT was measured on the low, middle and high channels. (See APPENDIX 2 for the test data)

6) The EUT met the requirements of the Frequency Stability vs. Temperature and Voltage requirements for GSM850 band as per 47 CFR 2.1055(a), 2.1055(d), CFR 22.917 and RSS-132. (See APPENDIX 3 for the test data).

7) The EUT met the requirements of the Frequency Stability vs. Temperature and Voltage requirements for the PCS band as per 47 CFR 2.1055(a), 2.1055(d), 24.235 and RSS-133. The maximum frequency error measured was less than 0.1 ppm. The temperature range was from -30°C to +60°C in 10° temperature steps. The EUT was measured on low, middle and high channels at each temperature step. The EUT was measured at low (3.6 volts), nominal (3.8 volts) and high (4.2 volts) dc input voltage at each temperature step and channel at maximum output power. (See APPENDIX 3 for the test data).

8) The radiated spurious emissions/harmonics and ERP/EIRP were measured for both GSM850 and PCS bands. The results are within the limits. The EUT was placed on a nonconductive styrofoam table, 100 cm high that was positioned on a remotely controlled turntable. The EUT height of one metre was set in order to align it with the lowest height of the receiving antenna. The test distance used between the EUT and the receiving antenna was three metres. Then the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The turntable was rotated to determine the azimuth of the peak emissions. The maximum emissions level was recorded. Both the horizontal and vertical polarisations of the emissions were measured. The maximum emissions level was recorded. The EUT was then substituted with an antenna placed in the same location as the EUT. A Dipole antenna was used for the ERP measurements and a Horn antenna was used for EIRP measurements. After the final maximum reading was obtained the Handheld was substituted with a dipole or horn antenna, which was placed in the same location as the Handheld. The substitution antenna was connected into a signal generator that was set to the test frequency. The emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The signal generator output was then adjusted to match the Handheld output reading. The signal generator output was recorded. Both the horizontal and vertical polarisations of the emissions were measured.

   The measurements were performed in a semi-anechoic chamber. The semi-anechoic chamber FCC registration number is **778487** and the Industry Canada file number is **IC4240**. The EUT was measured on the low, middle and high channels.

   The highest ERP in the GSM850 band measured was 31.45 dBm at 824.2 MHz (channel 128).
   The highest EIRP in the PCS band measured was 30.3 dBm at 1880.00 MHz (channel 661).

   The radiated carrier harmonics were measured up to the 10^{th} harmonic for low, middle and high channels in the GSM850 band and PCS band. Both the horizontal and vertical polarizations were measured. The harmonic emissions above the 7^{th} harmonic were in the noise floor (NF) for the GSM850 band and above the 3^{rd} harmonic for the PCS band.
   The worst test margin for GSM850 band harmonic emissions measured was 17.3 dB below the limit at 2472.60MHz.
   The worst test margin for PCS band harmonic emissions measured was 12.9 dB below the limit at 5640 MHz.

   The EUT's RF local oscillator (LO) emissions were measured in the GSM850 band and PCS band in the standalone configuration in the vertical

position on the low and high channels. Both the horizontal and vertical polarizations were measured. The RF LO emissions were in the NF.

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels for simultaneous transmission in GSM850/Bluetooth and in PCS/Bluetooth. Both the horizontal and vertical polarizations were measured. The harmonic emissions above the 7th harmonic were in the NF for the GSM850 band and above the 3rd harmonic for the PCS band.
The worst test margin for GSM850 band measured was 17.3 dB below the limit at 2512.8 MHz.
The worst test margin for PCS band measured was 12.0 dB below the limit at 5729.40 MHz.

Sample Calculation:

Field Strength (dBµV/M) is calculated as follows:
FS = Measured Level (dBµV) + A.F. (dB/m) + Cable Loss (dB) - Preamp (dB) + Filter Loss (dB)

Measurement Uncertainty ±4.0 dB

To view the test data see APPENDIX 4.

I. Compliance Test Equipment Used

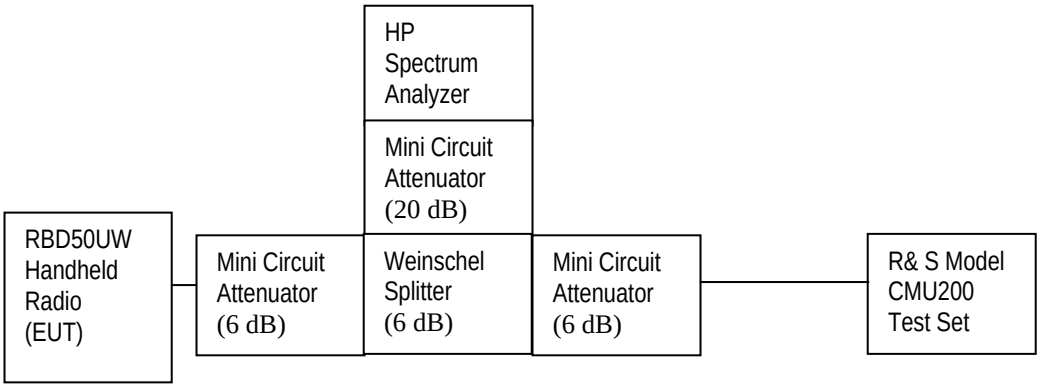
UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909 A	185831	06-11-27	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	06-11-25	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	06-04-27	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	17401	06-07-21	Radiated Emissions
Horn Antenna	TDK	HRN-0118	130092	06-09-24	Radiated Emissions
Horn Antenna	TDK	HRN-0118	30101	06-07-21	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	973	06-12-13	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	06-09-21	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	102204	06-06-09	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	100251	06-05-19	Conducted Emissions
Spectrum Analyzer	HP	8563E	3745A08112	06-09-10	Conducted Emissions
DC Power Supply	HP	6632B	US37472178	07-09-14	Conducted Emissions
Power Sensor	Giga-tronics	80401A	1835838	06-11-29	Frequency Stability
Power Meter	Giga-tronics	8541C	1837762	06-11-29	Frequency Stability
Signal Generator	Agilent	8648C	4037U03155	07-09-13	Frequency Stability
Temperature Probe	Hart Scientific	61161-302	21352860	06-09-28	Frequency Stability
Environment monitor	Control Company	1870	230355189	06-12-23	Conducted Emissions
Environment monitor	Control Company	1870	230355190	06-12-23	Radiated Emissions
Environmental Chamber	ESPEC Corp.	SH-240S1	91007118	N/R	Frequency Stability

APPENDIX 1 - CONDUCTED RF EMISSIONS TEST DATA/PLOTS

Conducted RF Emission Test Data cont'd

This appendix contains measurement data pertaining to conducted spurious emissions, –26 dBc bandwidth, 99% power bandwidth and the channel mask.

Test Setup Diagram



Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	HP	8563E	3745A08112	30 Hz – 26.5 GHz
Splitter	Weinschel	1515	ME092	DC – 18 GHz
Attenuator	Mini Circuit	MCL BW-S20W2	--	DC – 18 GHz
Attenuator	Mini Circuit	MCL BW-S6W2	--	DC – 18 GHz
Attenuator	Mini Circuit	MCL BW-S6W2	--	DC – 18 GHz
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	100251	--

The environmental test conditions were:
Temperature 24ºC
Pressure 998 mb
Relative Humidity 25%

Conducted RF Emission Test Data cont'd

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 24.238(a), RSS-133, CFR 22 Subpart H and RSS-132 were measured from 10 MHz to 20 GHz. The EUT emissions were in the noise floor.
See figures 1 to 12 for the plots of the conducted spurious emissions.

–26 dBc Bandwidth and Occupied Bandwidth (99%)

For each carrier frequency of low, middle and high, the modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth.
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.
The worst case –26dBc bandwidth for the three GSM850 channels was measured to be 277 kHz, and for the three PCS channels was measured to be 285 kHz as shown below. This results in a 3.0 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was employed.

Test Data for GSM850 and PCS selected Frequencies

GSM850 Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
824.2	275	248.3
837.6	277	248.3
848.8	272	250.0

PCS Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
1850.2	278	246.7
1880.0	280	250.0
1909.8	285	246.7

Measurement Plots for GSM850 and PCS
Refer to the following measurement plots for more detail.

See Figures 13 to 24 for the plots of the –26dBc Bandwidth and 99% Occupied Bandwidth.
See Figures 25 to 28 for plots of the channel mask results.

The RF power output was at maximum for all the recorded measurements shown below.

Conducted RF Emission Test Data cont'd

Figure 1: GSM 850, Spurious Conducted Emissions, Low channel

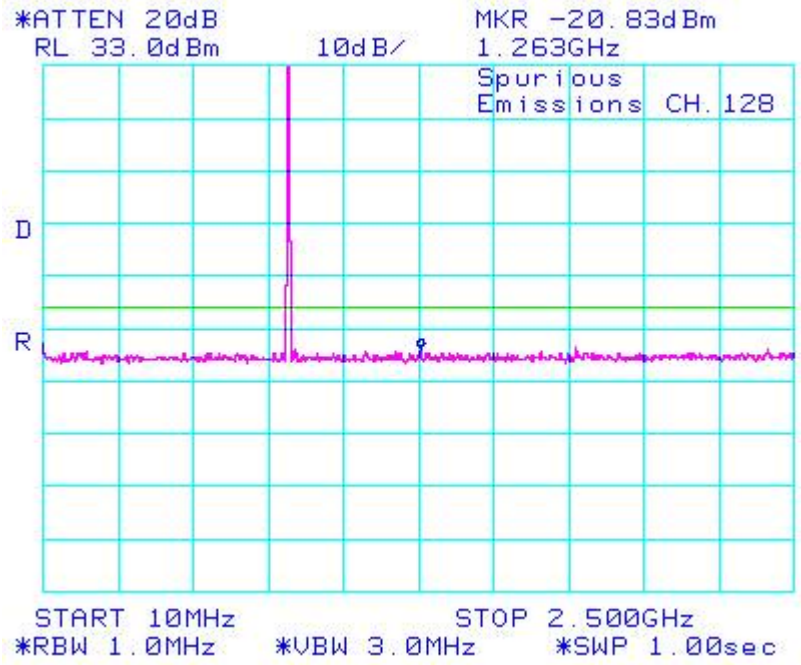
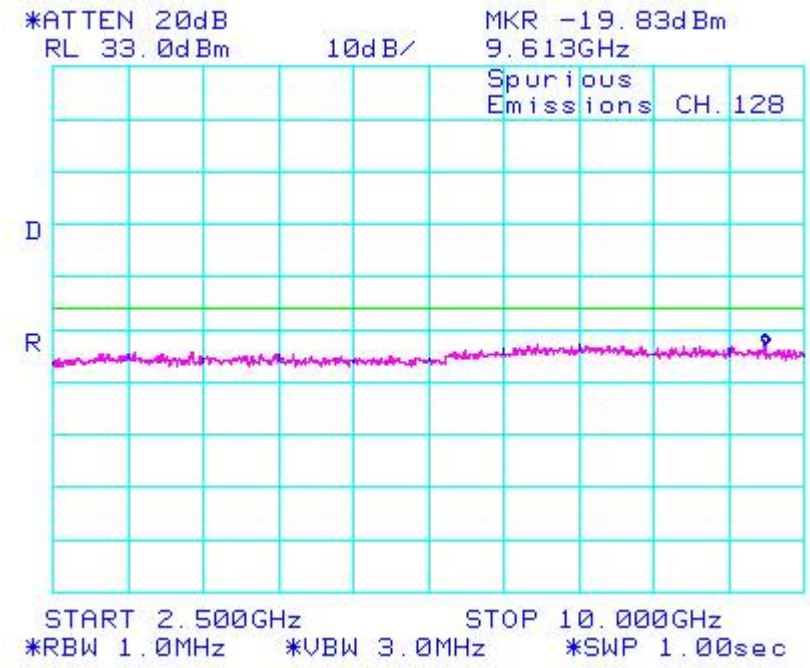


Figure 2: GSM 850, Spurious Conducted Emissions, Low channel



Conducted RF Emission Test Data cont'd

Figure 3: GSM 850, Spurious Conducted Emissions, Middle Channel

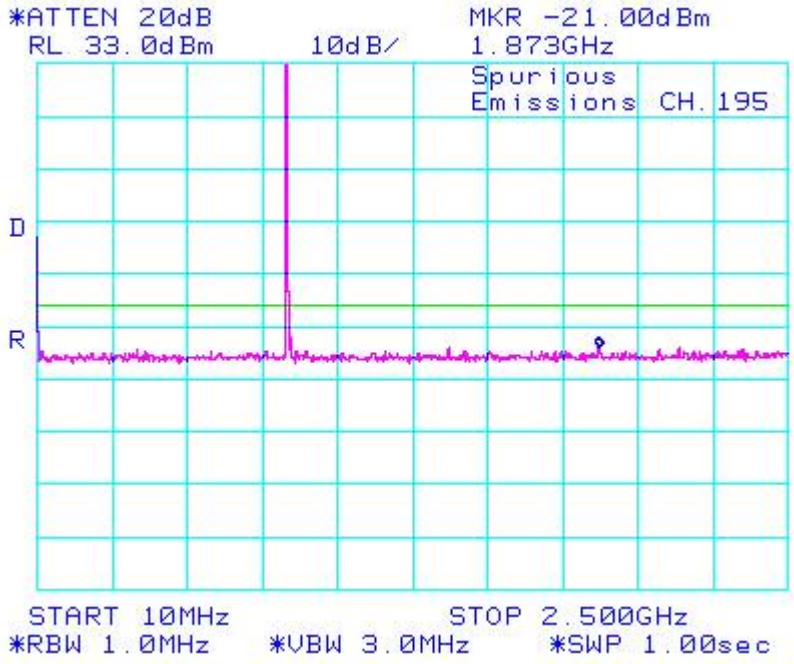
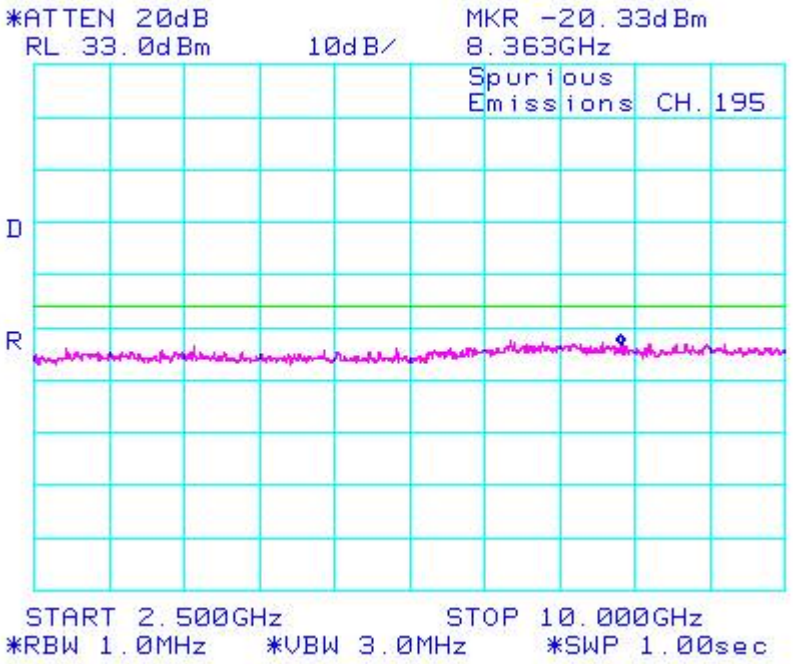


Figure 4: GSM 850, Spurious Conducted Emissions, Middle Channel



Conducted RF Emission Test Data cont'd

Figure 5: GSM 850, Spurious Conducted Emissions, High Channel

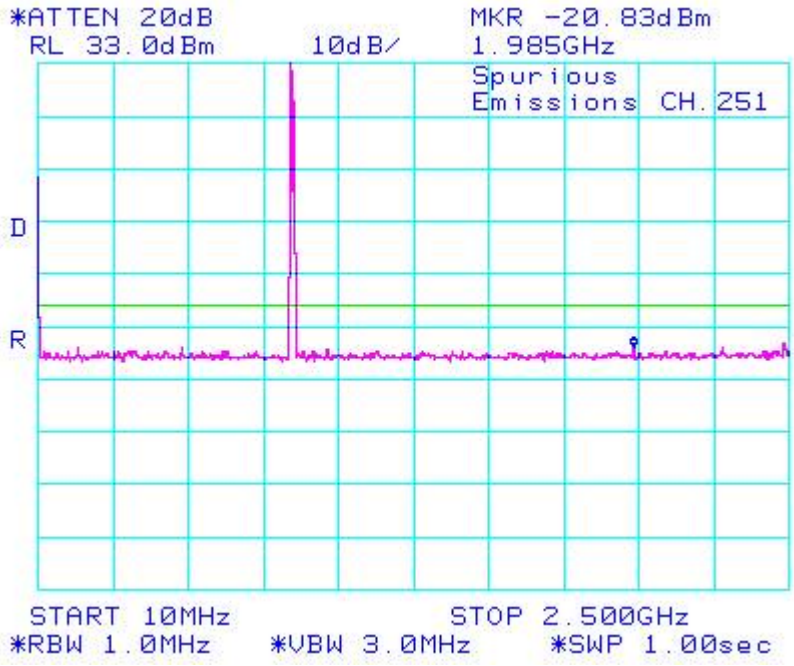
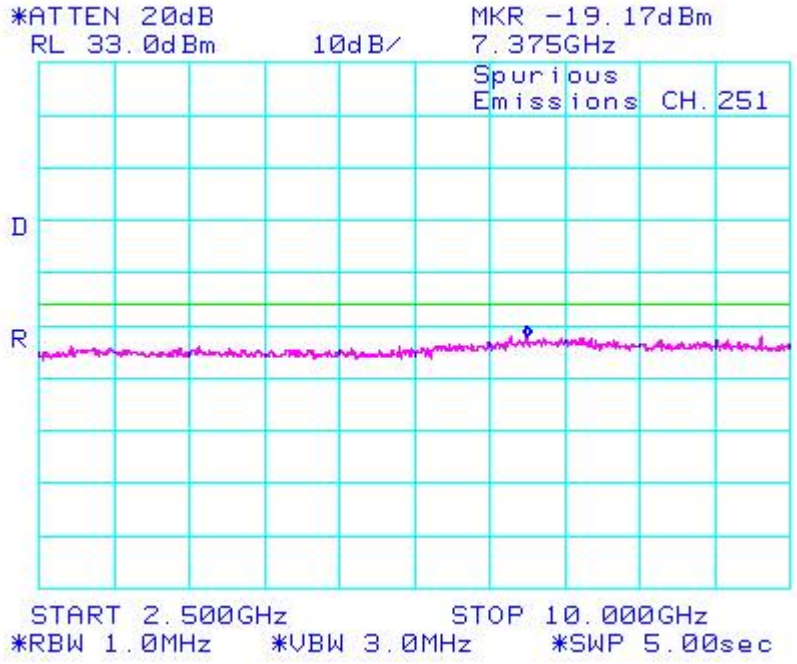


Figure 6: GSM 850, Spurious Conducted Emissions, High Channel



Conducted RF Emission Test Data cont'd

Figure 7: PCS, Spurious Conducted Emissions, Low Channel

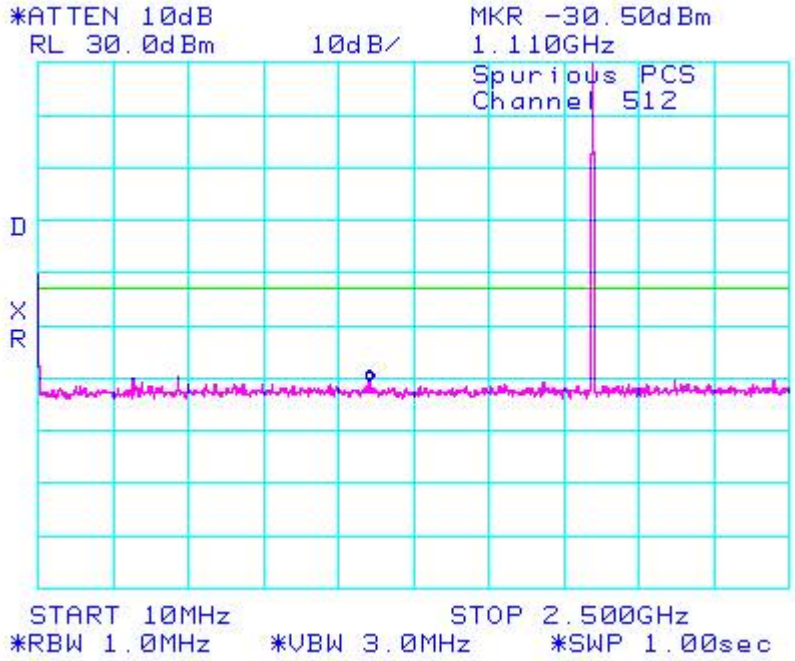
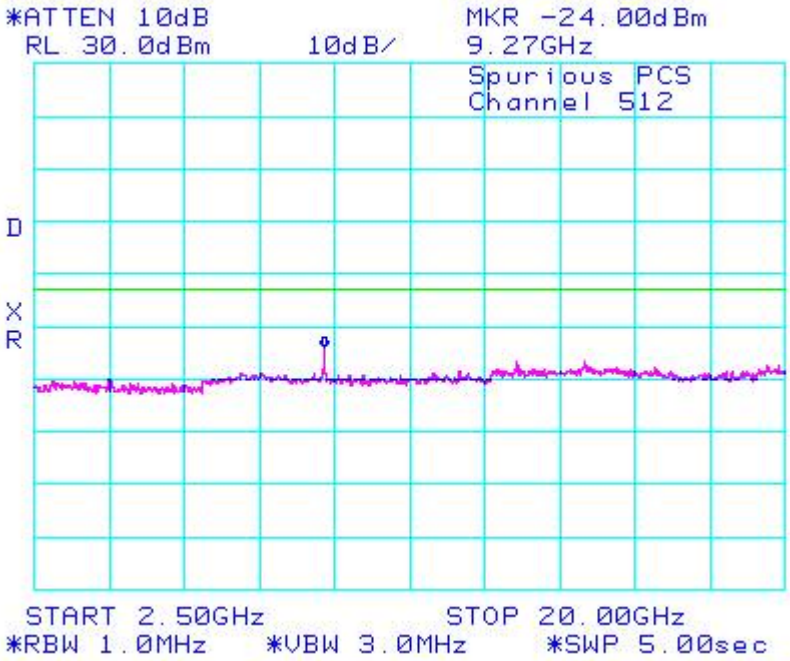


Figure 8: PCS, Spurious Conducted Emissions, Low Channel



Conducted RF Emission Test Data cont'd

Figure 9: PCS, Spurious Conducted Emissions, Middle Channel

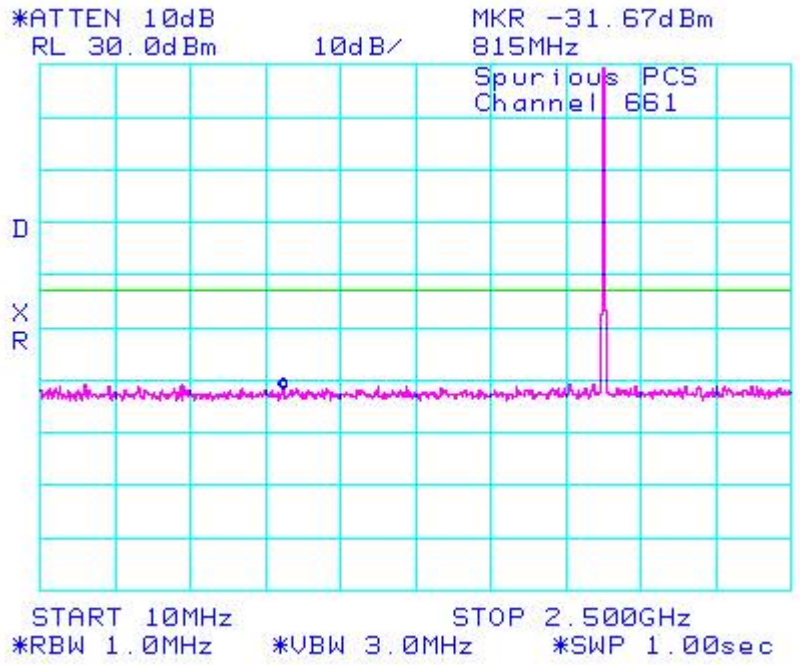
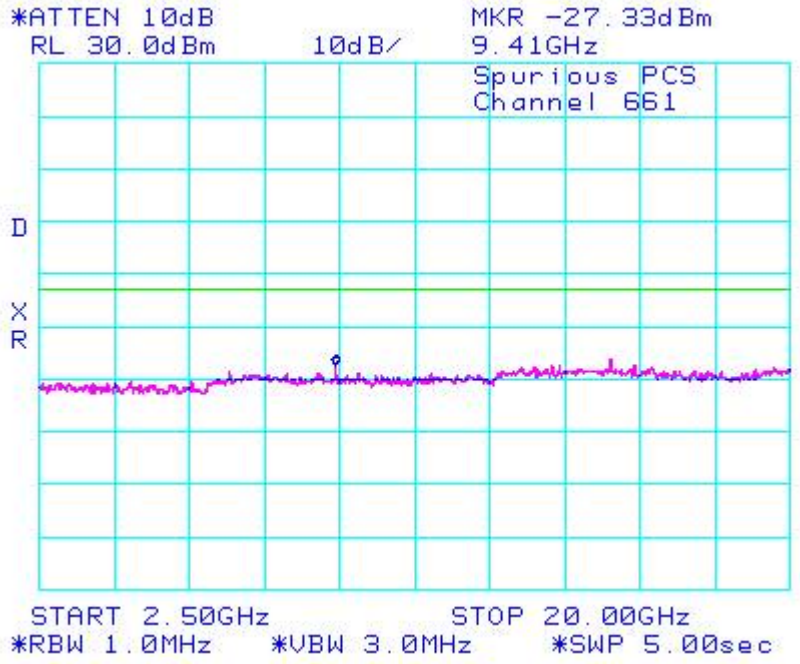


Figure 10: PCS, Spurious Conducted Emissions, Middle Channel



Conducted RF Emission Test Data cont'd

Figure 11: PCS, Spurious Conducted Emissions, High Channel

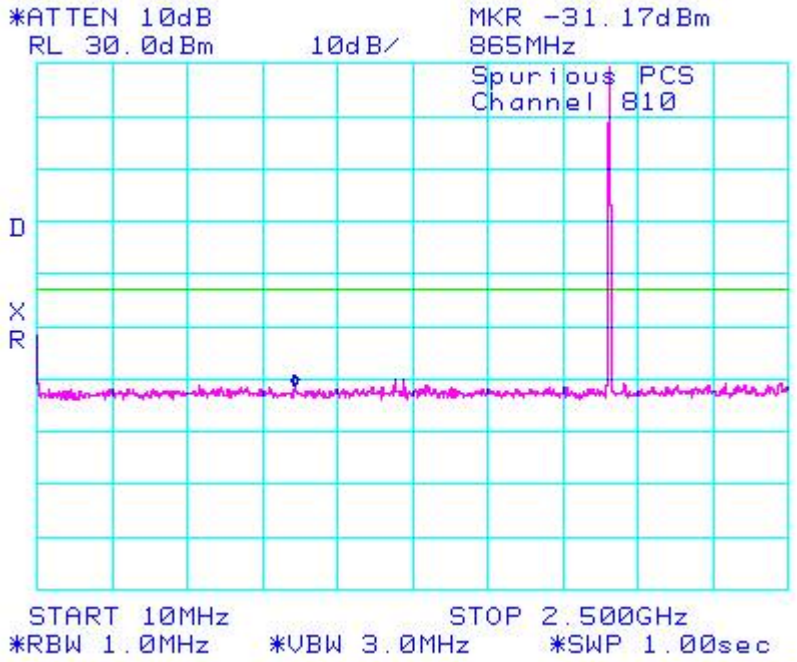
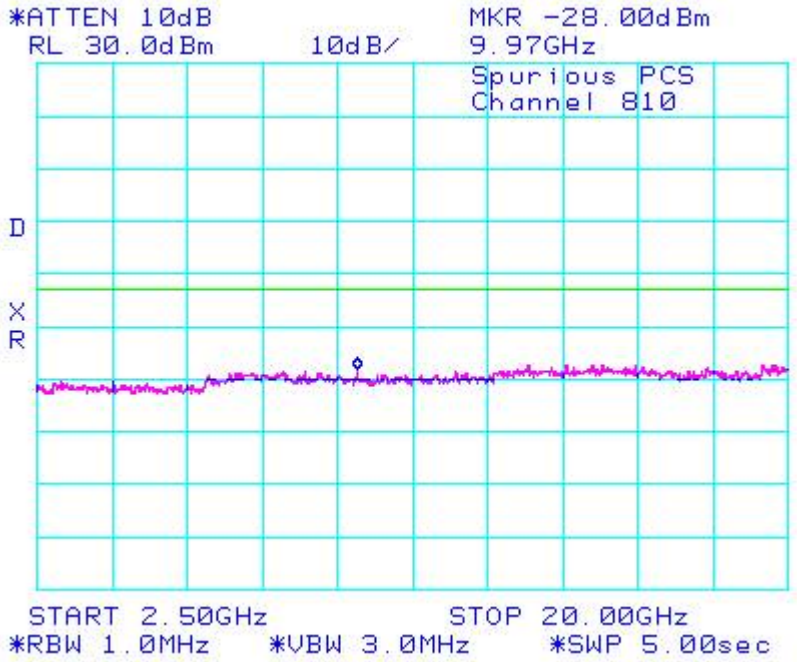


Figure 12: PCS, Spurious Conducted Emissions, High Channel



Conducted RF Emission Test Data cont'd

Figure 13: -26dBc bandwidth, GSM 850 Low Channel

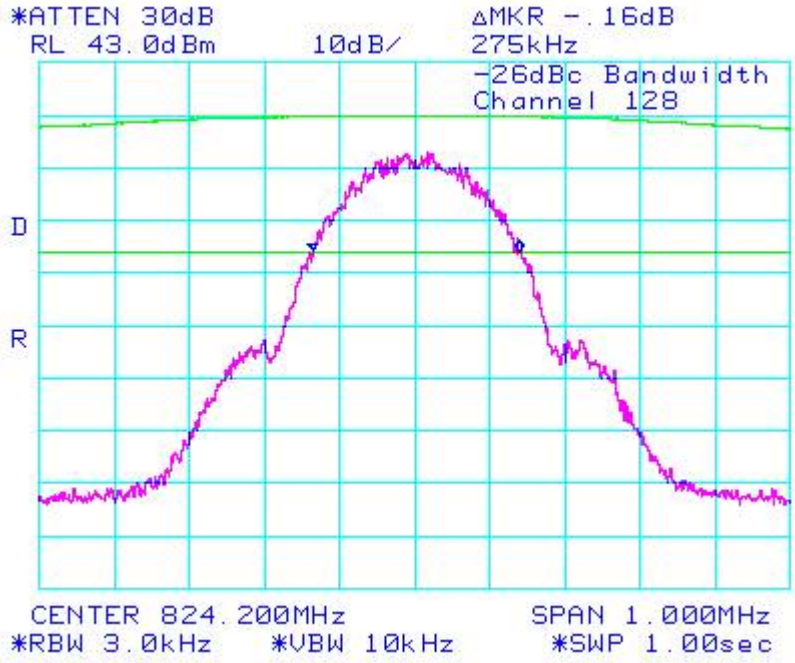
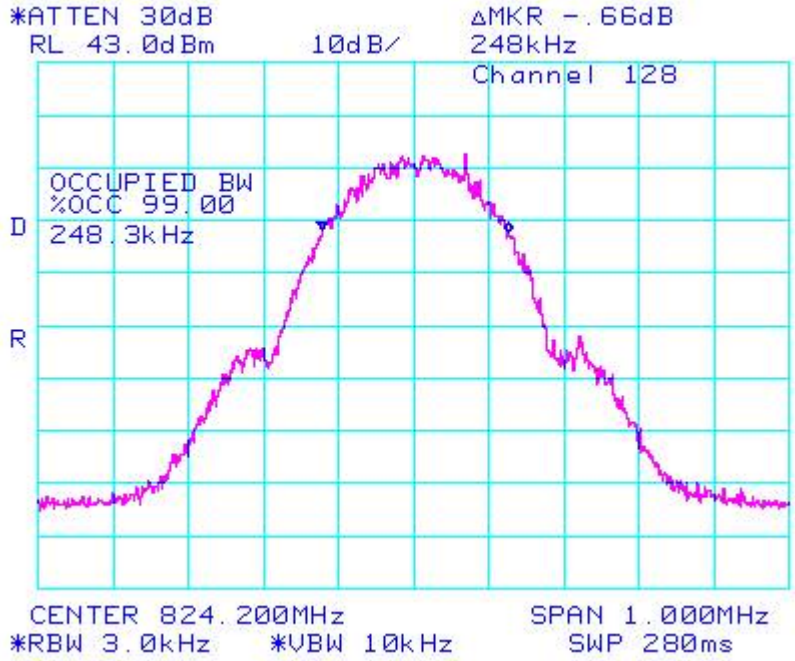


Figure 14: Occupied Bandwidth, GSM 850 Low Channel



Conducted RF Emission Test Data cont'd

Figure 15: -26dBc bandwidth, GSM 850 Middle Channel

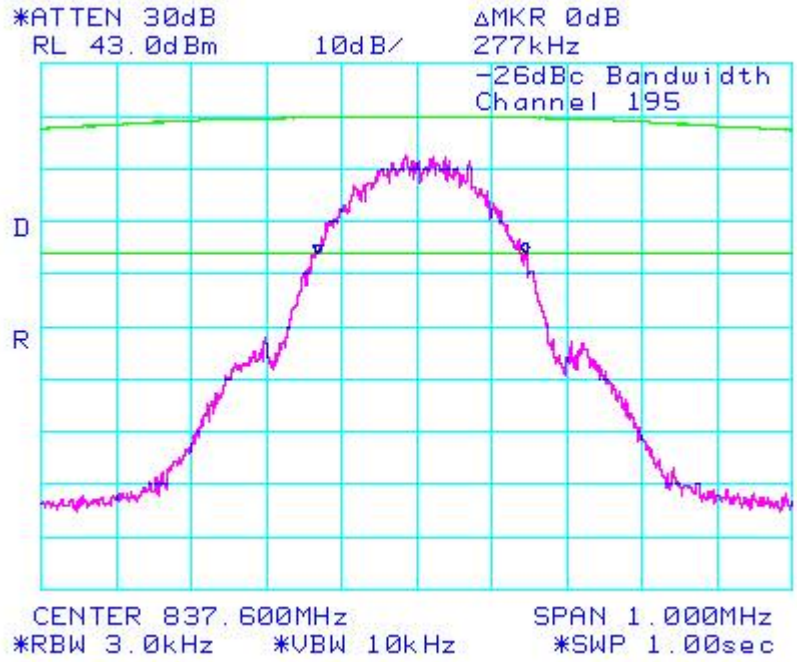
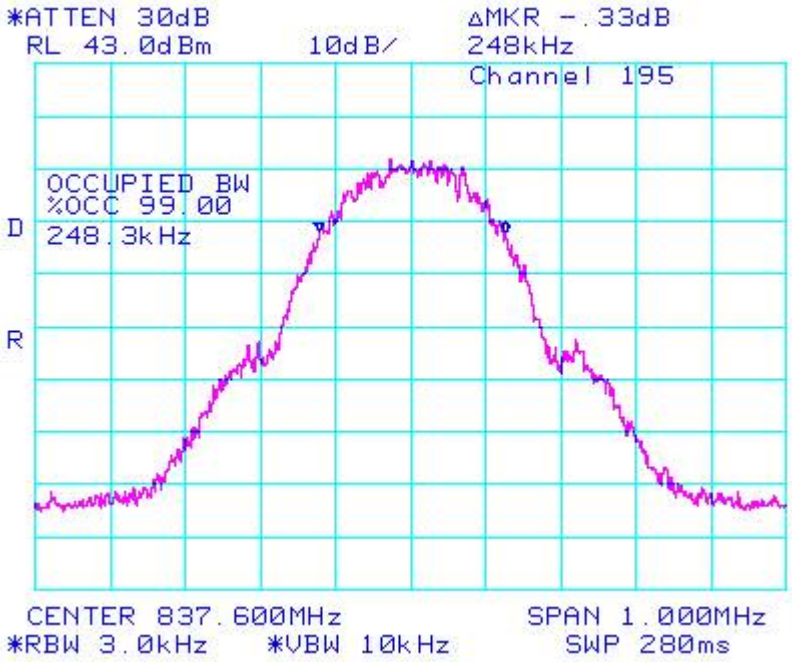


Figure 16: Occupied Bandwidth, GSM 850 Middle Channel



Conducted RF Emission Test Data cont'd

Figure 17: -26dBc bandwidth, GSM 850 High Channel

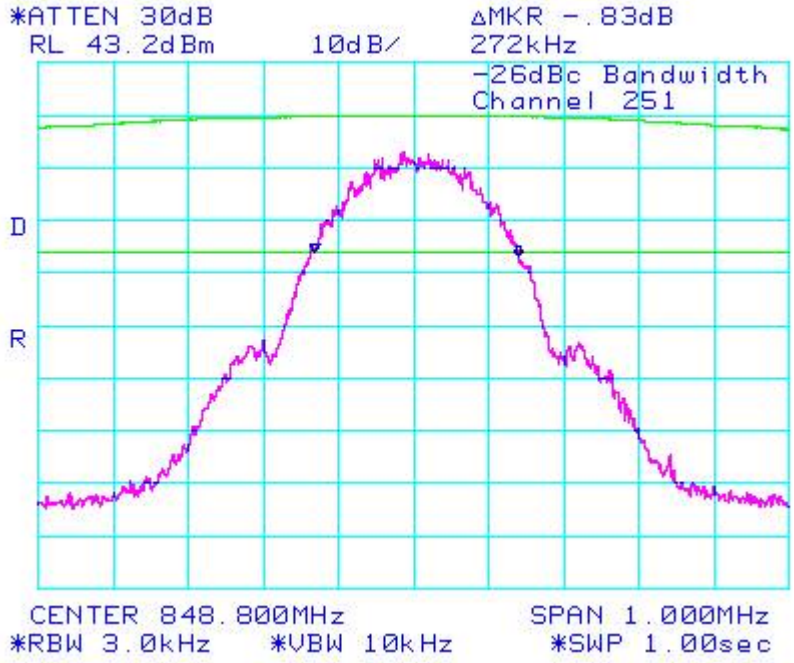
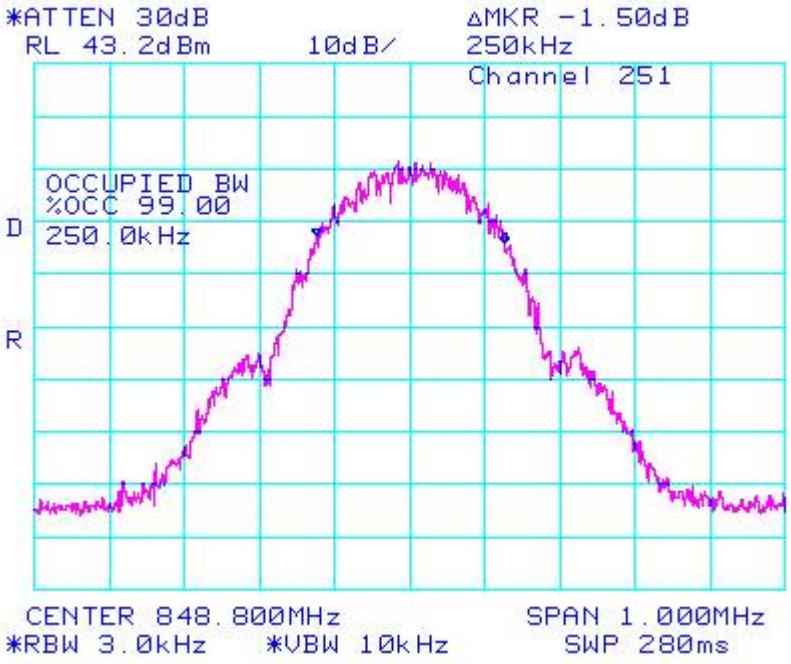


Figure 18: Occupied Bandwidth, GSM 850 High Channel



Conducted RF Emission Test Data cont'd

Figure 19: -26dBc bandwidth, PCS Low Channel

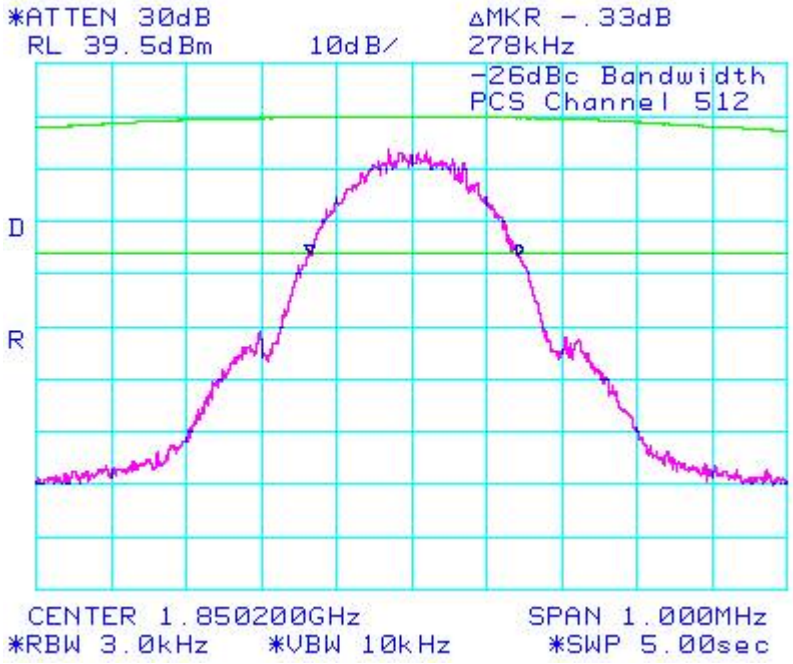
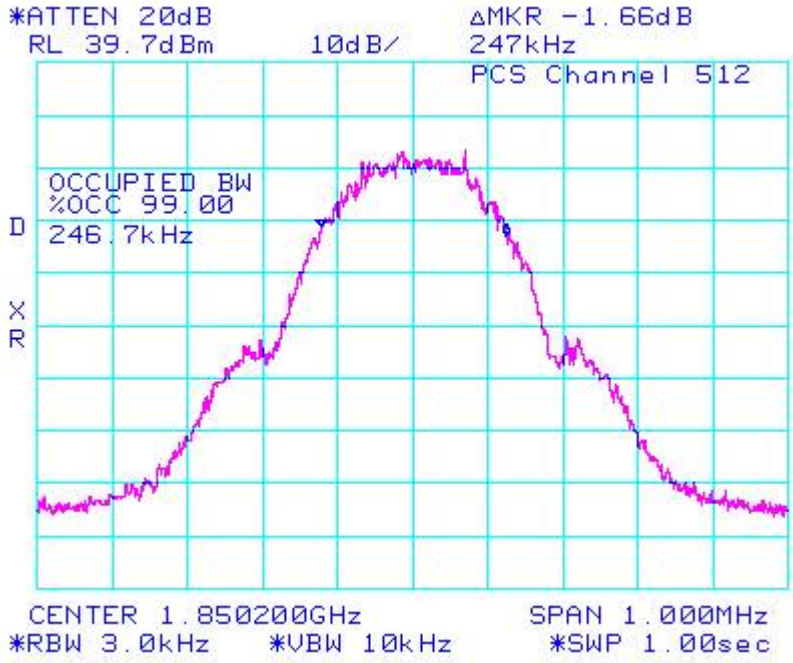


Figure 20: Occupied Bandwidth, PCS Low Channel



Conducted RF Emission Test Data cont'd

Figure 21: -**26dBc bandwidth, PCS Middle Channel**

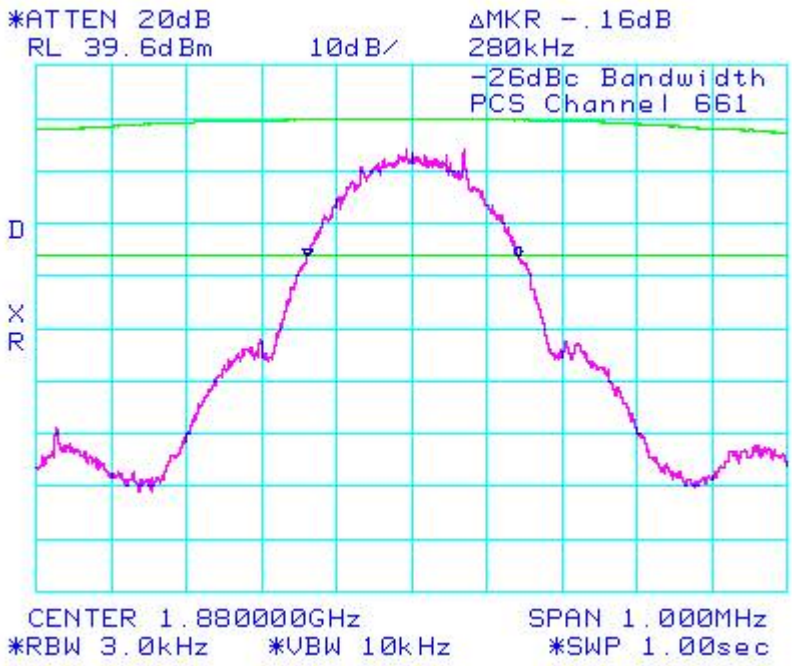
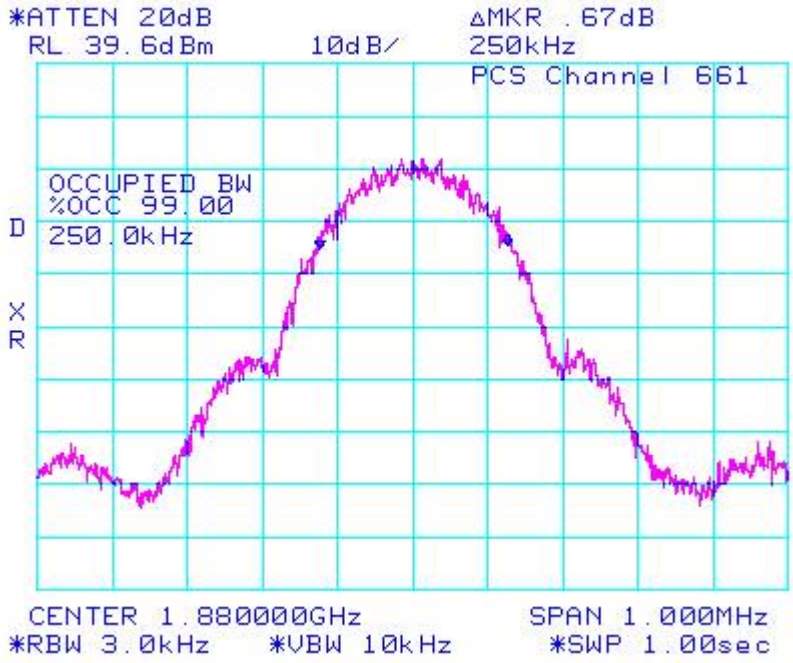


Figure 22: Occupied Bandwidth, PCS Middle Channel



Conducted RF Emission Test Data cont'd

Figure 23: -26dBc bandwidth, PCS High Channel

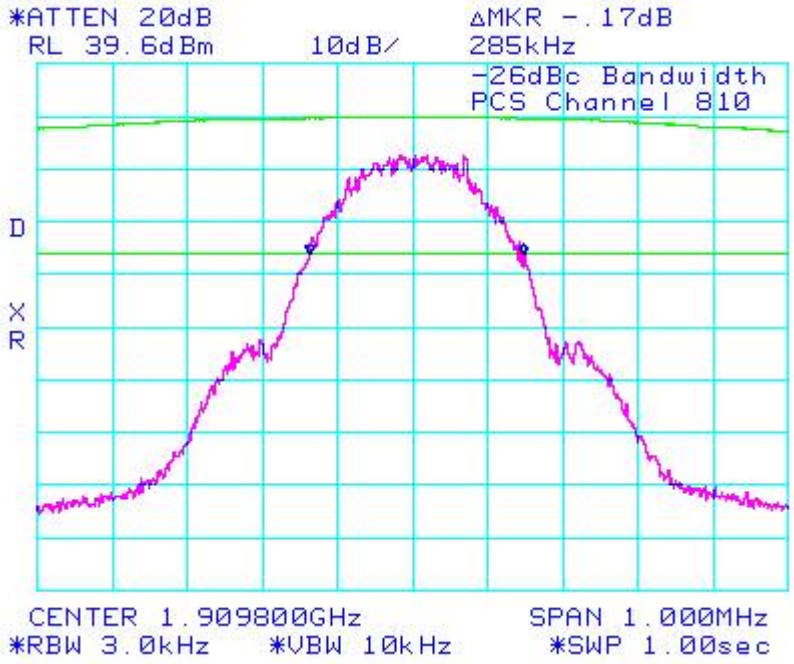
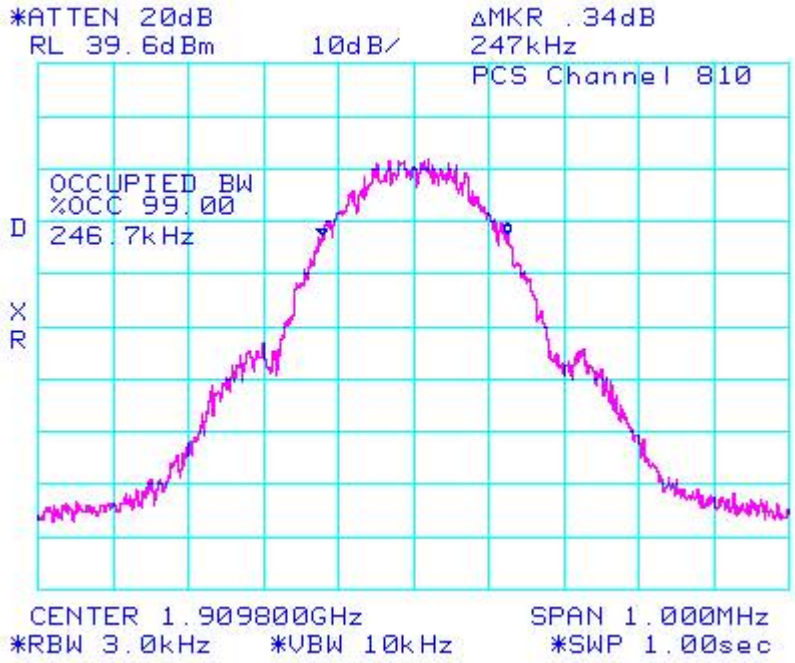


Figure 24: Occupied Bandwidth, PCS High Channel



Conducted RF Emission Test Data cont'd

Figure 25: GSM 850, Low Channel Mask

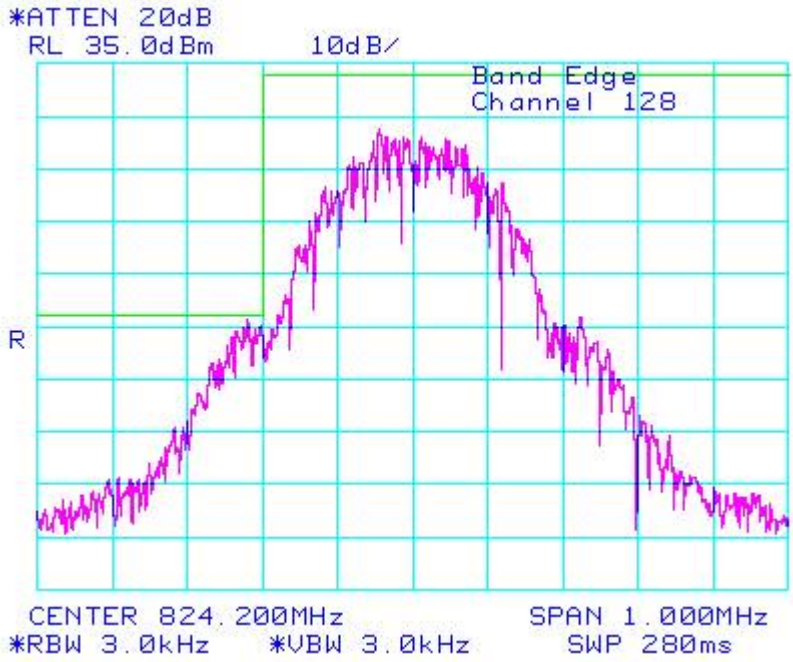
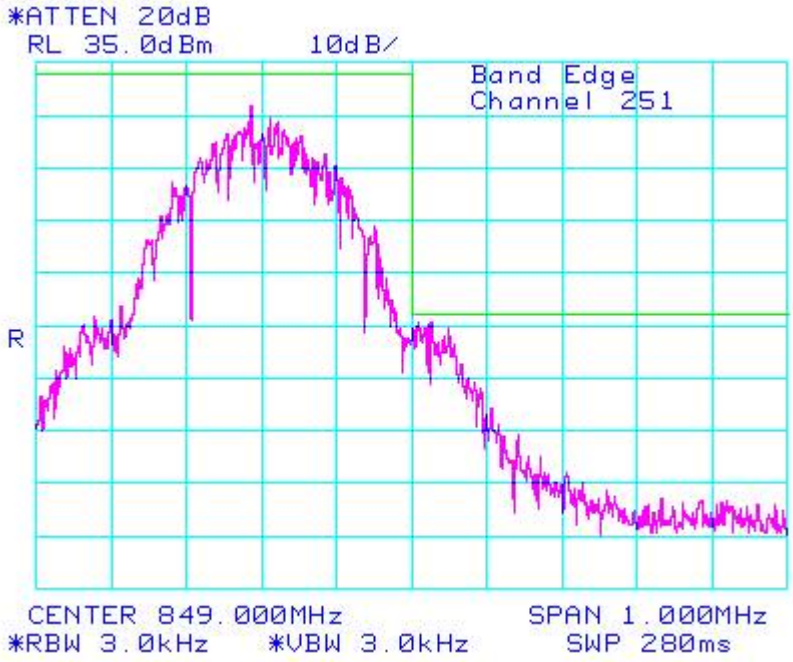


Figure 26: GSM 850 High Channel Mask



Conducted RF Emission Test Data cont'd

Figure27: PCS, Low Channel Mask

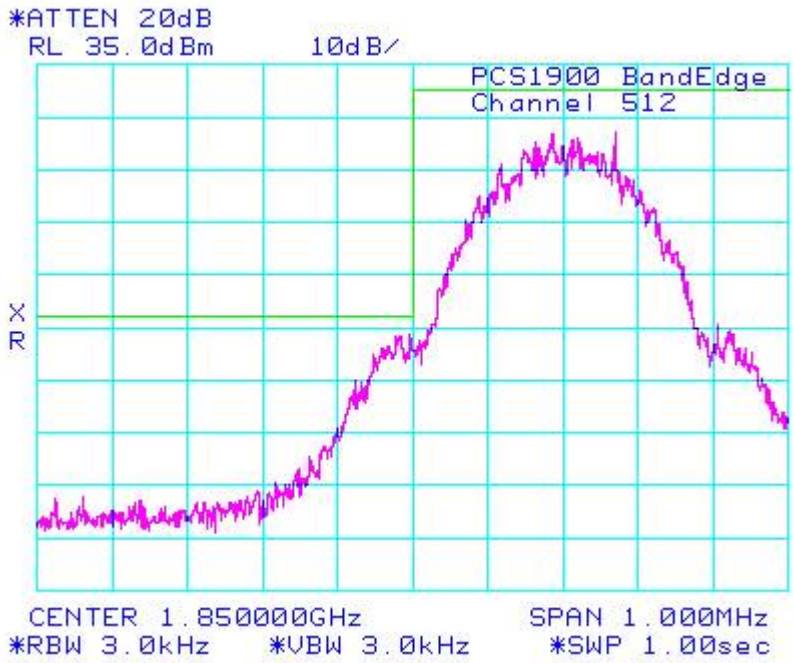
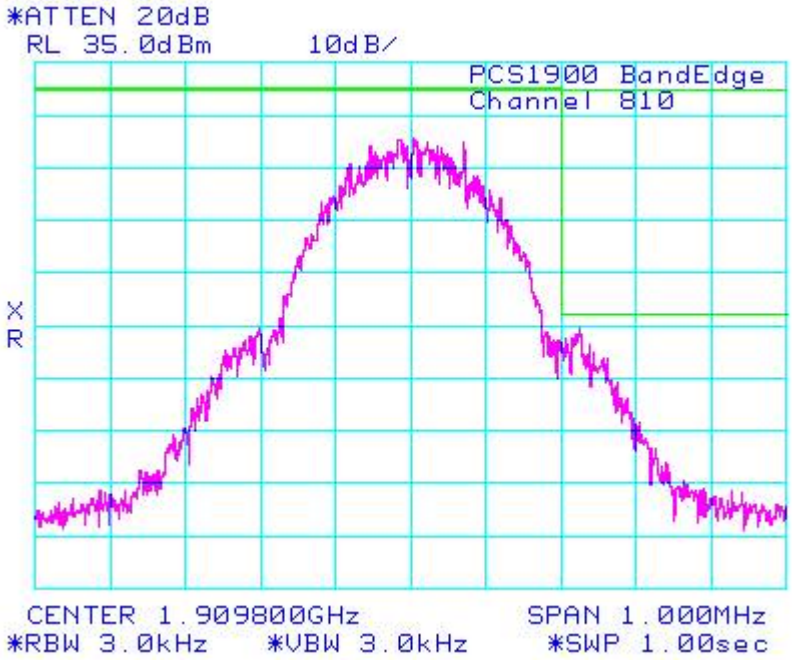
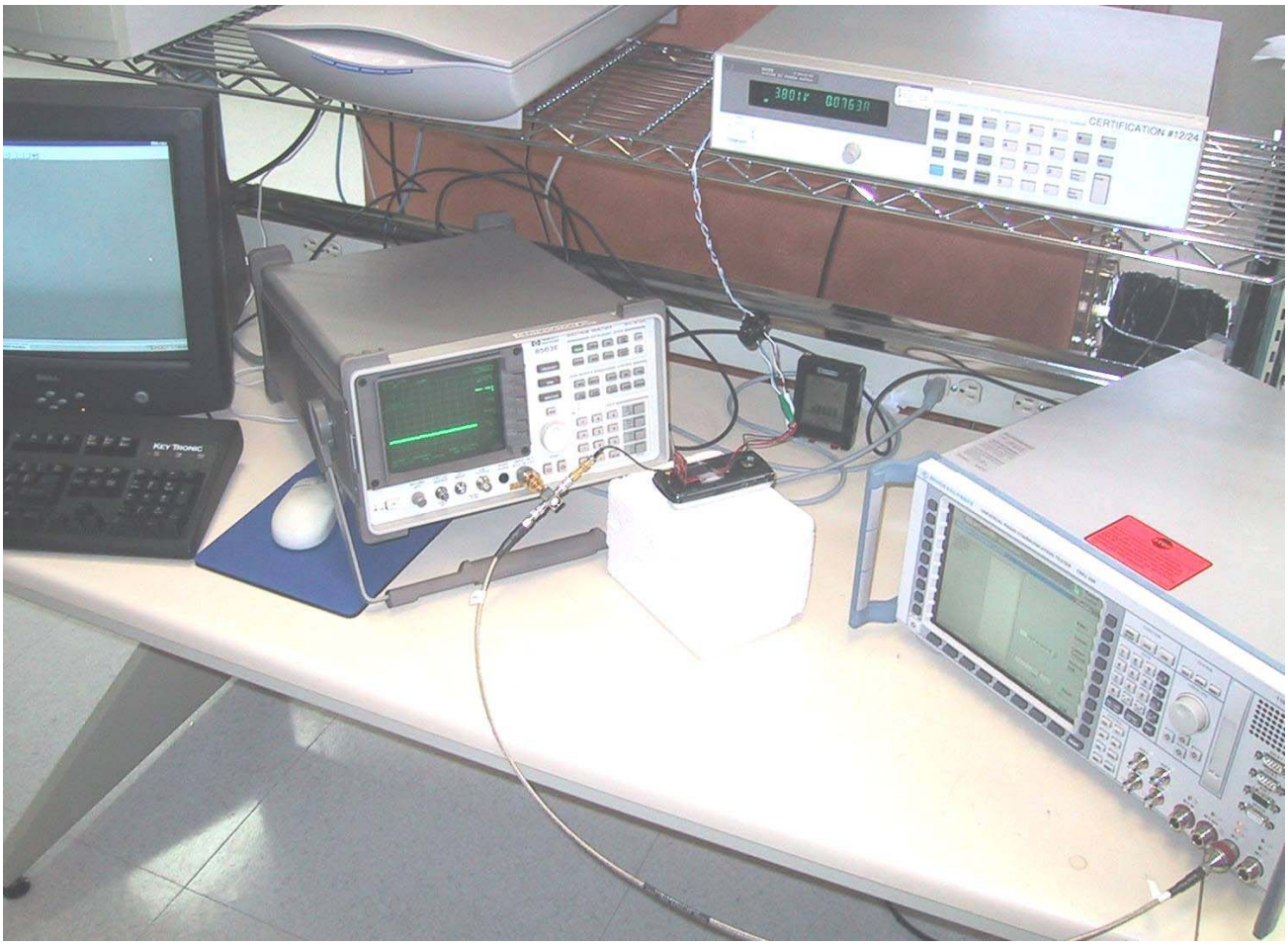


Figure28: PCS, High Channel Mask



Conducted RF Emission Test Set-up



APPENDIX 2 – CONDUCTED RF OUTPUT POWER TEST DATA

Conducted RF Output Power Test Data

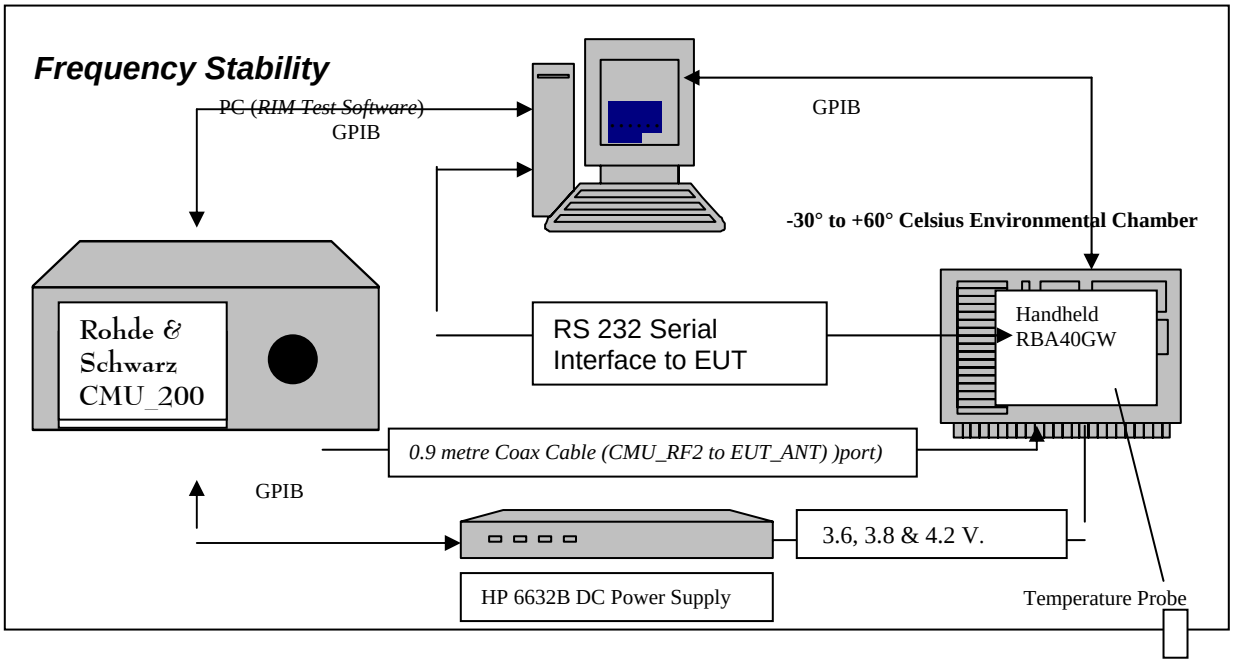
The conducted RF output power was measured using the Communication Tester, Rohde & Schwarz, model CMU 200. The low, middle and high channels were measured at maximum radio output power. The insertion loss of the coaxial cable from the CMU 200 to the Handheld was compensated for in the measurements.
Peak nominal output power is 32.5 dBm ±0.3 dB for GSM850 and 29.8 dBm ±0.5 dB for PCS.

Test Results

Channel	Frequency (MHz)	Maximum Output Power (dBm)
GSM850		
128	824.20	**32.50**
189	837.60	32.40
251	848.80	32.50
PCS		
512	1850.2	**29.80**
661	1880.0	29.70
810	1909.8	29.40

APPENDIX 3 – FREQUENCY STABILITY TEST DATA

Frequency Stability Test Data



SYSTEM	Model	Serial Number	Calibration Due Date.
R & S Universal Radio Communication Test Set	CMU200	100251	19-May-06
HP System DC Power Supply	6632B	US37472178	12-July-2007
Agilent Signal Generator	8648C	4037U03155	13-Sept.-2007
Giga-tronics Power Metre	8541C	1837762	03 Dec.-2006
Giga-tranics Power Sensor	80401A	1835838	03 Dec.-2006
Espec Environmental Chamber	SH240S1	91004919	N/A
Control Company Temperature Probe	15-077-21	51129471	20-May-2007

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements
2.995 Frequency Stability - Procedures
(a,b) Frequency Stability - Temperature Variation
(d) Frequency Stability - Voltage Variation

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

The RBA41GW handheld, (referred as EUT herein and after) transmitted frequencies are less than 0.1 ppm of the received frequency from the Rhode & Schwarz CMU 200 Universal Radio Communication Test Set.
The EUT meets the requirements as stated in CFR 47 chapter 1, Section 24.235, RSS-133, CFR 47 chapter 1, Section 22.917 and RSS-132 Frequency Stability.
Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMU 200 and the EUT antenna port; located inside the environmental chamber.

Calibration for the Cable Loss was performed in the RF Laboratory on 09 April 2006 using the Giga-tronics power metre and Agilent Signal Generator.
The cable assembly from the RF input to the RF output was measured at the following Frequencies:

PCS Frequency (MHz)	Cable loss (dB)
1850.2	1.10
1880.0	1.10
1909.8	1.10

GSM 850 Frequency (MHz)	Cable loss (dB)
824.2	0.71
836.4	0.71
848.6	0.71

Procedure:

The EUT was placed in the Temperature chamber and connected to CMU 200 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the measurements were to be made.

The chamber was switched on and the temperature was set to -30°C.
After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled.
The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the CMU 200 via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, to 3.8 volts to 4.2 volts nominal

voltage. The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.6 volts, 3.8 volts and 4.2 volts. The transmit frequency was varied in 3 steps consisting of 824.2, 836.4, and 848.6 MHz for the GSM850 band and 1850.2, 1880.0 and 1909.8 MHz for the PCS band. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.
After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

PROCEDURE:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

1. Switch on the HP 6632B power supply; CMU 200 Communications test Set, and Environmental Chamber.
2. Start test program
3. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.6 volts.
5. Set up CMU 200 Radio Communication Tester.
6. Command the CMU 200 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power, Frequency Error.
10. The CMU 200 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
11. Repeat steps 5 to 10 changing the supply voltage to 3.8 Volts
12. Increase temperature by 10°C and soak for 1/2 hour.
13. Repeat steps 4 - 12 for temperatures –30°C to 60°C.
14. Repeat steps 5 to 10 changing the supply voltage to 4.2 volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.6, 3.8 and 4.2 volts.
The maximum frequency error in the GSM850 band measured was 0.0983 PPM.
The maximum frequency error in the PCS band measured was -0.0535 PPM.

GSM850 Channel results: channels 128, 189 and 250 @ 20°C maximum transmitted power

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	3.6	20	10	0.0121
189	836.4	3.6	20	18	0.0215
250	848.6	3.6	20	22	0.0259

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	3.8	20	62	0.0752
189	836.4	3.8	20	55	0.0658
250	848.6	3.8	20	52	0.0613

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	4.2	20	20	0.0243
189	836.4	4.2	20	15	0.0179
250	848.6	4.2	20	-3.5	-0.0041

GSM850 Results: channel 128 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	3.6	-30	65	0.0789
128	824.2	3.6	-20	40	0.0485
128	824.2	3.6	-10	44	0.0534
128	824.2	3.6	0	46	0.0558
128	824.2	3.6	10	81	**0.0983**
128	824.2	3.6	20	10	0.0121
128	824.2	3.6	30	-24	-0.0291
128	824.2	3.6	40	-24	-0.0291
128	824.2	3.6	50	10	0.0121
128	824.2	3.6	60	7	0.0085

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	3.8	-30	-5	-0.0061
128	824.2	3.8	-20	24	0.0291
128	824.2	3.8	-10	26	0.0315
128	824.2	3.8	0	35	0.0425
128	824.2	3.8	10	39	0.0473
128	824.2	3.8	20	62	0.0752
128	824.2	3.8	30	36	0.0437
128	824.2	3.8	40	20	0.0243
128	824.2	3.8	50	35	0.0425
128	824.2	3.8	60	14	0.0170

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	4.2	-30	27	0.0328
128	824.2	4.2	-20	10	0.0121
128	824.2	4.2	-10	17	0.0206
128	824.2	4.2	0	15	0.0182
128	824.2	4.2	10	12	0.0146
128	824.2	4.2	20	20	0.0243
128	824.2	4.2	30	-16	-0.0194
128	824.2	4.2	40	-1	-0.0012
128	824.2	4.2	50	-10	-0.0121
128	824.2	4.2	60	10	0.0121

GSM850 Results: channel 189 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.4	3.6	-30	66	0.0789
189	836.4	3.6	-20	68	0.0813
189	836.4	3.6	-10	46	0.0550
189	836.4	3.6	0	45	0.0538
189	836.4	3.6	10	80	0.0956
189	836.4	3.6	20	18	0.0215
189	836.4	3.6	30	-16	-0.0191
189	836.4	3.6	40	-20	-0.0239
189	836.4	3.6	50	-15	-0.0179
189	836.4	3.6	60	13	0.0155

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.4	3.8	-30	-5.2	-0.0062
189	836.4	3.8	-20	28	0.0335
189	836.4	3.8	-10	27	0.0323
189	836.4	3.8	0	42	0.0502
189	836.4	3.8	10	44	0.0526
189	836.4	3.8	20	55	0.0658
189	836.4	3.8	30	30	0.0359
189	836.4	3.8	40	32	0.0383
189	836.4	3.8	50	30	0.0359
189	836.4	3.8	60	12	0.0143

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.4	4.2	-30	-9	-0.0108
189	836.4	4.2	-20	-8	-0.0096
189	836.4	4.2	-10	20	0.0239
189	836.4	4.2	0	12	0.0143
189	836.4	4.2	10	11	0.0132
189	836.4	4.2	20	15	0.0179
189	836.4	4.2	30	-20	-0.0239
189	836.4	4.2	40	-5	-0.0060
189	836.4	4.2	50	-20	-0.0239
189	836.4	4.2	60	6	0.0072

GSM850 Results: channel 250 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.6	3.6	-30	68	0.0801
250	848.6	3.6	-20	60	0.0707
250	848.6	3.6	-10	40	0.0471
250	848.6	3.6	0	47	0.0554
250	848.6	3.6	10	77	0.0907
250	848.6	3.6	20	22	0.0259
250	848.6	3.6	30	-30	-0.0354
250	848.6	3.6	40	-30	-0.0354
250	848.6	3.6	50	-21	-0.0247
250	848.6	3.6	60	11	0.0130

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.6	3.8	-30	14	0.0165
250	848.6	3.8	-20	34	0.0401
250	848.6	3.8	-10	25	0.0295
250	848.6	3.8	0	46	0.0542
250	848.6	3.8	10	44	0.0519
250	848.6	3.8	20	52	0.0613
250	848.6	3.8	30	45	0.0530
250	848.6	3.8	40	20	0.0236
250	848.6	3.8	50	31	0.0365
250	848.6	3.8	60	10	0.0118

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.6	4.2	-30	25	0.0295
250	848.6	4.2	-20	16	0.0189
250	848.6	4.2	-10	20	0.0236
250	848.6	4.2	0	7	0.0082
250	848.6	4.2	10	-15	-0.0177
250	848.6	4.2	20	-3.5	-0.0041
250	848.6	4.2	30	-9	-0.0106
250	848.6	4.2	40	10	0.0118
250	848.6	4.2	50	-2	-0.0024
250	848.6	4.2	60	-4	-0.0047

PCS Channel results: channels 512, 661, & 810 @ 20°C maximum transmitted power

Traffic Channel Number	PCS Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	*PPM*
512	1850.2	3.6	20	-81.00	-0.0438
661	1880.0	3.6	20	-45.00	-0.0239
810	1909.8	3.6	20	-43.00	-0.0225

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.8	20	-60.00	-0.0324
661	1880.0	3.8	20	-52.00	-0.0277
810	1909.8	3.8	20	-51.00	-0.0267

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	4.2	20	-33.00	-0.0178
661	1880.0	4.2	20	-33.00	-0.0176
810	1909.8	4.2	20	-38.00	-0.0199

PCS 1900 Results: channel 512 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.6	-30	-52.00	-0.0281
512	1850.2	3.6	-20	-55.00	-0.0297
512	1850.2	3.6	-10	-71.00	-0.0384
512	1850.2	3.6	0	-39.00	-0.0211
512	1850.2	3.6	10	-52.00	-0.0281
512	1850.2	3.6	20	-81.00	-0.0438
512	1850.2	3.6	30	-67.00	-0.0362
512	1850.2	3.6	40	-86.00	-0.0465
512	1850.2	3.6	50	-94.00	-0.0508
512	1850.2	3.6	60	-99.00	**-0.0535**

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.8	-30	-52.00	-0.0281
512	1850.2	3.8	-20	-52.00	-0.0281
512	1850.2	3.8	-10	-61.00	-0.0330
512	1850.2	3.8	0	-31.00	-0.0168
512	1850.2	3.8	10	-40.00	-0.0216
512	1850.2	3.8	20	-60.00	-0.0324
512	1850.2	3.8	30	-61.00	-0.0330
512	1850.2	3.8	40	-73.00	-0.0395
512	1850.2	3.8	50	-77.00	-0.0416
512	1850.2	3.8	60	-81.00	-0.0438

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	4.2	-10	-31.00	-0.0168
512	1850.2	4.2	0	-33.00	-0.0178
512	1850.2	4.2	10	-20.00	-0.0108
512	1850.2	4.2	20	-33.00	-0.0178
512	1850.2	4.2	30	-55.00	-0.0297
512	1850.2	4.2	40	-77.00	-0.0416
512	1850.2	4.2	50	-70.00	-0.0378
512	1850.2	4.2	60	-58.00	-0.0313
512	1850.2	4.2	-10	-31.00	-0.0168
512	1850.2	4.2	0	-33.00	-0.0178

PCS 1900 Results: channel 661 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880.0	3.6	-30	-71.00	-0.0378
661	1880.0	3.6	-20	-60.00	-0.0319
661	1880.0	3.6	-10	-65.00	-0.0346
661	1880.0	3.6	0	-74.00	-0.0394
661	1880.0	3.6	10	-38.00	-0.0202
661	1880.0	3.6	20	-45.00	-0.0239
661	1880.0	3.6	30	-73.00	-0.0388
661	1880.0	3.6	40	-75.00	-0.0399
661	1880.0	3.6	50	-83.00	-0.0441
661	1880.0	3.6	60	-85.00	-0.0452

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880.0	3.8	-30	-66.00	-0.0351
661	1880.0	3.8	-20	-61.00	-0.0324
661	1880.0	3.8	-10	-59.00	-0.0314
661	1880.0	3.8	0	-33.00	-0.0176
661	1880.0	3.8	10	-44.00	-0.0234
661	1880.0	3.8	20	-52.00	-0.0277
661	1880.0	3.8	30	-57.00	-0.0303
661	1880.0	3.8	40	-70.00	-0.0372
661	1880.0	3.8	50	-71.00	-0.0378
661	1880.0	3.8	60	-77.00	-0.0410

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880.0	4.2	-30	-48.00	-0.0255
661	1880.0	4.2	-20	-60.00	-0.0319
661	1880.0	4.2	-10	-43.00	-0.0229
661	1880.0	4.2	0	-41.00	-0.0218
661	1880.0	4.2	10	-51.00	-0.0271
661	1880.0	4.2	20	-33.00	-0.0176
661	1880.0	4.2	30	-67.00	-0.0356
661	1880.0	4.2	40	-65.00	-0.0346
661	1880.0	4.2	50	-74.00	-0.0394
661	1880.0	4.2	60	-66.00	-0.0351

PCS 1900 Results: channel 810 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	3.6	-30	-61.00	-0.0319
810	1909.8	3.6	-20	-65.00	-0.0340
810	1909.8	3.6	-10	-64.00	-0.0335
810	1909.8	3.6	0	-71.00	-0.0372
810	1909.8	3.6	10	-73.00	-0.0382
810	1909.8	3.6	20	-43.00	-0.0225
810	1909.8	3.6	30	-79.00	-0.0414
810	1909.8	3.6	40	-85.00	-0.0445
810	1909.8	3.6	50	-94.00	-0.0492
810	1909.8	3.6	60	-74.00	-0.0387

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	3.8	-30	-66.00	-0.0346
810	1909.8	3.8	-20	-67.00	-0.0351
810	1909.8	3.8	-10	-61.00	-0.0319
810	1909.8	3.8	0	-36.00	-0.0189
810	1909.8	3.8	10	-45.00	-0.0236
810	1909.8	3.8	20	-51.00	-0.0267
810	1909.8	3.8	30	-66.00	-0.0346
810	1909.8	3.8	40	-74.00	-0.0387
810	1909.8	3.8	50	-80.00	-0.0419
810	1909.8	3.8	60	-76.00	-0.0398

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	4.2	-30	-35.00	-0.0183
810	1909.8	4.2	-20	-31.00	-0.0162
810	1909.8	4.2	-10	-25.00	-0.0131
810	1909.8	4.2	0	-39.00	-0.0204
810	1909.8	4.2	10	-32.00	-0.0168
810	1909.8	4.2	20	-38.00	-0.0199
810	1909.8	4.2	30	-68.00	-0.0356
810	1909.8	4.2	40	-64.00	-0.0335
810	1909.8	4.2	50	-79.00	-0.0414
810	1909.8	4.2	60	-72.00	-0.0377

APPENDIX 4 – RADIATED EMMISIONS TEST DATA

Radiated Emissions Test Data Results

Test distance is 3.0 metres March 29, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Dipole)	Limit (dBm)	Diff. To Limit (dB)
GSM850 Band (ERP) Handheld Standalone, thumbwheel down												
F0	128	824.20	850	Dipole	V	76.7	89.7	V-V	16.3	**31.45**	38.50	-7.05
F0	128	824.20	850	Dipole	H	89.7						
F0	195	837.60	850	Dipole	V	76.2	88.2	V-V	15.1	30.25	38.50	-8.25
F0	195	837.60	850	Dipole	H	88.2						
F0	251	848.80	850	Dipole	V	76	88.2	V-V	14	29.15	38.50	-9.35
F0	251	848.80	850	Dipole	H	88.2						

ERP = Generator Level + Antenna Gain – Cable Loss + Preamp Gain

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres March 29, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) Handheld Standalone, thumbwheel down **Low Channel –** 824.2 MHz												
2nd	128	1648.40	850	Horn	V	57.9	61	V-V	-16.5	-39.1	-13	-26.1
2nd	128	1648.40	850	Horn	H	61						
3rd	128	2472.60	850	Horn	V	65	65.5	V-V	-2	-30.3	-13	**-17.3**
3rd	128	2472.60	850	Horn	H	65.5						
4th	128	3296.80	850	Horn	V	48.2	48.2	V-V	-17.9	-46	-13	-32.7
4th	128	3296.80	850	Horn	H	NF						
5th	128	4121.00	850	Horn	V	47	49.9	V-V	-16.5	-45.7	-13	-19.2
5th	128	4121.00	850	Horn	H	49.9						
6th	128	4945.20	850	Horn	V	49	49	V-V	-2	-32.2	-13	-19.2
6th	128	4945.20	850	Horn	H	49						
7th	128	5769.40	850	Horn	V	52.1	52.1	V-V	-2.4	-33.8	-13	-20.8
7th	128	5769.40	850	Horn	H	NF						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 7th harmonic were in the noise floor (NF)

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres March 29, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) Handheld Standalone, thumbwheel down **Mid Channel –**837.60 MHz												
2nd	195	1675.20	850	Horn	V	55.3	62	V-V	-15.4	-38	-13	-25
2nd	195	1675.20	850	Horn	H	62						
3rd	195	2512.80	850	Horn	V	63.4	65.1	V-V	-2.1	-30.4	-13	-17.4
3rd	195	2512.80	850	Horn	H	65.1						
4th	195	3350.40	850	Horn	V	47.1	47.1	V-V	-18.6	-46.7	-13	-29.2
4th	195	3350.40	850	Horn	H	NF						
5th	195	4188.00	850	Horn	V	47.9	49.3	V-V	-13	-42.2	-13	-25.4
5th	195	4188.00	850	Horn	H	49.3						
6th	195	5025.60	850	Horn	V	50.1	50.1	V-V	-8.2	-38.4	-13	-25.4
6th	195	5025.60	850	Horn	H	48.8						
7th	195	5863.20	850	Horn	V	52.7	52.7	V-V	-1.1	-32.5	-13	-19.5
7th	195	5863.20	850	Horn	H	50.3						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 7th harmonic were in the noise floor (NF)

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres March 29, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) Handheld Standalone, thumbwheel down **High Channel –** 848.8 MHz												
2nd	251	1697.60	850	Horn	V	55.3	65.2	V-V	-11.4	-34	-13	-21
2nd	251	1697.60	850	Horn	H	65.2						
3rd	251	2546.40	850	Horn	V	57.6	63.2	V-V	-2.9	-31.2	-13	-18.2
3rd	251	2546.40	850	Horn	H	63.2						
4th	251	3395.20	850	Horn	V	47.1	47.1	V-V	-18.1	-46.2	-13	-28.3
4th	251	3395.20	850	Horn	H	NF						
5th	251	4244.00	850	Horn	V	47.7	48.4	V-V	-12.1	-41.3	-13	-24.5
5th	251	4244.00	850	Horn	H	48.4						
6th	251	5092.80	850	Horn	V	50.5	50.5	V-V	-7.3	-37.5	-13	-24.5
6th	251	5092.80	850	Horn	H	49.4						
7th	251	5941.60	850	Horn	V	51.1	51.8	V-V	-2.1	-33.5	-13	-20.5
7th	251	5941.60	850	Horn	H	51.8						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 7th harmonic were in the noise floor (NF)

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres March 29, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM BAND												
RF Local Oscillator (LO_1) Handheld Standalone, thumbwheel down												
Low Channel (824.2 MHz)												
F0	128	1648.40	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	128	1648.40	850	Horn	H	NF							
Emissions were in the NF.													
High Channel (848.8 MHz)												
F0	251	1697.60	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	251	1697.60	850	Horn	H	NF							
Emissions were in the NF.													
RF LO_2													
Low Channel (824.2 MHz)													
F0	128	3476.80	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	128	3476.80	850	Horn	H	NF							
Emissions were in the NF.													
High Channel (848.8 MHz)													
F0	251	3575.20	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	251	3575.20	850	Horn	H	NF							
Emissions were in the NF.													

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres April 3, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) and Bluetooth Handheld Standalone, thumbwheel down **GSM850 Low Channel –** 824.8 MHz – **Bluetooth Low Channel** – 2402.0 MHz												
2nd	195	1675.20	850	Horn	V	57.9	61	V-V	-16.5	-39.1	-13	-26.1
2nd	195	1675.20	850	Horn	H	61						
3rd	195	2512.80	850	Horn	V	65	65.6	V-V	-2	-30.3	-13	**-17.3**
3rd	195	2512.80	850	Horn	H	65.6						
4th	128	3296.80	850	Horn	V	51.2	51.2	V-V	-13.4	-41.5	-13	-18.8
4th	128	3296.80	850	Horn	H	47.9						
5th	128	4121.00	850	Horn	V	58.5	58.5	V-V	-2.6	-31.8	-13	-26.9
5th	128	4121.00	850	Horn	H	57.8						
6th	128	4945.20	850	Horn	V	48	48.3	V-V	-9.7	-39.9	-13	-26.9
6th	128	4945.20	850	Horn	H	48.3						
7th	128	5769.40	850	Horn	V	52	52	V-V	-5.2	-36.6	-13	-23.6
7th	128	5769.40	850	Horn	H	48.6						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 7th harmonic were in the noise floor (NF)

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres April 3, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) and Bluetooth Handheld Standalone, thumbwheel down **GSM850 Middle Channel –** 837.6 MHz - **Bluetooth Middle Channel** – 2441.0 MHz												
2nd	251	1697.60	850	Horn	V	55.3	-16.1	-38.7	-13	-25.7	-16.1	-38.7
2nd	251	1697.60	850	Horn	H	60.9						
3rd	251	2546.40	850	Horn	V	63.2	-2	-30.3	-13	-17.3	-2	-30.3
3rd	251	2546.40	850	Horn	H	65						
4th	195	3350.40	850	Horn	V	47.3	-17.8	-45.9	-13	-25.8	-17.8	-45.9
4th	195	3350.40	850	Horn	H	NF						
5th	195	4188.00	850	Horn	V	48	-9.6	-38.8	-13	-25.5	-9.6	-38.8
5th	195	4188.00	850	Horn	H	50.3						
6th	195	5025.60	850	Horn	V	49.5	-8.3	-38.5	-13	-25.5	-8.3	-38.5
6th	195	5025.60	850	Horn	H	48.8						
7th	195	5863.20	850	Horn	V	51.5	-2.5	-33.9	-13	-20.9	-2.5	-33.9
7th	195	5863.20	850	Horn	H	51.2						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 7th harmonic were in the noise floor (NF

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres April 3, 2006

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) and Bluetooth Handheld Standalone, thumbwheel down **GSM850 High Channel –** 848.8 MHz – **Bluetooth High Channel** – 2480.0 MHz												
2nd	251	1697.60	850	Horn	V	55.3	-12.1	-34.7	-13	-21.7	-12.1	-34.7
2nd	251	1697.60	850	Horn	H	64.7						
3rd	251	2546.40	850	Horn	V	57.4	-3	-31.3	-13	-18.3	-3	-31.3
3rd	251	2546.40	850	Horn	H	63						
4th	251	3395.20	850	Horn	V	NF	N/A	N/A	-13	-28.6	N/A	N/A
4th	251	3395.20	850	Horn	H	NF						
5th	251	4244.00	850	Horn	V	47.5	-12.4	-41.6	-13	-28.1	-12.4	-41.6
5th	251	4244.00	850	Horn	H	48.5						
6th	251	5092.80	850	Horn	V	46.9	-10.9	-41.1	-13	-28.1	-10.9	-41.1
6th	251	5092.80	850	Horn	H	46.6						
7th	251	5941.60	850	Horn	V	47	-6.4	-37.8	-13	-24.8	-6.4	-37.8
7th	251	5941.60	850	Horn	H	47.4						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 7th harmonic were in the noise floor (NF)

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres. PCS Band April 3, 2006

								Substitution Method				
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
PCS BAND (EIRP) Handheld Standalone, horizontal												
F0	512	1850.20	1900	Horn	V	87.1	93.7	V-V	-6.4	29.2	33	-3.8
F0	512	1850.20	1900	Horn	H	93.7						
F0	661	1880.00	1900	Horn	V	86.9	93.8	V-V	-5.3	**30.3**	33	-2.7
F0	661	1880.00	1900	Horn	H	93.8						
F0	810	1909.80	1900	Horn	V	86.1	92.7	V-V	-6	29.6	33	-3.4
F0	810	1909.80	1900	Horn	H	92.7						

EIRP = Tracking Generator Level + Antenna Factor – Cable Loss + Preamp Gain

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres. PCS Band April 3, 2006

								Substitution Method				
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Pol. Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
PCS BAND (Harmonics) Handheld Standalone, horizontal **Low Channel** 1850.20 MHz												
2nd	512	3700.40	1900	Horn	V	48.4	48.4	V-V	-10.5	-33.1	-13	-20.1
2nd	512	3700.40	1900	Horn	H	46.8						
3rd	512	5550.60	1900	Horn	V	48.2	48.4	V-V	-2.8	-28	-13	-15
3rd	512	5550.60	1900	Horn	H	48.4						
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF **Middle Channel** 1880.00 MHz												
2nd	661	3760.00	1900	Horn	V	45.7	45.7	V-V	-14.1	-36.7	-13	-23.7
2nd	661	3760.00	1900	Horn	H	45.3						
3rd	661	5640.00	1900	Horn	V	49.4	49.4	V-V	-0.7	-25.9	-13	**-12.9**
3rd	661	5640.00	1900	Horn	H	49.3						
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF **High Channel** 1909.8 MHz												
2nd	810	3819.60	1900	Horn	V	46.8	46.8	V-V	-11.7	-34.3	-13	-21.3
2nd	810	3819.60	1900	Horn	H	46.3						
3rd	810	5729.40	1900	Horn	V	49.3	49.3	V-V	-1.1	-26.3	-13	-13.3
3rd	810	5729.40	1900	Horn	H	47.3						
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF												

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres. PCS Band April 3, 2006
The measurements were performed in transmit mode with the handheld in standalone vertical position.

EUT				Rx Antenna		Spectrum Analyzer			Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
RF LO_1 horizontal													
Low Channel													
F0	512	1423.20	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	512	1423.20	1900	Horn	H	NF							
Emissions were in the NF.													
High Channel													
F0	810	1482.80	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	810	1482.80	1900	Horn	H	NF							
Emissions were in the NF.													
RF LO_2													
Low Channel													
F0	512	1930.10	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	512	1930.10	1900	Horn	H	NF							
Emissions were in the NF.													
High Channel													
F0	810	1989.70	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	810	1989.70	1900	Horn	H	NF							
Emissions were in the NF.													

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres. April 3, 2006

								Substitution Method				
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Pol. Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
PCS and Bluetooth												
Handheld Standalone, horizontal												
Low Channel 1850.20 MHz **Bluetooth Low Channel** – 2402.0 MHz												
2nd	512	3700.40	1900	Horn	V	48.1	48.1	V-V	-11.5	-34.1	-13	-21.1
2nd	512	3700.40	1900	Horn	H	47.7						
3rd	512	5550.6	1900	Horn	V	47.9	47.9	V-V	-3.1	-28.3	-13	-15.3
3rd	512	5550.6	1900	Horn	H	48.1						
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF												
Middle Channel 1880.00 MHz **Bluetooth High Channel** – 2441.0 MHz												
2nd	661	3760.00	1900	Horn	V	46.33	46.33	V-V	-12.8	-35.4	-13	-22.4
2nd	661	3760.00	1900	Horn	H	45.91						
3rd	661	5640.00	1900	Horn	V	48.2	48.2	V-V	-2	-27.2	-13	-14.2
3rd	661	5640.00	1900	Horn	H	47.9						
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF												
High Channel 1909.8 MHz **Bluetooth High Channel** – 2480.0 MHz												
2nd	810	38.19.60	1900	Horn	V	46.1	46.1	V-V	-12.6	-35.2	-13	-22.2
2nd	810	3819.60	1900	Horn	H	NF						
3rd	810	5729.40	1900	Horn	V	49.9	49.9	V-V	0.2	-25	-13	**-12**
3rd	810	5729.40	1900	Horn	H	48						
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF												

The environmental tests conditions were: Temperature 26^0 C
Pressure 1004mb
Relative Humidity 24%

Radiated Emissions Test Photo