EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22 and 24
and
Industry Canada, RSS-133 and RSS-128

Research In Motion Limited

REPORT NO.: RIM-0094-0407-02

PRODUCT MODEL NO: RAQ40GW
TYPE NAME: BlackBerry Wireless Handheld
FCC ID: L6ARAQ40GW
IC: 2503A-RAQ40GW

Date: 20 July 2004

Declaration

Statement of Performance:

The BlackBerry Wireless Handheld, model RAQ40GW 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 equipment used was suitable for the tests performed and within the manufacturers published specifications and operating parameters.
The test methods were consistent with the methods described in the relevant standards.

Tested by

Maurice Battler

Maurice Battler
Compliance Specialist Date: 20 July 2004

M. Attay

Masud S. Attayi, P.Eng.
Senior Compliance and Certification Engineer Date: 21 July 2004

Reviewed and Approved by:

Paul G Cardinal

Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification Date: 27 July 2004

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-128 Issue 2, Rev 1, Nov. 6/99, 800 MHz Dual-Mode TDMA Cellular Telephones
Industry Canada, RSS-133 Issue 2, Rev. 1 Nov. 6/1999, 2.0 GHz Personal Communications Services

B) Product Identification

The equipment under test (EUT) was tested at the Research In Motion (RIM) EMI test facility, located at:

305 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906
Web Site: www.rim.com

The testing began on June 28, 2004 and completed on July 19, 2004. The sample equipment under test (EUT) included:

1a BlackBerry Wireless Handheld, model number RAQ40GW ASY-07200-001 revision F and ASY-07220-001 revision J, RF PCB version 004, PIN 2013505F, FCC ID L6ARAQ40GW, IC: 2503A-RAQ40GW.

1b BlackBerry Wireless Handheld, model number RAQ40GW ASY-07200-001 revision 1A and ASY-07220-001 revision 1A, RF PCB version 004, PIN 2013239F, FCC ID L6ARAQ40GW, IC: 2503A-RAQ40GW.

For the purpose of this report, items 1a and 1b are interchangeable. The differences do not impact the test results.

The transmit frequency ranges for the BlackBerry Wireless Handheld model number RAQ40GW are: GSM850 824 to 849 MHz, GSM 880 to 915 MHz, DCS 1710 to 1785 MHz, PCS 1850 to 1910 MHz and Bluetooth 2402 to 2480 MHz.

C) 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 837/493/073
3) DC Power Supply, H/P, model 6632B, serial number US37472178

D) Test Voltage

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

E) Test Results Chart

SPECIFICATION	Test Type	MEETS REQUIREMENTS	Performed By
FCC CFR 47 Part 22, Subpart H IC RSS-128	Radiated Spurious/harmonic Emissions, ERP, LO	Yes	Masud Attayi
FCC CFR 47 Part 2, Subpart J, Part 22, Subpart H IC RSS-128	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	Masud Attayi
FCC CFR 47 Part 24, Subpart E IC RSS-133	Conducted Emissions, Occupied Bandwidth, Frequency Stability	Yes	Maurice Battler

F) Modifications to EUT

No modifications were required to the EUT.

G) **Summary of Results**

1) The EUT passed the Conducted Spurious Emissions requirements in the GSM850 band as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d) and RSS-128. 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 the test data.

2) The EUT passed the 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 the test data.

3) The EUT passed the Occupied Bandwidth and channel mask requirements in the GSM850 band as per 47 CFR 2.202, CFR 22.917 and RSS-128. The EUT was measured on the low, middle and high channels.
See APPENDIX 1 for the test data.

4) The EUT passed 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 the test data.

5) The EUT passed 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 passed 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-128.
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 (3.5 volts), nominal (3.8 volts) and high (4.1 volts) dc input voltage at each temperature step and channel at maximum output power.
See APPENDIX 3 for the test data.

7) The EUT passed 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 degree temperature steps. The EUT was measured on low, middle and high channels at each temperature step. The EUT was measured at low (3.5 volts), nominal (3.8 volts) and high (4.1 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 wooden table, 100 cm high that was positioned on a remotely rotatable turntable. The test distance used between the EUT and the receiving antenna was three metres. 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. Both the horizontal and vertical polarisations of the emissions were measured.
The maximum emissions level was recorded. The EUT was then substituted with a substitution 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. 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 31.75 dBm at 848.8 MHz (channel 251).
The highest EIRP in the PCS band measured was 31.5 dBm at 1909.8 MHz (channel 810).

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.
The worst test margin for GSM850 band measured was 23.2 dB below the limit at 1648.4 MHz.
The worst test margin for PCS band measured was 12.2 dB below the limit at 3700.4 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 noise floor (NF).

The EUT's IF LO emissions were measured in the GSM850 band in the standalone configuration in the vertical position on the middle channel. Both the horizontal and vertical polarizations were measured. The highest emissions measured had a test margin of 23.8 dB at 896.0 MHz.

The EUT's IF local oscillator emissions were measured in the PCS band in the standalone configuration in the vertical position on the middle channel. Both the horizontal and vertical polarizations of the emissions were measured. The IF LO was in the NF.

The radiated spurious harmonic emissions were measured up to the 10th harmonic for low, middle and high channels in the GSM850 band and PCS band with Bluetooth transmitting simultaneously. The worst test margin for GSM850 band measured was 24.4 dB below the limit at 1648.4 MHz. The worst test margin for PCS and Bluetooth bands measured was 12.8 dB below the limit at 3700.4 MHz.

The radiated Bluetooth harmonics in frequency hopping mode were measured in simultaneous transmission with the GSM850 and then the PCS band up to the 10th harmonics. Both the horizontal and vertical polarizations were measured. The RF harmonic emissions above the 5th harmonics were in the NF for the GSM850 band and above the 2nd harmonics for the PCS band.

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.

H) **Compliance Test Equipment Used**

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	04-11-06	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	04-11-06	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	04-07-31	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017301	04-12-16	Radiated Emissions
Horn Antenna	TDK	HRN-0118	130092	04-09-16	Radiated Emissions
Horn Antenna	TDK	HRN-0118	30101	04-07-18	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	04-09-25	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	973	04-12-01	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837/493/073	05-05-29	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	100251	05-04-21	Conducted Emissions
Spectrum Analyzer	HP	8563E	3745A08112	04-07-31	Conducted Emissions
DC Power Supply	HP	6632B	US37472178	04-08-01	Conducted Emissions
Temperature Probe	Hart Scientific	61161-302	21352860	04-09-15	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability

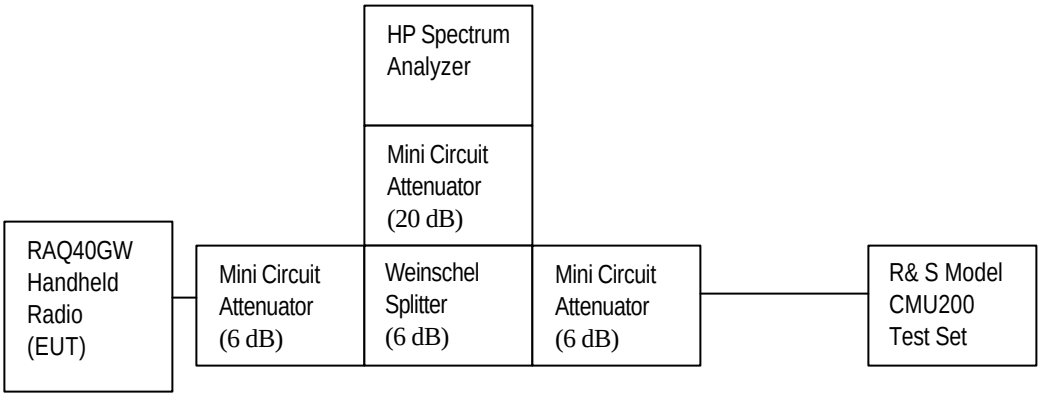
APPENDIX 1

RF CONDUCTED EMISSIONS TEST DATA/PLOTS

RF Conducted 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	374A08112	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	--

RF Conducted 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-128 were measured from 10 MHz to 20 GHz. The EUT has a test margin of greater than 20 dB.
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 emission bandwidth for the three GSM850 channels was measured to be 273 kHz, and for the three PCS channels was measured to be 273 kHz as shown below, which results in 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	273	250.0
837.6	272	250.0
848.8	270	250.0

PCS Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
1850.2	273	245.0
1880.0	262	245.0
1909.8	263	248.3

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

See Figures 1 to 12 for plots of the Spurious Emission results
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.

RF Conducted Emission Test Data cont'd

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

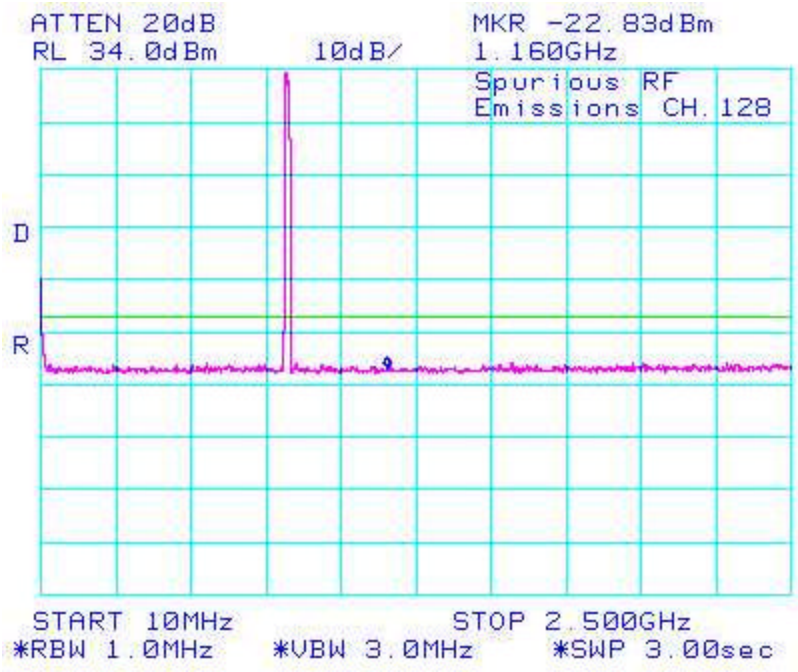
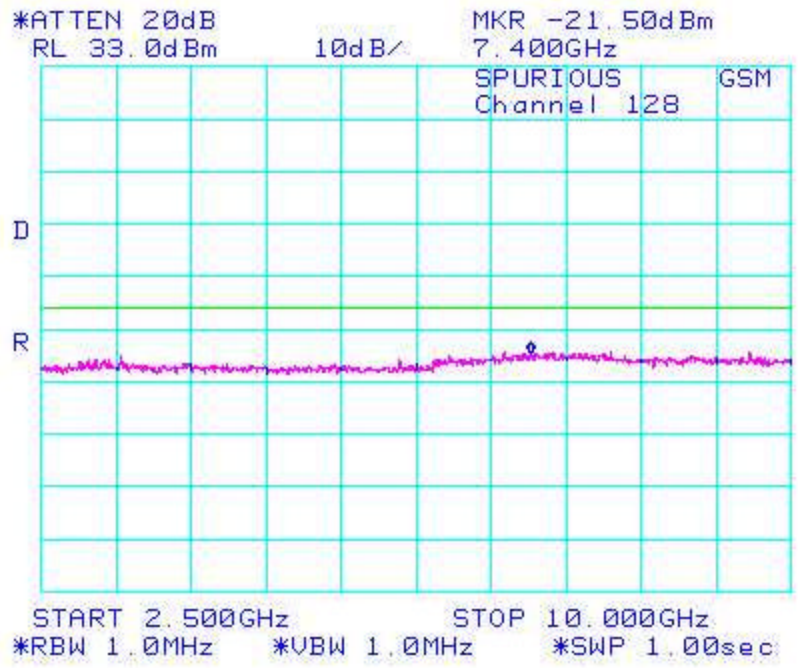


Figure 2: GSM 850, Spurious Conducted Emissions, Low channel



RF Conducted Emission Test Data cont'd

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

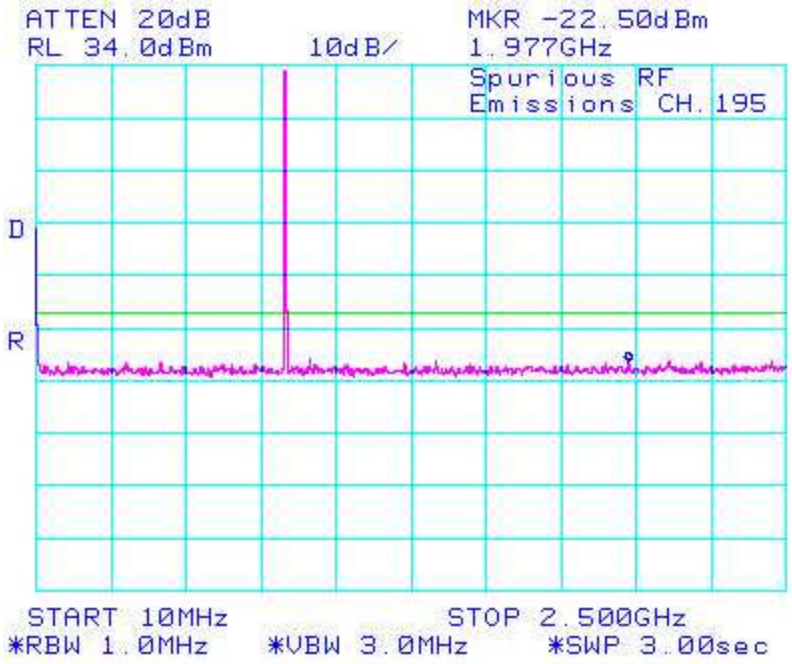
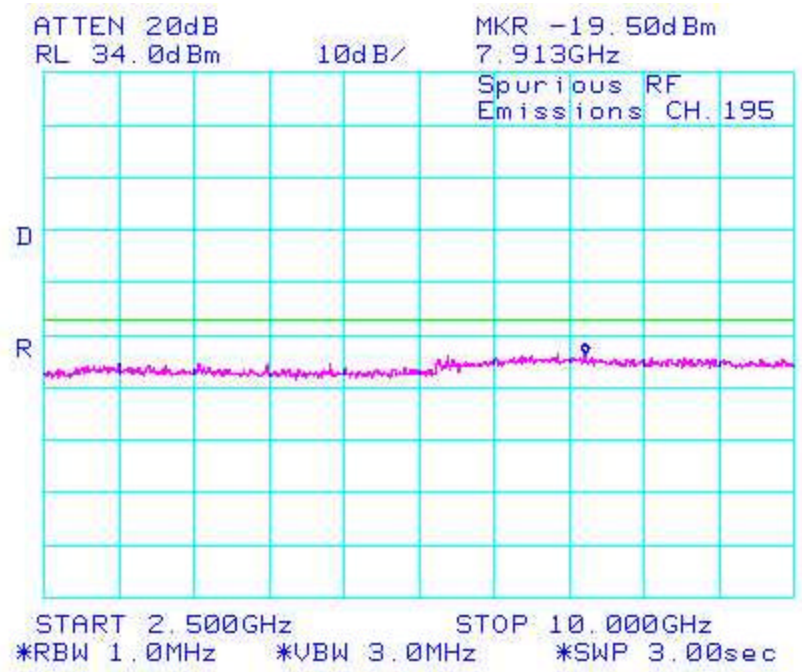


Figure 4: GSM 850, Spurious Conducted Emissions, Middle Channel



RF Conducted Emission Test Data cont'd

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

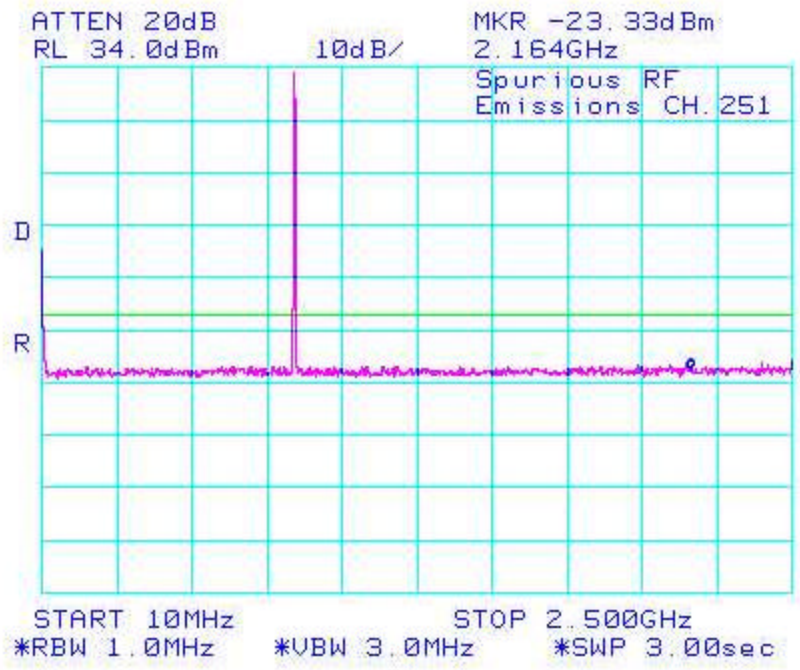
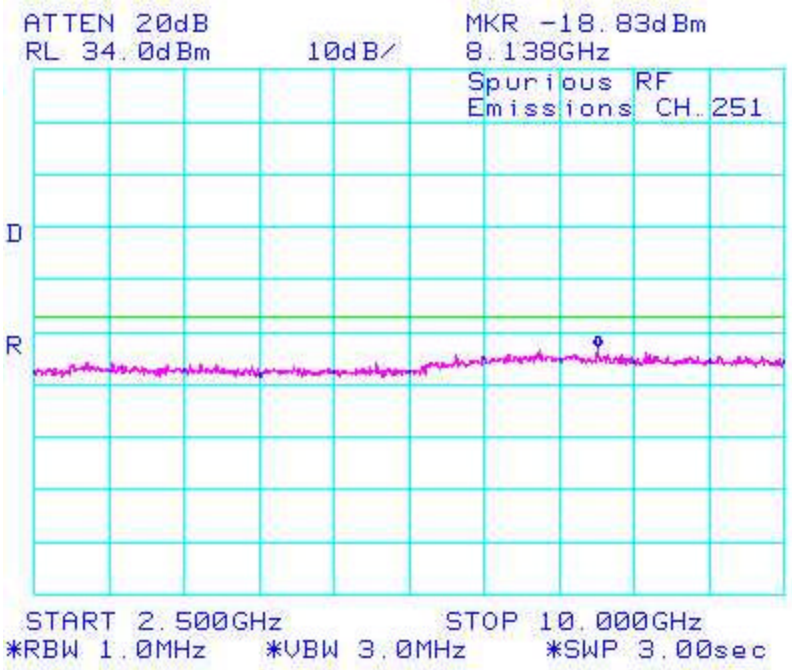


Figure 6: GSM 850, Spurious Conducted Emissions, High Channel



RF Conducted Emission Test Data cont'd

Figure 7: PCS, Spurious Conducted Emissions, Low Channel

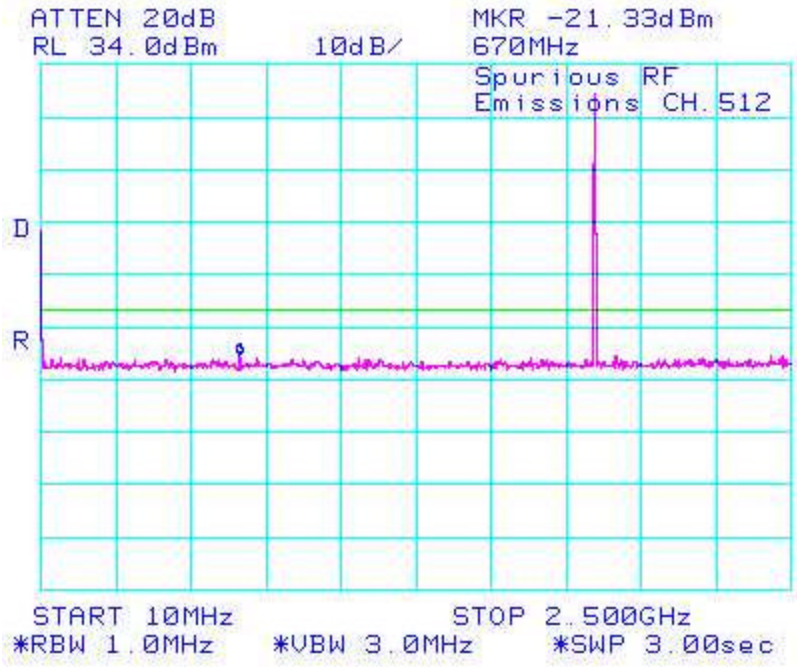
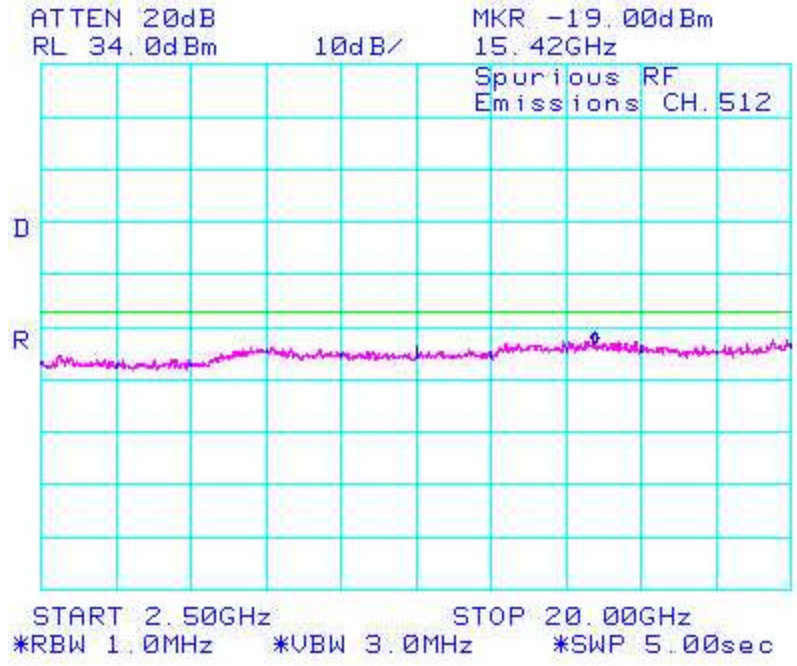


Figure 8: PCS, Spurious Conducted Emissions, Low Channel



RF Conducted Emission Test Data cont'd

Figure 9: PCS, Spurious Conducted Emissions, Middle Channel

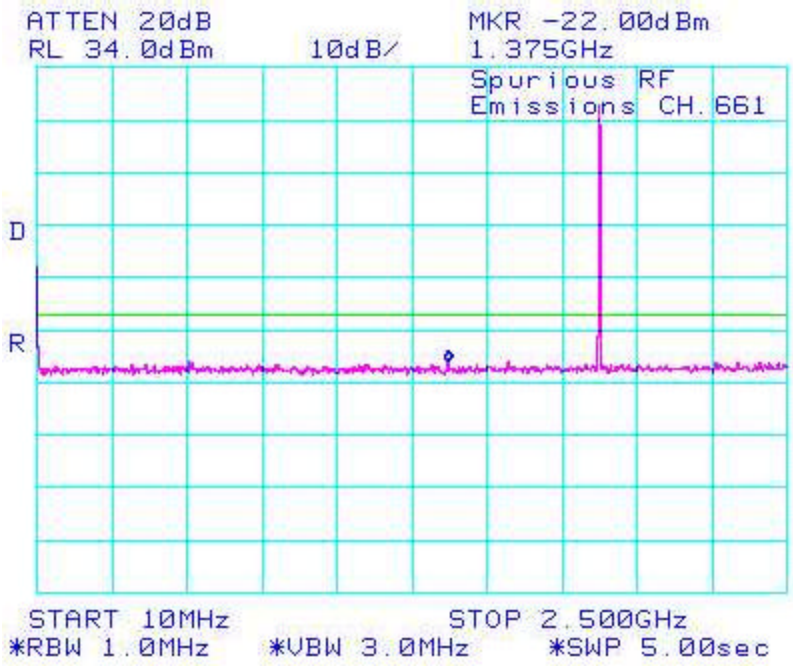
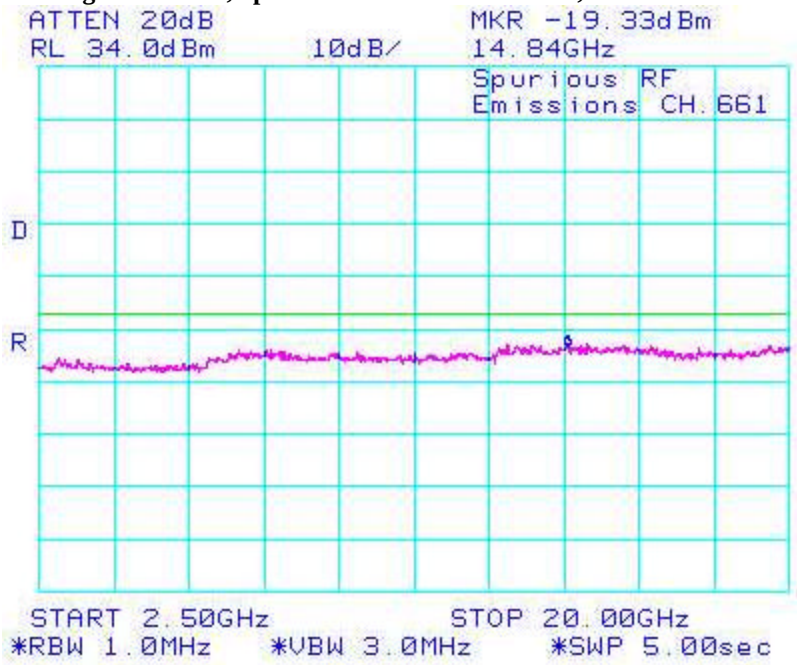


Figure 10: PCS, Spurious Conducted Emissions, Middle Channel



RF Conducted Emission Test Data cont'd

Figure 11: PCS, Spurious Conducted Emissions, High Channel

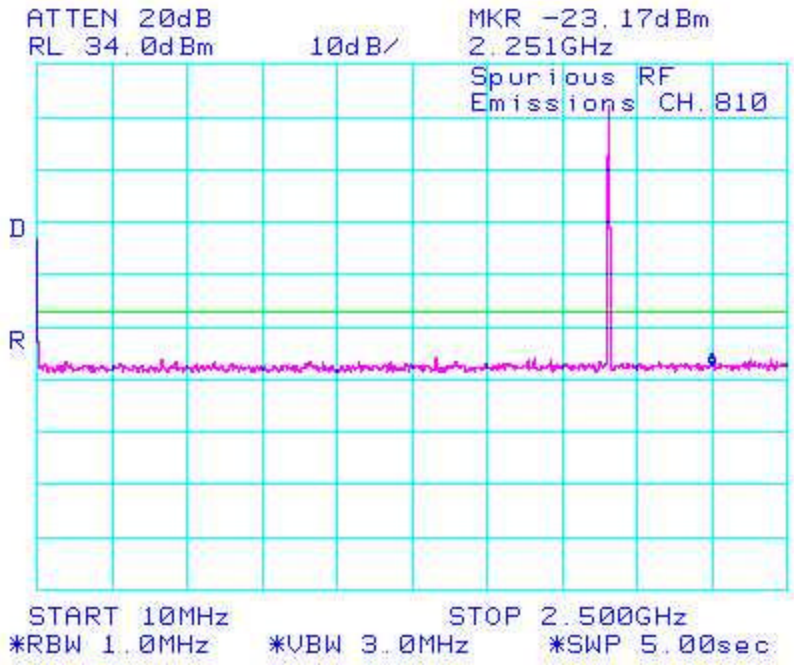
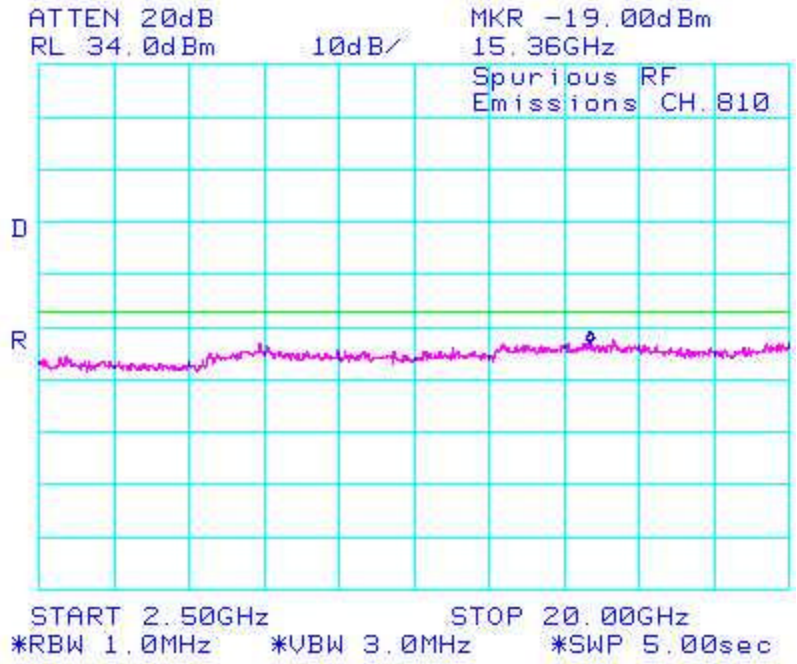


Figure 12: PCS, Spurious Conducted Emissions, High Channel



RF Conducted Emission Test Data cont'd

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

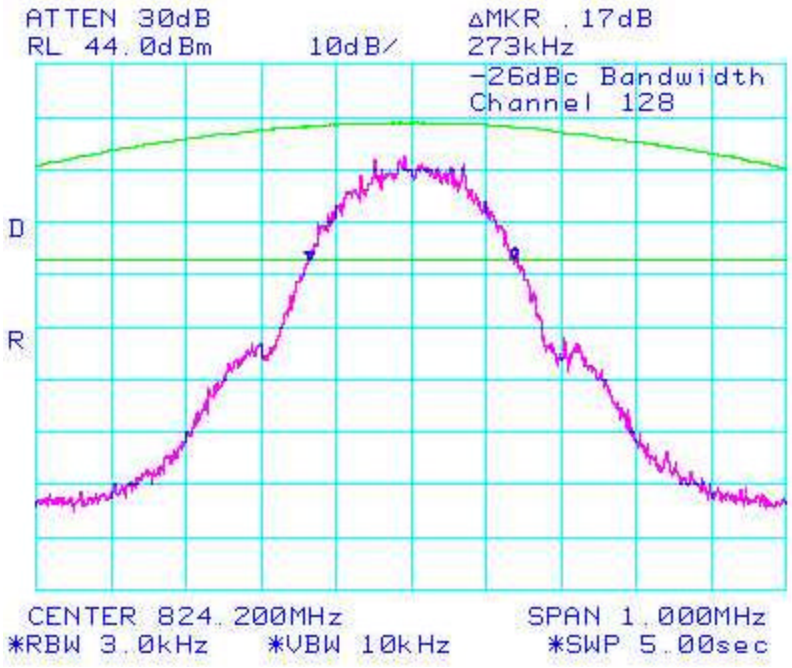
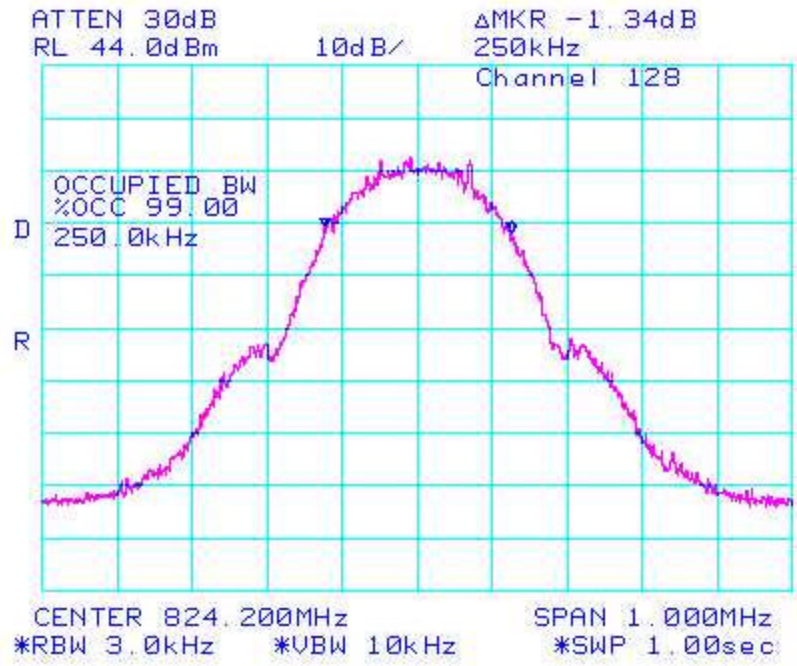


Figure 14: Occupied Bandwidth, GSM 850 Low Channel



RF Conducted Emission Test Data cont'd

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

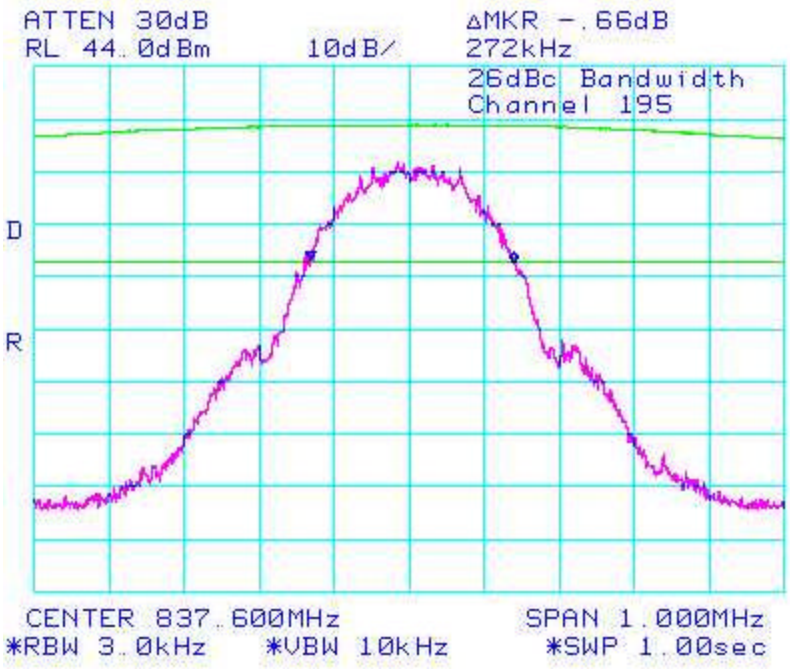
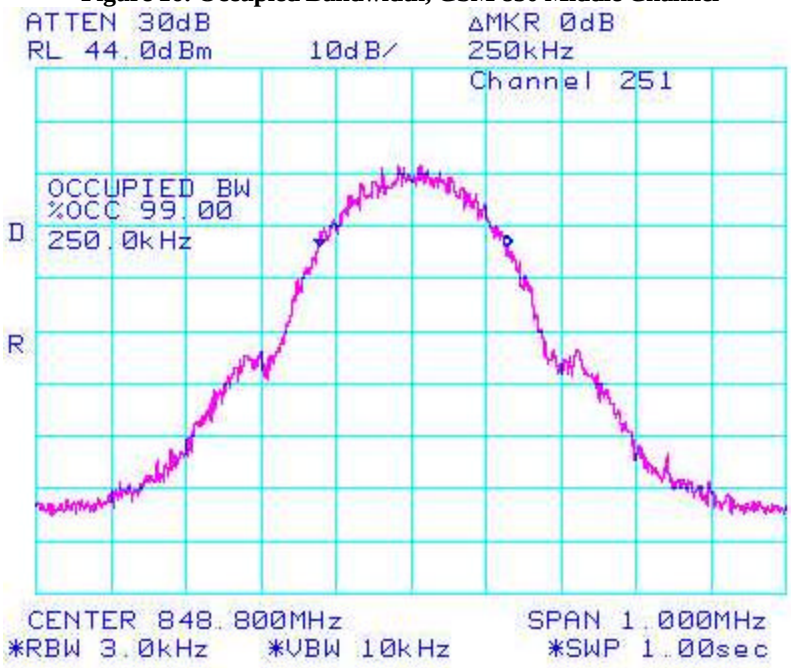


Figure 16: Occupied Bandwidth, GSM 850 Middle Channel



RF Conducted Emission Test Data cont'd

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

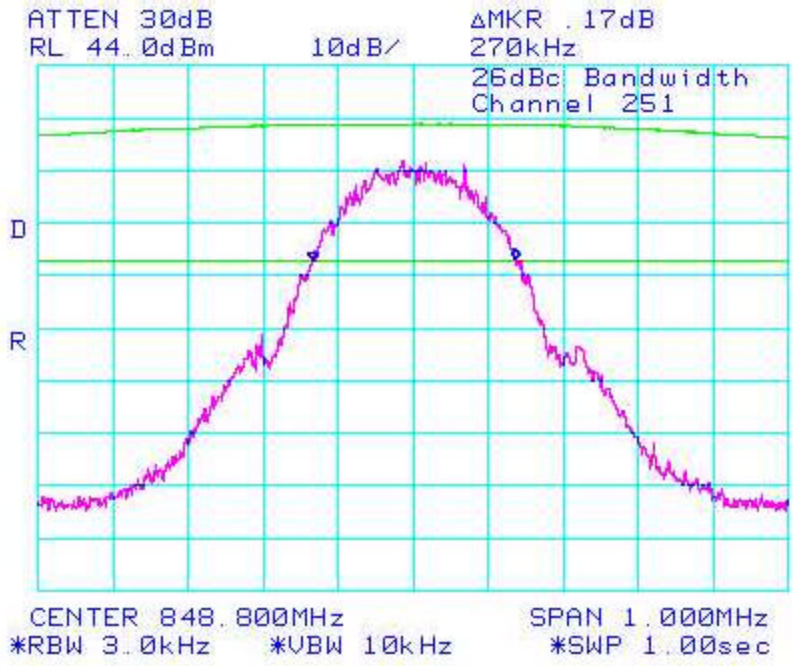
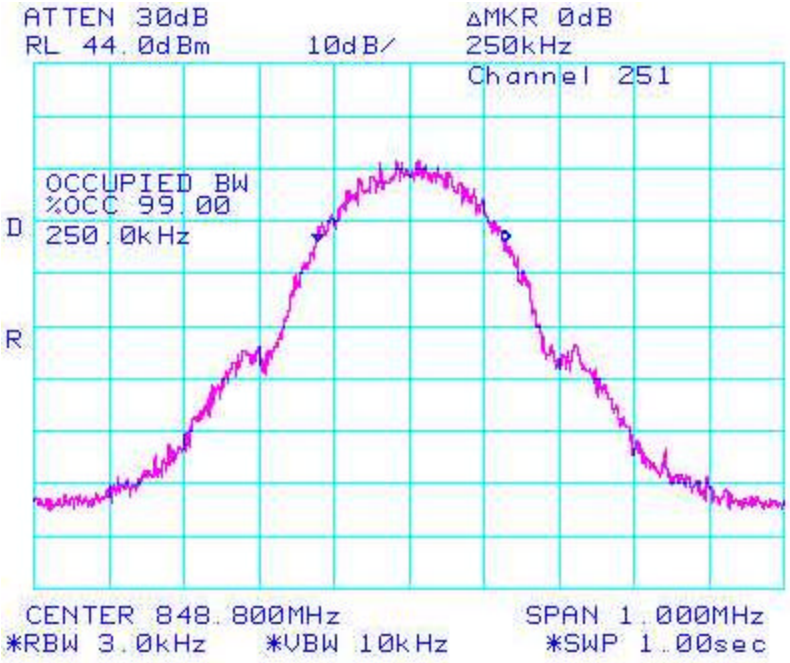


Figure 18: Occupied Bandwidth, GSM 850 High Channel



RF Conducted Emission Test Data cont'd

Figure 19: -26dBc bandwidth, PCS Low Channel

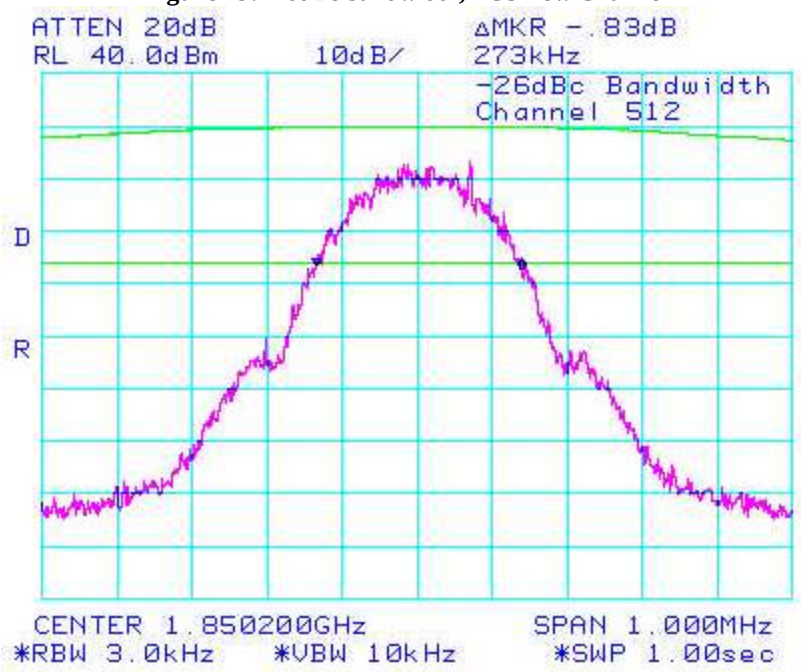
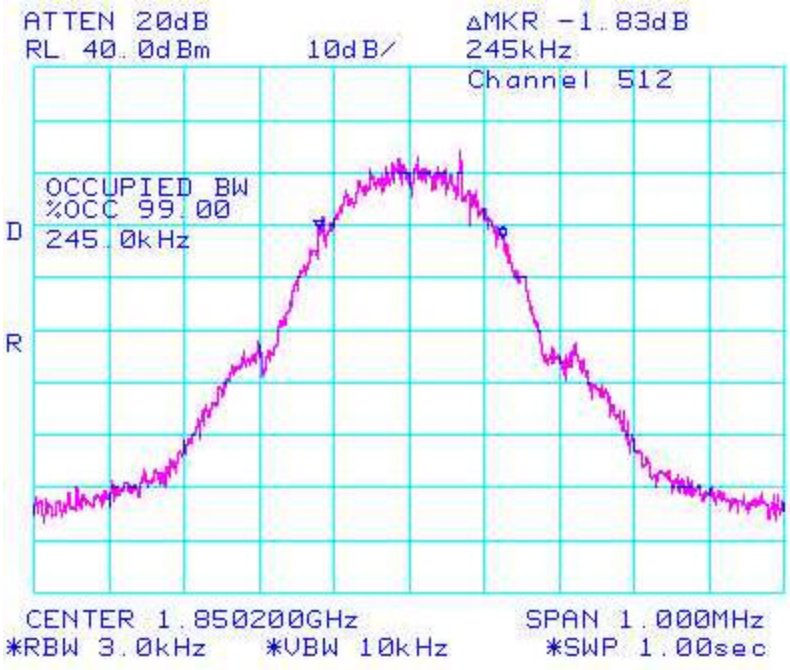


Figure 20: Occupied Bandwidth, PCS Low Channel



RF Conducted Emission Test Data cont'd

Figure 21: -26dBc bandwidth, PCS Middle Channel

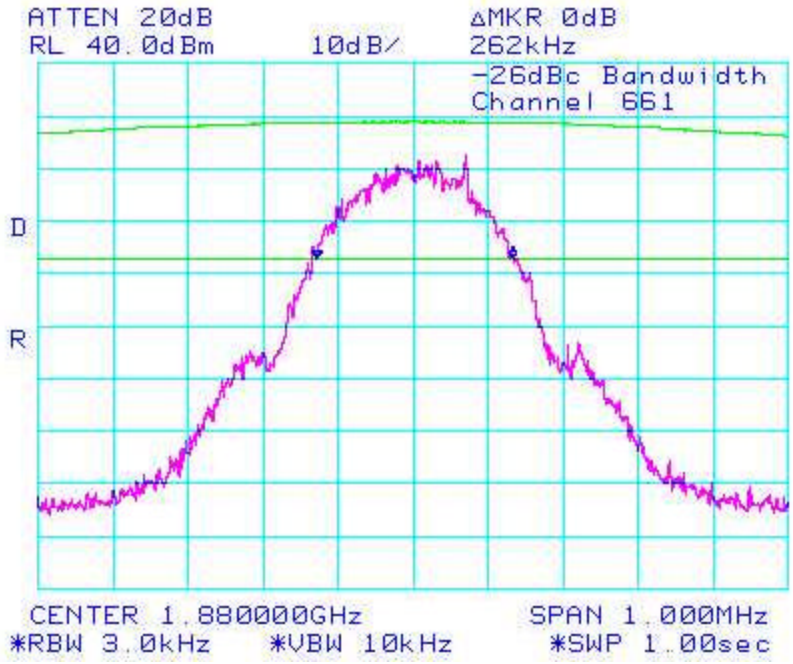
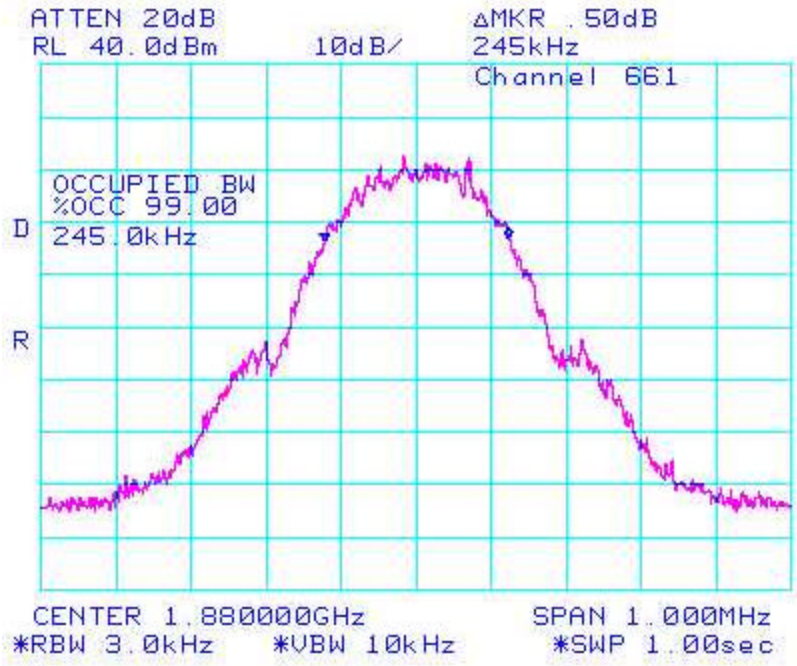


Figure 22: Occupied Bandwidth, PCS Middle Channel



RF Conducted Emission Test Data cont'd

Figure 23: -26dBc bandwidth, PCS High Channel

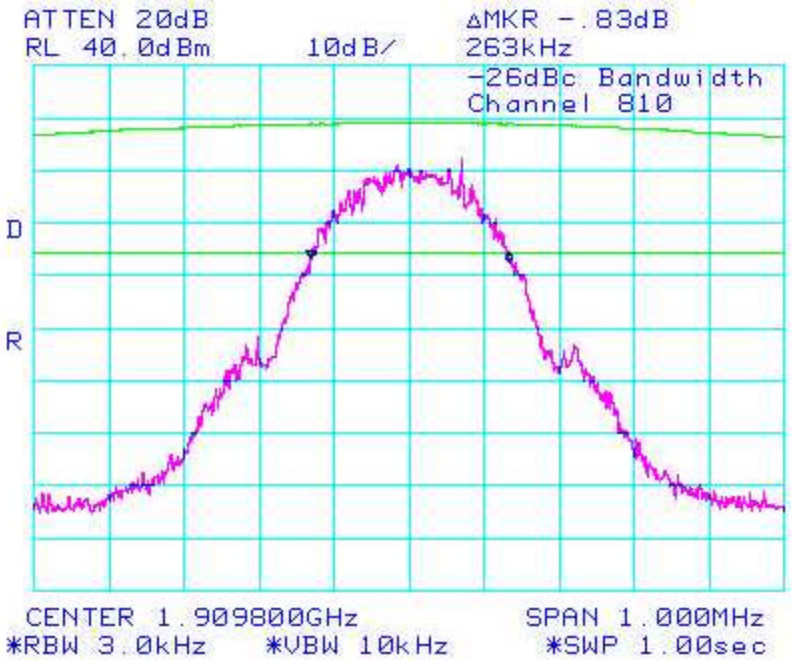
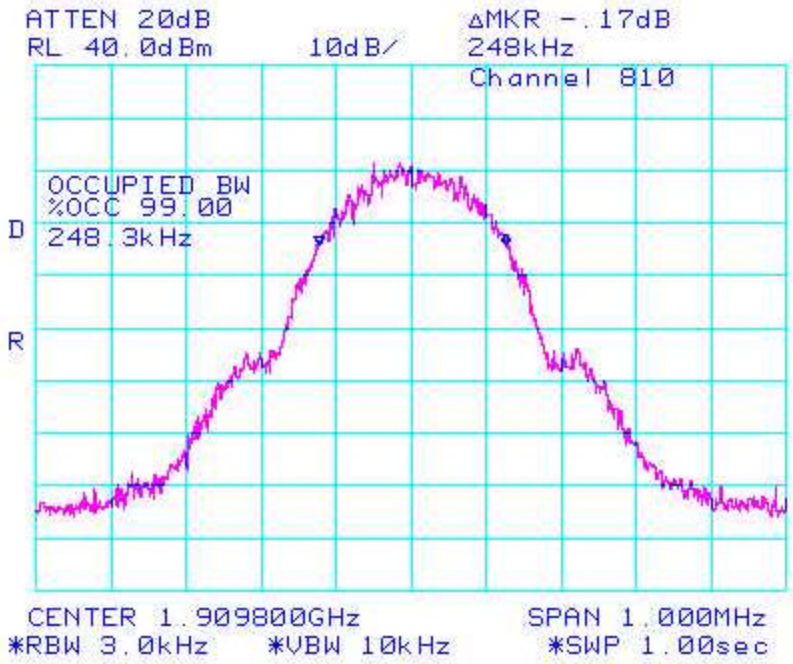


Figure 24: Occupied Bandwidth, PCS High Channel



RF Conducted Emission Test Data cont'd

Figure 25: GSM 850, Low Channel Mask

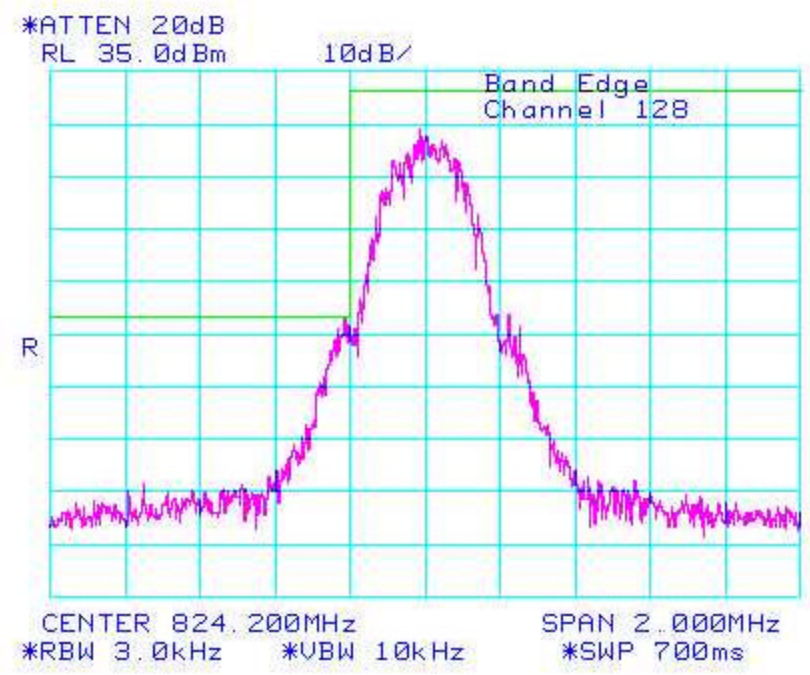
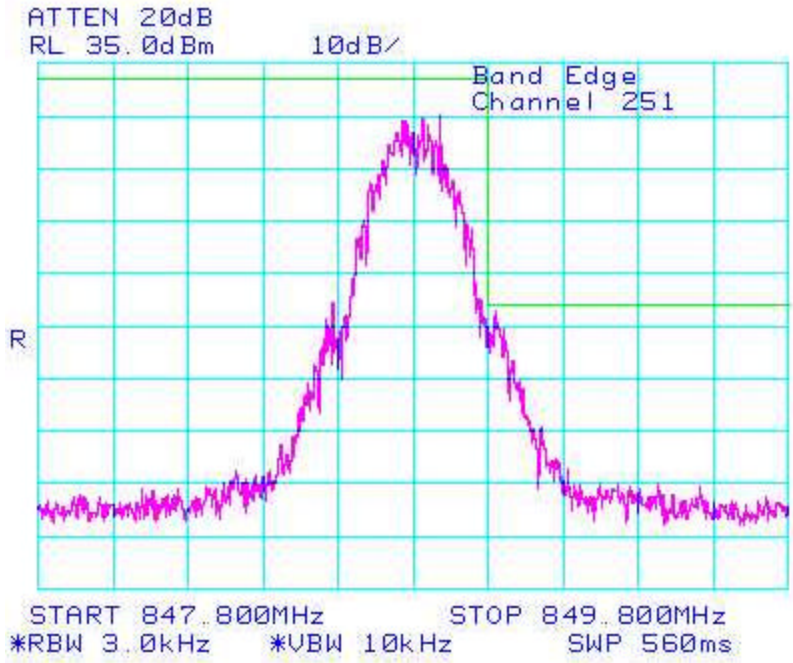


Figure 26: GSM 850 High Channel Mask



RF Conducted Emission Test Data cont'd

Figure27: PCS, Low Channel Mask

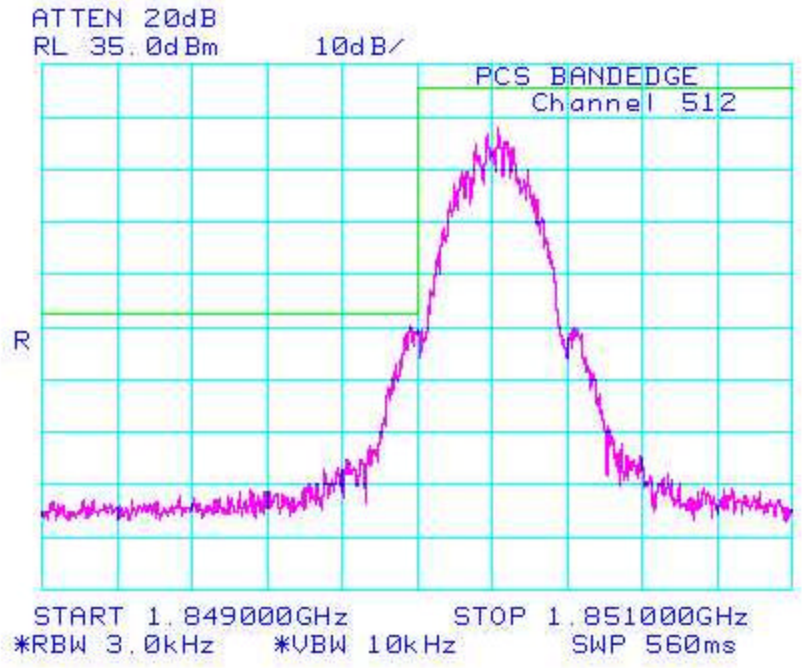
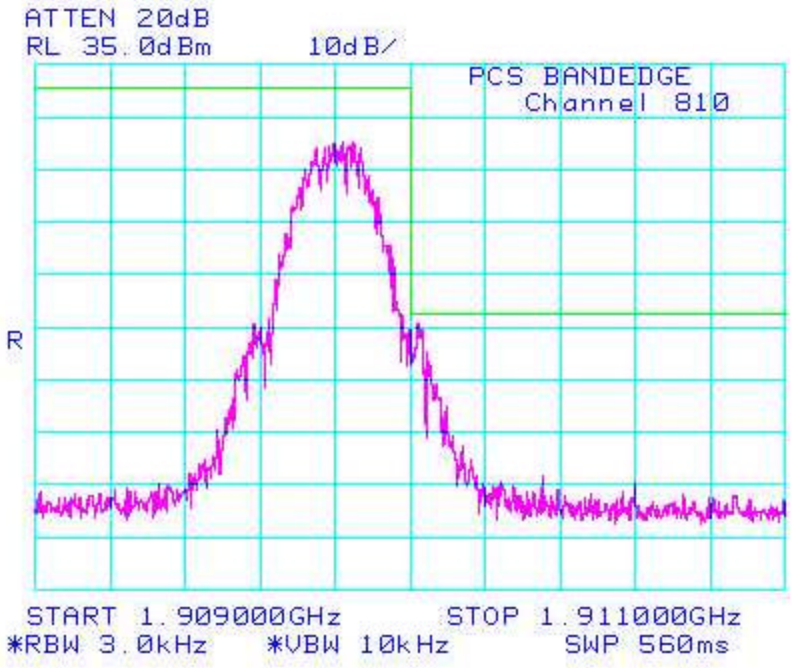


Figure28: PCS, High Channel Mask



RF Conducted Emission Test Data cont'd

FCC CFR 47 Part 24, Subpart E, RSS-133

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 on center channel is 32.7 dBm for GSM850 and 30 dBm for PCS.

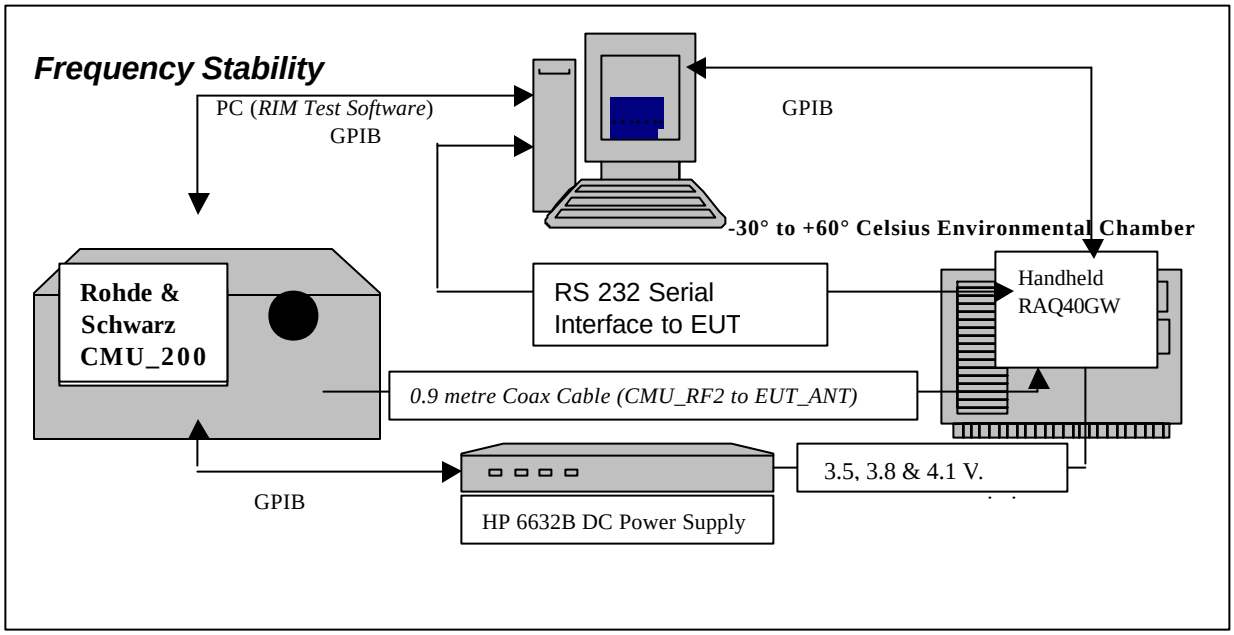
Test Results

Channel	Frequency (MHz)	Maximum Output Power (dBm)
GSM850		
128	824.20	33.0
189	837.60	33.2
251	848.80	33.2
PCS		
512	1850.2	30.3
661	1880.0	30.3
810	1909.8	29.8

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	21-April-2005
HP System DC Power Supply	6632B	US37472178	01-Aug-2004
Network Analyzer	HP 8753D	3410A07083	31-July-2004
Calibration Kit	HP85033C	2920A02997	20-Aug-2004
Espec Environmental Chamber	SH240S1	91004919	N/A
Hart Temperature Probe	61161-302	21352860	15-Sept-2004

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 RAQ40GW 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-128 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-meter 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 12 July 2004.

Procedure:
Full_ Two port Calibration of 8720D using the 85033D was completed.

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	*1.26*
1880.0	*1.26*
1909.8	*1.26*

GSM 850 Frequency (MHz)	Cable loss (dB)
824.2	*0.73*
836.4	*0.73*
848.6	*0.73*

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 3.5 volts, to 3.8 volts to 4.1 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 3.5 volts, 3.8 volts and 4.1 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 start of the measurement 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 degrees Celsius and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.5 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 degrees to 60 degrees Celsius.
14. Repeat steps 5 to 10 changing the supply voltage to 4.1 Volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.5, 3.8 and 4.1 Volts.

The maximum frequency error in the GSM850 band measured was 0.0752 PPM.

The maximum frequency error in the PCS band measured was 0.0193 PPM.

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

Traffic Channel Number	*GSM 850 Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
128	824.2	3.5	20	47.590	0.0577
189	836.4	3.5	20	50.880	0.0608
250	848.6	3.5	20	48.620	0.0573

Traffic Channel Number	*GSM 850 Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
128	824.2	3.8	20	45.260	0.0549
189	836.4	3.8	20	46.880	0.0560
250	848.6	3.8	20	45.460	0.0536

Traffic Channel Number	*GSM 850 Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
128	824.2	4.1	20	44.490	0.0540
189	836.4	4.1	20	51.980	0.0621
250	848.6	4.1	20	61.280	0.0722

GSM850 Results: channel 128 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
128	824.2	3.5	-30	46.620	0.0566
128	824.2	3.5	-20	40.490	0.0491
128	824.2	3.5	-10	39.450	0.0479
128	824.2	3.5	0	41.460	0.0503
128	824.2	3.5	10	45.460	0.0552
128	824.2	3.5	20	47.590	0.0577
128	824.2	3.5	30	47.330	0.0574
128	824.2	3.5	40	49.660	0.0603
128	824.2	3.5	50	55.530	0.0674
128	824.2	3.5	60	57.150	0.0693

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
128	824.2	3.8	-30	46.170	0.0560
128	824.2	3.8	-20	47.330	0.0574
128	824.2	3.8	-10	44.750	0.0543
128	824.2	3.8	0	39.650	0.0481
128	824.2	3.8	10	42.170	0.0512
128	824.2	3.8	20	45.260	0.0549
128	824.2	3.8	30	46.560	0.0565
128	824.2	3.8	40	50.750	0.0616
128	824.2	3.8	50	51.790	0.0628
128	824.2	3.8	60	50.500	0.0613

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
128	824.2	4.1	-30	0.0567	33.63
128	824.2	4.1	-20	0.0618	33.52
128	824.2	4.1	-10	0.0526	33.43
128	824.2	4.1	0	0.0485	33.31
128	824.2	4.1	10	0.0526	33.18
128	824.2	4.1	20	0.0540	33.06
128	824.2	4.1	30	0.0534	32.96
128	824.2	4.1	40	0.0699	32.82
128	824.2	4.1	50	0.0625	32.70
128	824.2	4.1	60	0.0689	32.60

GSM850 Results: channel 189 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
189	836.4	3.5	-30	0.0494	33.46
189	836.4	3.5	-20	0.0512	33.33
189	836.4	3.5	-10	0.0544	33.22
189	836.4	3.5	0	0.0570	33.12
189	836.4	3.5	10	0.0574	33.01
189	836.4	3.5	20	0.0608	32.89
189	836.4	3.5	30	0.0632	32.76
189	836.4	3.5	40	0.0647	32.65
189	836.4	3.5	50	0.0638	32.53
189	836.4	3.5	60	0.0725	32.41

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
189	836.4	3.8	-30	42.420	0.0507
189	836.4	3.8	-20	45.330	0.0542
189	836.4	3.8	-10	45.980	0.0550
189	836.4	3.8	0	43.910	0.0525
189	836.4	3.8	10	47.850	0.0572
189	836.4	3.8	20	46.880	0.0560
189	836.4	3.8	30	52.690	0.0630
189	836.4	3.8	40	58.440	0.0699
189	836.4	3.8	50	50.560	0.0604
189	836.4	3.8	60	55.660	0.0665

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
189	836.4	4.1	-30	33.840	0.0405
189	836.4	4.1	-20	46.810	0.0560
189	836.4	4.1	-10	47.270	0.0565
189	836.4	4.1	0	50.110	0.0599
189	836.4	4.1	10	44.620	0.0533
189	836.4	4.1	20	51.980	0.0621
189	836.4	4.1	30	54.430	0.0651
189	836.4	4.1	40	54.690	0.0654
189	836.4	4.1	50	52.170	0.0624
189	836.4	4.1	60	62.890	0.0752

GSM850 Results: channel 250 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
250	848.6	3.5	-30	45.260	0.0533
250	848.6	3.5	-20	48.110	0.0567
250	848.6	3.5	-10	49.850	0.0587
250	848.6	3.5	0	43.330	0.0511
250	848.6	3.5	10	41.520	0.0489
250	848.6	3.5	20	48.620	0.0573
250	848.6	3.5	30	53.400	0.0629
250	848.6	3.5	40	54.500	0.0642
250	848.6	3.5	50	55.270	0.0651
250	848.6	3.5	60	55.210	0.0651

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
250	848.6	3.8	-30	44.810	0.0528
250	848.6	3.8	-20	41.970	0.0495
250	848.6	3.8	-10	47.650	0.0562
250	848.6	3.8	0	45.260	0.0533
250	848.6	3.8	10	43.460	0.0512
250	848.6	3.8	20	45.460	0.0536
250	848.6	3.8	30	48.040	0.0566
250	848.6	3.8	40	60.700	0.0715
250	848.6	3.8	50	54.690	0.0644
250	848.6	3.8	60	55.080	0.0649

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
250	848.6	4.1	-30	38.160	0.0450
250	848.6	4.1	-20	45.070	0.0531
250	848.6	4.1	-10	47.910	0.0565
250	848.6	4.1	0	57.470	0.0677
250	848.6	4.1	10	43.650	0.0514
250	848.6	4.1	20	61.280	0.0722
250	848.6	4.1	30	60.500	0.0713
250	848.6	4.1	40	61.540	0.0725
250	848.6	4.1	50	59.080	0.0696
250	848.6	4.1	60	62.700	0.0739

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	3.5	20	-25.380	-0.0137
661	1880.0	3.5	20	33.250	0.0177
810	1909.8	3.5	20	36.810	0.0193

Traffic Channel Number	*PCS Frequency (MHz*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	3.8	20	-16.140	-0.0087
661	1880.0	3.8	20	-21.890	-0.0116
810	1909.8	3.8	20	-22.600	-0.0118

Traffic Channel Number	*PCS Frequency (MHz*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	4.1	20	-26.150	-0.0141
661	1880.0	4.1	20	32.610	0.0173
810	1909.8	4.1	20	36.480	0.0191

PCS 1900 Results: channel 512 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	3.5	-30	-18.920	-0.0102
512	1850.2	3.5	-20	-31.060	-0.0168
512	1850.2	3.5	-10	-21.110	-0.0114
512	1850.2	3.5	0	-18.210	-0.0098
512	1850.2	3.5	10	25.250	0.0136
512	1850.2	3.5	20	-25.380	-0.0137
512	1850.2	3.5	30	25.050	0.0135
512	1850.2	3.5	40	17.820	0.0096
512	1850.2	3.5	50	-18.730	-0.0101
512	1850.2	3.5	60	24.090	0.0130

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	3.8	-30	-30.280	-0.0164
512	1850.2	3.8	-20	18.140	0.0098
512	1850.2	3.8	-10	17.050	0.0092
512	1850.2	3.8	0	-23.120	-0.0125
512	1850.2	3.8	10	-31.120	-0.0168
512	1850.2	3.8	20	-16.140	-0.0087
512	1850.2	3.8	30	20.530	0.0111
512	1850.2	3.8	40	-22.020	-0.0119
512	1850.2	3.8	50	-19.500	-0.0105
512	1850.2	3.8	60	-21.240	-0.0115

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	4.1	-30	-18.530	-0.0100
512	1850.2	4.1	-20	22.540	0.0122
512	1850.2	4.1	-10	-26.280	-0.0142
512	1850.2	4.1	0	18.530	0.0100
512	1850.2	4.1	10	-20.790	-0.0112
512	1850.2	4.1	20	-26.150	-0.0141
512	1850.2	4.1	30	-21.240	-0.0115
512	1850.2	4.1	40	20.150	0.0109
512	1850.2	4.1	50	-22.410	-0.0121
512	1850.2	4.1	60	-24.020	-0.0130

PCS 1900 Results: channel 661 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
661	1880.0	3.5	-30	-24.800	-0.0132
661	1880.0	3.5	-20	16.210	0.0086
661	1880.0	3.5	-10	23.960	0.0127
661	1880.0	3.5	0	-21.240	-0.0113
661	1880.0	3.5	10	25.630	0.0136
661	1880.0	3.5	20	33.250	0.0177
661	1880.0	3.5	30	24.020	0.0128
661	1880.0	3.5	40	19.370	0.0103
661	1880.0	3.5	50	22.280	0.0119
661	1880.0	3.5	60	19.630	0.0104

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
661	1880.0	3.8	-30	-21.180	-0.0113
661	1880.0	3.8	-20	27.830	0.0148
661	1880.0	3.8	-10	18.470	0.0098
661	1880.0	3.8	0	-17.050	-0.0091
661	1880.0	3.8	10	19.760	0.0105
661	1880.0	3.8	20	-21.890	-0.0116
661	1880.0	3.8	30	-15.300	-0.0081
661	1880.0	3.8	40	28.730	0.0153
661	1880.0	3.8	50	-20.530	-0.0109
661	1880.0	3.8	60	18.850	0.0100

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
661	1880.0	4.1	-30	15.630	0.0083
661	1880.0	4.1	-20	33.380	0.0178
661	1880.0	4.1	-10	-24.920	-0.0133
661	1880.0	4.1	0	28.800	0.0153
661	1880.0	4.1	10	-20.400	-0.0109
661	1880.0	4.1	20	32.610	0.0173
661	1880.0	4.1	30	-23.440	-0.0125
661	1880.0	4.1	40	20.790	0.0111
661	1880.0	4.1	50	20.790	0.0111
661	1880.0	4.1	60	-17.760	-0.0094

PCS 1900 Results: channel 810 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
810	1909.8	3.5	-30	-20.790	-0.0109
810	1909.8	3.5	-20	29.960	0.0157
810	1909.8	3.5	-10	27.060	0.0142
810	1909.8	3.5	0	-24.540	-0.0128
810	1909.8	3.5	10	24.020	0.0126
810	1909.8	3.5	20	36.810	0.0193
810	1909.8	3.5	30	27.380	0.0143
810	1909.8	3.5	40	16.590	0.0087
810	1909.8	3.5	50	14.140	0.0074
810	1909.8	3.5	60	-21.180	-0.0111

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
810	1909.8	3.8	-30	17.500	0.0092
810	1909.8	3.8	-20	32.670	0.0171
810	1909.8	3.8	-10	17.760	0.0093
810	1909.8	3.8	0	35.260	0.0185
810	1909.8	3.8	10	22.790	0.0119
810	1909.8	3.8	20	-22.600	-0.0118
810	1909.8	3.8	30	17.890	0.0094
810	1909.8	3.8	40	26.350	0.0138
810	1909.8	3.8	50	-18.530	-0.0097
810	1909.8	3.8	60	-21.830	-0.0114

Traffic Channel Number	*Frequency (MHz)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
810	1909.8	4.1	-30	-17.690	-0.0093
810	1909.8	4.1	-20	35.000	0.0183
810	1909.8	4.1	-10	-13.880	-0.0073
810	1909.8	4.1	0	23.890	0.0125
810	1909.8	4.1	10	26.930	0.0141
810	1909.8	4.1	20	36.480	0.0191
810	1909.8	4.1	30	18.210	0.0095
810	1909.8	4.1	40	31.060	0.0163
810	1909.8	4.1	50	25.510	0.0134
810	1909.8	4.1	60	15.630	0.0082

APPENDIX 4

RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Data Results

Test distance is 3.0 metres June 28, 2004

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, on it's side												
F0	128	824.20	850	Dipole	V	79.3	86.4	V V	11.5	27.85	38.5	-10.65
F0	128	824.20	850	Dipole	H	89.8		H H	10.5			
F0	195	837.60	850	Dipole	V	78.9	87.7	V V	14.1	30.45	38.5	-8.05
F0	195	837.60	850	Dipole	H	89.7		H H	12.3			
F0	251	848.80	850	Dipole	V	77.9	88.7	V V	15.4	31.75	38.5	-6.75
F0	251	848.80	850	Dipole	H	88.8		H H	13.2			

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

Example: 824.20 MHz = 11.5 (Tracking Generator Level) – 7.7 (Antenna Loss) – 2.15 (Dipole Factor) – 3.8 (Cable Loss) + 30.0 (Preamp Gain) = 27.85 dBm (Reading Relative to Dipole)

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres June 28, 2004

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, on its side												
Low Channel – 824.2 MHz												
2nd	128	1648.40	128	Horn	V	56.0	63.8	V-V	-39.1	-36.2	-13	-23.2
2nd	128	1648.40	128	Horn	H	63.8		H-H	-39.0			
3rd	128	2472.60	128	Horn	V	48.0	48.0	V-V	-47.7	-43.2	-13	-30.2
3rd	128	2472.60	128	Horn	H	45.7		H-H	-48.8			
4th	128	3296.80	128	Horn	V	NF	NF	V-V			-13	
4th	128	3296.80	128	Horn	H	NF		H-H				
5th	128	4121.00	128	Horn	V	46.0	47.7	V-V	-42.2	-38.9	-13	-38.9
5th	128	4121.00	128	Horn	H	47.7		H-H	-42.7			
The harmonics were investigated up to the 10th harmonic. Emissions above the 5th harmonic were in the NF												
Middle Channel – 837.6 MHz												
2nd	850	1675.20	850	Horn	V	48.6	51.0	V-V	-53.6	-50.9	-13	-37.9
2nd	850	1675.20	850	Horn	H	51.0		H-H	-53.9			
3rd	850	2512.80	850	Horn	V	47.6	47.6	V-V	-47.6	-43.1	-13	-30.1
3rd	850	2512.80	850	Horn	H	44.8		H-H	-48.8			
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF												

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres June 28, 2004

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)
High Channel – 848.8 MHz												
2nd	251	1697.60	850	Horn	V	53.3	58.2	V-V	-44.8	-41.6	-13	-28.6
2nd	251	1697.60	850	Horn	H	58.2		H-H	-44.3			
3rd	251	2546.40	850	Horn	V	46.8	46.8	V-V	-48.2	-43.7	-13	-30.7
3rd	251	2546.40	850	Horn	H	46.1		H-H	-49.2			
4th	251	3395.20	850	Horn	V	NF	NF	V-V			-13	
4th	251	3395.20	850	Horn	H	NF		H-H				
5th	251	4244.00	850	Horn	V	46.3	46.6	V-V	-43.0	-39.7	-13	-26.7
5th	251	42.44.00	850	Horn	H	46.6		H-H	-43.1			

The harmonics were investigated up to the 10th harmonic.

Emissions above the 5th harmonic were in the noise floor (NF)

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres June 28, 2004

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 dipole) (dBm))	Limit (dBm)	Diff to Limit (dB)
GSM BAND **RF Local Oscillator 1 (LO_1)** **Low Channel**													
F0	128	1272.20	850	Horn	V	NF	NF		V-V			-13	
F0	128	1272.20	850	Horn	H	NF			H-H				
Emissions were in the NF.													
High Channel													
F0	251	1296.80	850	Horn	V	NF	NF		V-V			-13	
F0	251	1296.80	850	Horn	H	NF			H-H				
Emissions were in the NF.													
RF LO_2 **Low Channel**													
F0	128	1738.20	850	Horn	V	NF	NF		V-V			-13	
F0	128	1738.20	850	Horn	H	NF			H-H				
Emissions were in the NF.													
High Channel													
F0	251	1787.40	850	Horn	V	NF	NF		V-V			-13	
F0	251	1787.40	850	Horn	H	NF			H-H				
Emissions were in the NF.													

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres
The measurements were performed 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)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
IF (LO)													
IF LO Channel 195, (837.6 MHz)													
FO	195	896.00	850	HLP	V	38.5	37.96	37.96	V V	-52.2	-36.75	-13	-23.75
FO	195	896.00	850	HLP	H	36.5	35.96		H H	-53.7			

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres June 28, 2004

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 and Bluetooth transmitting in frequency hopping mode Handheld Standalone, on its side **Low Channel –** 824.2 MHz												
2nd	128	1648.40	850	Horn	V	56.4	62.7	V-V	-40.2	-37.4	-13	-24.4
2nd	128	1648.40	850	Horn	H	62.7		H-H	-40.2			
3rd	128	2472.60	850	Horn	V	49.5	49.5	V-V	-45.5	-41.0		-28.0
3rd	128	2472.60	850	Horn	H	44.3		H-H	-46.3			
4th	128	3296.80	850	Horn	V	NF	NF	V-V			-13	
4th	128	3296.80	850	Horn	H	NF		H-H				
5th	128	4121.00	850	Horn	V	46.5	47.2	V-V	-42.3	-39.0	-13	-39.0
5th	128	4121.00	850	Horn	H	47.2		H-H	-43.0			
The harmonics were investigated up to the 10th harmonic. Emissions above the 5th harmonic were in the noise floor (NF) **Middle Channel** – 837.6 MHz												
2nd	195	1675.20	850	Horn	V	48.1	50.6	V-V	-53.8	-51.1	-13	-38.1
2nd	195	1675.20	850	Horn	H	50.6		H-H	-54.3			
3rd	195	2512.80	850	Horn	V	48.5	48.5	V-V	-46.5	-42.0	-13	-29.0
3rd	195	2512.80	850	Horn	H	46.4		H-H	-47.7			
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF												

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres June 28, 2004

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)
High Channel – 848.8 MHz												
2nd	251	1697.60	850	Horn	V	52.2	57.3	V-V	-45.8	-42.9	-13	-29.9
2nd	251	1697.60	850	Horn	H	57.3		H-H	-45.6			
3rd	251	2546.40	850	Horn	V	46.3	48.0	V-V	-46.3	-41.8		-28.8
3rd	251	2546.40	850	Horn	H	48.0		H-H	-47.8			
4th	251	3395.20	850	Horn	V	NF	NF	V-V			-13	
4th	251	3395.20	850	Horn	H	NF		H-H				
5th	251	4244.00	850	Horn	V	47.6	47.6	V-V	-41.9	-38.6	-13	-25.6
5th	251	4244.00	850	Horn	H	47.2		H-H	-42.1			

The harmonics were investigated up to the 10th harmonic.

Emissions above the 5th harmonic were in the noise floor (NF)

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres. PCS Band June 28, 2004

								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, on its side												
F0	512	1850.20	1900	Horn	V	86.7	94.5	V-V	-5.8	30.2	33	-2.8
F0	512	1850.20	1900	Horn	H	94.5		H-H	-4.5			
F0	661	1880.00	1900	Horn	V	87.0	94.5	V-V	-4.3	31.4	33	-1.6
F0	661	1880.00	1900	Horn	H	94.5		H-H	-3.3			
F0	810	1909.80	1900	Horn	V	87.6	94.9	V-V	-4.2	31.5	33	-1.5
F0	810	1909.80	1900	Horn	H	94.9		H-H	-3.2			

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

Example: 1850.20 MHz = -4.5 (Tracking Generator Level) + 7.7 (Antenna Factor) – 5.6 (Cable Loss) + 32.6 (Preamp Gain) = 30.2 dBm (Reading Relative to Isotropic Radiator)

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres. PCS Band June 28, 2004

								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, on its side **Low Channel** 1850.20 MHz												
2nd	512	3700.40	1900	Horn	V	56.7	56.7	V-V	-28.5	-25.2	-13	-12.2
2nd	512	3700.40	1900	Horn	H	54.8		H-H	-29.2			
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF												
Middle Channel 1880.00 MHz												
2nd	661	3760.00	1900	Horn	V	54.3	54.3	V-V	-30.1	-26.8	-13	-13.8
2nd	661	3760.00	1900	Horn	H	51.4		H-H	-30.5			
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF												
High Channel 1909.8 MHz												
2nd	810	3819.60	1900	Horn	V	54.7	54.7	V-V	-30.3	-27.0	-13	-14.0
2nd	810	3819.60	1900	Horn	H	49.7		H-H	-31.4			
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF												

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres. PCS Band June 28, 2004

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													
Low Channel													
F0	512	1423.20	1900	Horn	V	NF	NF		V-V			-13	
F0	512	1423.20	1900	Horn	H	NF			H-H				
Emissions were in the NF.													
High Channel													
F0	810	1482.80	1900	Horn	V	NF	NF		V-V			-13	
F0	810	1482.80	1900	Horn	H	NF			H-H				
Emissions were in the NF.													
RF LO_2													
Low Channel													
F0	512	1930.10	1900	Horn	V	NF	NF		V-V			-13	
F0	512	1930.10	1900	Horn	H	NF			H-H				
Emissions were in the NF.													
High Channel													
F0	810	1989.70	1900	Horn	V	NF	NF		V-V			-13	
F0	810	1989.70	1900	Horn	H	NF			H-H				
Emissions were in the NF.													

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres. PCS Band June 28, 2004

The measurements were performed in transmit mode with the handheld in standalone vertical position.

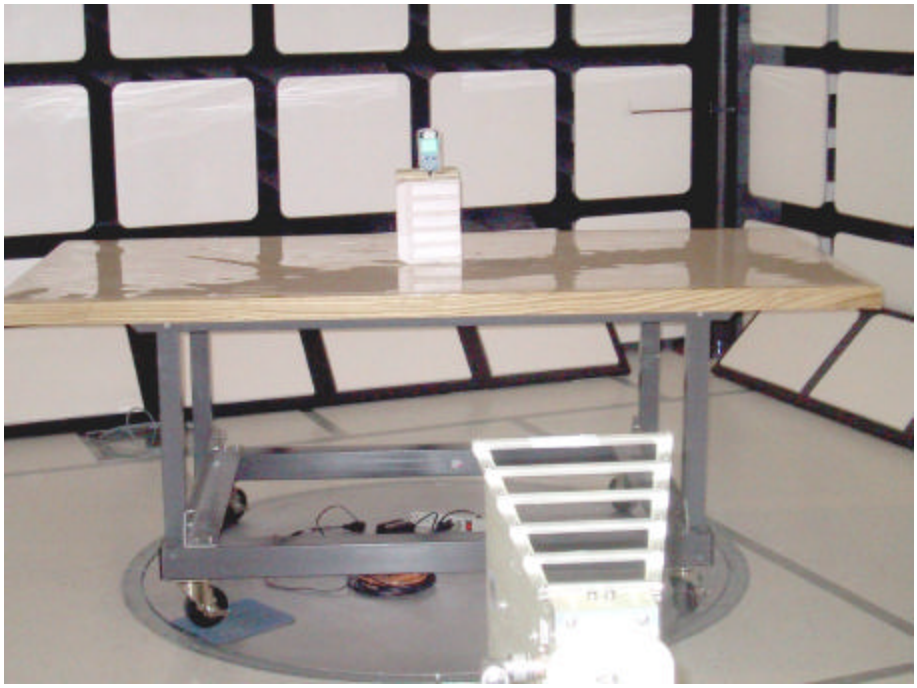
EUT				Rx Antenna		Spectrum Analyzer			Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
IF (LO)													
F0	661	854.00	1900	HLP	V	NF	NF		V-V			-13	
F0	661	854.00	1900	HLP	H	NF			H-H				
Emissions were in the NF.													

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres. June 25, 2004

								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 transmitting in frequency hopping mode												
Handheld Standalone, on its side												
Low Channel 1850.20 MHz												
2nd	512	3700.40	1900	Horn	V	56.2	56.2	V-V	-29.1	-25.8	-13	-12.8
2nd	512	3700.40	1900	Horn	H	53.3		H-H	-29.8			
3rd	512	5550.6	1900	Horn	V	NF	NF	V-V			-13	
3rd	512	5550.6	1900	Horn	H	NF		H-H				
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF												
Middle Channel 1880.00 MHz												
2nd	661	3760.00	1900	Horn	V	54.2	54.2	V-V	-30.1	-26.8	-13	-13.8
2nd	661	3760.00	1900	Horn	H	52.4		H-H	-30.5			
3rd	661	5640.00	1900	Horn	V	NF	NF	V-V			-13	
3rd	661	5640.00	1900	Horn	H	NF		H-H				
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF												
High Channel 1909.8 MHz												
2nd	810	38.19.60	1900	Horn	V	54.0	54.0	V-V	-31.0	-27.7	-13	-14.7
2nd	810	3819.60	1900	Horn	H	49.4		H-H	-32.0			
3rd	810	5729.40	1900	Horn	V	NF	NF	V-V			-13	
3rd	810	5729.40	1900	Horn	H	NF		H-H				
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF												

Radiated Emissions Test Photos cont'd



Radiated Emissions at 3.0 metres