EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47 Parts 2, 22 and 24
&
Industry Canada (IC) RSS-132 and 133

RIM Testing Services (RTS)

A division of Research In Motion Limited

REPORT NO: RTS-1115-0808-02

PRODUCT MODEL NO:	RBZ41GW
TYPE NAME:	BlackBerry® smartphone
FCC ID:	L6ARBZ40GW
IC:	2503A-RBZ40GW
EMISSION DESIGNATOR (GSM):	253KGXW
EMISSION DESIGNATOR (EDGE):	252KG7W

DATE: 26 September 2008

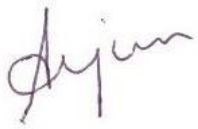
Statement of Performance:

The BlackBerry® smartphone, model RBZ41GW, part number CER-17672-001 Rev. 4 and accessories when configured and operated per RIM's operation instructions, perform within the requirements of the test standards.

Declaration:

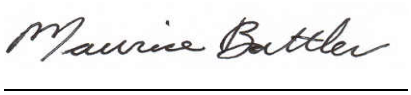
We hereby certify that:
The test data reported herein is an accurate record of the performance of the sample(s) tested.
The test results are valid for the tested unit (s) only.
The test equipment used was suitable for the tests performed and within manufacturer's published specifications and operating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

Documented by:



Arjun Singh Rai Bhatti
Compliance Specialist
Date: 30 September, 2008

Reviewed by:



Maurice Battler
Compliance Specialist
Date: 31 September, 2008

Reviewed by:

Masud S. Attayi, P.Eng.
Team Lead, Regulatory Compliance
Date: 01 October, 2008

Approved by:

Paul G. Cardinal, Ph.D.
Director
Date: 01 October, 2008

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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, 2006
- FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, Oct. 1, 2006
- FCC CFR 47 Part 24 Subpart E, Broadband PCS, Oct 1. 2006
- 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 4, February 2008, 2 GHz Personal Communications Services.

B Associated Documents

1. Document number RTS-1115-RBZ41GW-01
2. Document number RTS-1115-RBZ41GW-02
3. Cetecom test report 4-3101-01-08B_08.

C Product Identification

Manufactured by Research In Motion Limited whose headquarters is located at:

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

The equipment under test (EUT) was tested at the following locations:

RIM Testing Services (RTS) EMI test facility
305 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906

CETECOM ICT Services GmbH
Untertürkheimer Str. 6 – 10
D-66117 Saarbrücken
Germany
Phone: +49 (0) 681 5 98 84 55
Fax: +49 (0) 681 5 98 84 75

RIM Testing Services (RTS) EMI test facility
440 Phillip Street
Waterloo, Ontario,
Canada , N2L 5R9
Phone: 519 888 7465
Fax: 519 888 6906

The testing was performed from August 1 to September 19, 2008.

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RBZ41GW	CER-17672-001 Rev. 2	2076184A
2	RBZ41GW	CER-17672-001 Rev. 4	207B4C92

To view the differences between CER-17672-001 Rev. 2 to CER-17672-001 Rev. 3, see document number RTS-1115-RBZ41GW-01.
To view the differences between CER-17672-001 Rev. 3 to CER-17672-001 Rev. 4, see document number RTS-1115-RBZ41GW-02.

The changes from Rev 2 to Rev 4 had no effect on the measurement results in this report.

Conducted RF measurements were performed on BlackBerry® smartphone sample 1. Radiated Emission measurements were performed on BlackBerry® smartphone sample 2.

D Support Equipment Used for the Testing of the EUT

No support equipment used. See Section *H.Compliance Test Equipment Used.*

E Test Voltage

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

F Modifications to EUT

No modifications were required on the EUT.

G Summary of Results

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 2.1051 Part 22.917 Part 22.901(d)	RSS-132	Conducted Spurious Emissions	Pass	1
Part 2.1051 Part 24.238(a)	RSS-133	Conducted Spurious Emissions	Pass	1
Part 2.202 Part 22.917	RSS-132	Occupied Bandwidth and Channel Mask	Pass	1
Part 2.202 Part 24.238	RSS-133	Occupied Bandwidth and Channel Mask	Pass	1
Part 2.1046(a)	RSS-133 RSS-132	Conducted RF Output Power	Pass	2
Part 2.1055(a)(d) Part 22.917	RSS-132	Frequency Stability vs. Temperature and Voltage	Pass	3
Part 2.1055(a)(d) Part 24.235	RSS-133	Frequency Stability vs. Temperature and Voltage	Pass	3
Part 22, Subpart H	RSS-132	Radiated Spurious/Harmonic Emissions, ERP	See test report 4-3101-01-08B_08	-
Part 24, Subpart E	RSS-133	Radiated Spurious/Harmonic Emissions, EIRP	See test report 4-3101-01-08B_08	-

1) The EUT met the requirements of the Tx Conducted Spurious Emissions requirements in the GSM850 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 PCS1900 as per 47 CFR 2.1051, CFR 24.238(a) and RSS-133. The EUT was 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 as per 47 CFR 2.202, CFR 22.917 and RSS-132. The EUT was measured in GSM and EDGE mode 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 PCS1900 as per 47 CFR 2.202, CFR 24.238 and RSS-133. The EUT was measured in GSM and EDGE mode 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 the GSM850 and PCS1900 as per 47 CFR 2.1046(a). The EUT was measured in GSM and EDGE mode 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 as per 47 CFR 2.1055(a), 2.1055(d), CFR 22.917 and RSS-132. 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 (3.7 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.

7) The EUT met the requirements of the Frequency Stability vs. Temperature and Voltage requirements for the PCS1900 as per 47 CFR 2.1055(a), 2.1055(d), 24.235 and RSS-133. 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 (3.7 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) For the radiated spurious emissions/harmonics and ERP/EIRP see report 4-3101-01-08B_08.

H Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	08-11-21	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	08-11-16	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	09-06-03	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	09-02-29	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017301	08-12-15	Radiated Emissions
Horn Antenna	TDK	HRN-0118	130092	10-09-10	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030201	09-01-17	Radiated Emissions
Preamplifier	TDK	18-26	030002	08-11-20	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	973	08-12-18	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	08-09-28	Radiated Emissions
EMC Analyzer	Aglient	E7405A	US40240226	08-10-01	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	08-12-06	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	112394	08-12-10	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	102204	09-12-06	RF Conducted Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	08-12-24	Radiated Emissions
Spectrum Analyzer	HP	8563E	3745A08112	08-09-22	RF Conducted Emissions

Compliance Test Equipment Used cont'd

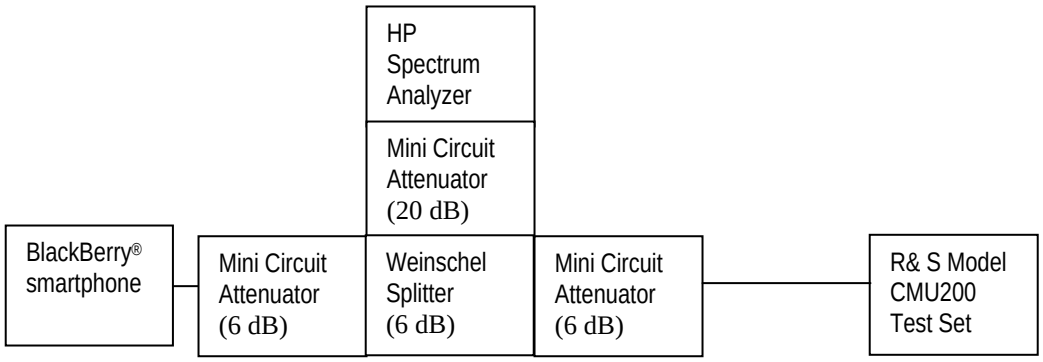
UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
DC Power Supply	HP	6632B	US37472178	09-09-17	RF Conducted Emissions
Environment Monitor	Control Company	1870	230355190	08-12-11	Radiated Emissions
Environment Monitor	Control Company	1870	230355189	08-12-11	RF Conducted Emissions
Temperature Probe	Control Company	15-077-21	51129471	09-05-12	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91007118	N/R	Frequency Stability
Signal Generator	Agilent	8648C	4037U03155	09-09-20	Frequency Stability
Signal Generator	Agilent	E8257D	MY45140527	08-09-19	Radiated Emissions
Power Meter	Agilent	E4419B	GB40202821	08-09-19	Frequency Stability
Power Sensor	Agilent	8481A	MY41095417	08-09-19	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 on BlackBerry® smartphone PIN 2076184A.

Test Setup Diagram



The environmental test conditions were:

Temperature	23ºC
Pressure	1008 mb
Relative Humidity	34%

Date of Tests: August 01 and September 02, 2008

The measurements were performed by Maurice Battler.

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 1-1 to 1-12 for the plots of the conducted spurious emissions.

Date of Test: August 01, 2008

–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 GSM850 band was measured to be 275 kHz, and for the PCS1900 band was measured to be 273 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 band and PCS1900 band selected Frequencies in GSM mode.

850 band Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
824.2	275	253.3
837.6	272	251.7
848.8	275	253.3

1900 band Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
1850.2	273	250.0
1880.0	283	250.0
1909.8	275	250.0

Measurement Plots for GSM850 and PCS1900 in GSM mode
Refer to the following measurement plots for more detail.
See Figures 1-13 to 1-24 for the plots of the –26dBc Bandwidth and 99% Occupied Bandwidth.
See Figures 1-25 to 1-28 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

Test Data for GSM850 band and PCS1900 band selected Frequencies in EDGE mode.

850 band Frequency (MHz)	99% Occupied Bandwidth (kHz)
824.2	250.0
837.6	251.7
848.8	248.3

1900 band Frequency (MHz)	99% Occupied Bandwidth (kHz)
1850.2	251.7
1880.0	248.3
1909.8	246.7

Measurement Plots for GSM850 band and PCS1900 band in EDGE mode
Refer to the following measurement plots for more detail.

See Figures 1-29 to 1-34 for the plots of the 99% Occupied Bandwidth.

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

Conducted RF Emission Test Data cont'd

Figure 1-1: GSM850 band, Spurious Conducted Emissions, Low channel

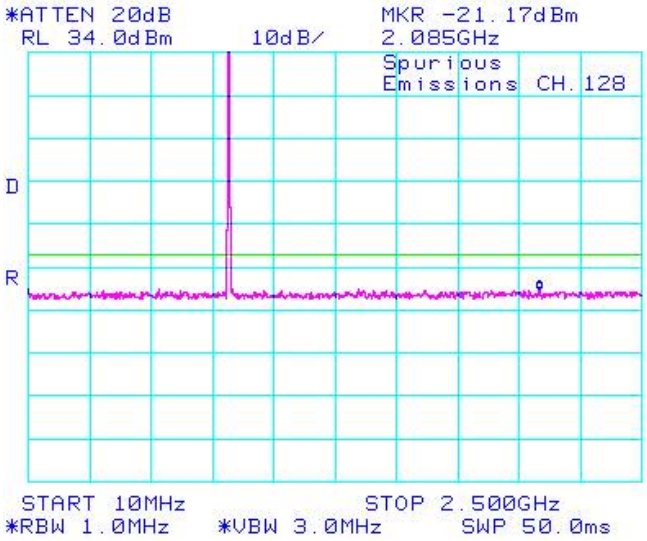


Figure 1-2: GSM850 band, Spurious Conducted Emissions, Low channel

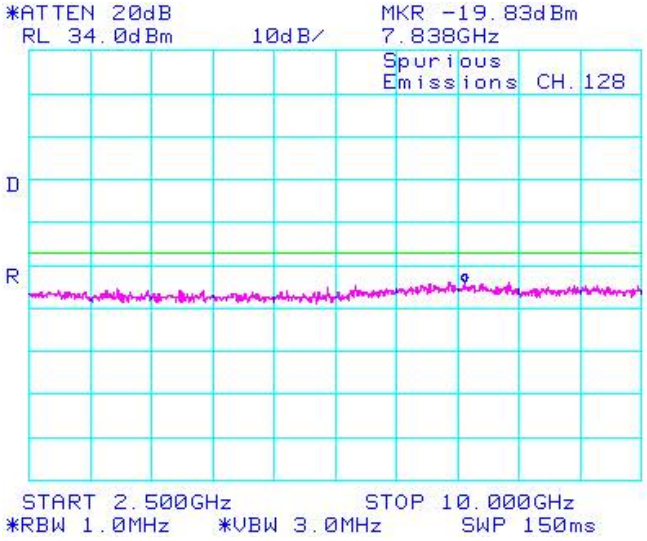


Figure 1-3: GSM850 band, Spurious Conducted Emissions, Middle Channel

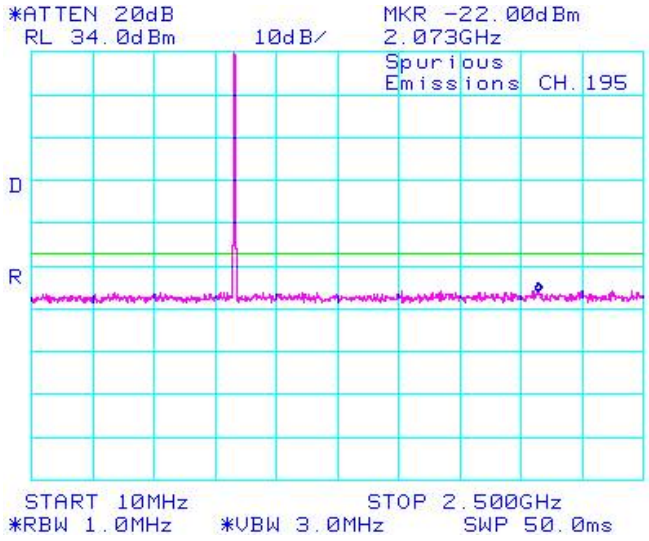
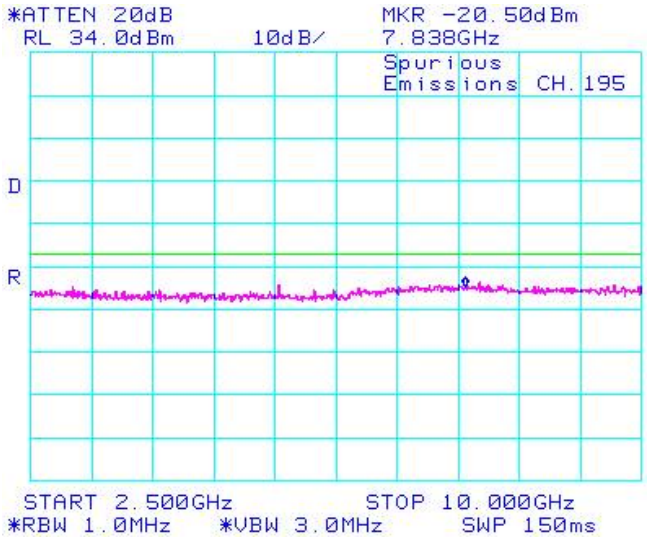


Figure 1-4: GSM850 band, Spurious Conducted Emissions, Middle Channel



Conducted RF Emission Test Data cont'd

Figure 1-5: GSM850 band, Spurious Conducted Emissions, High Channel

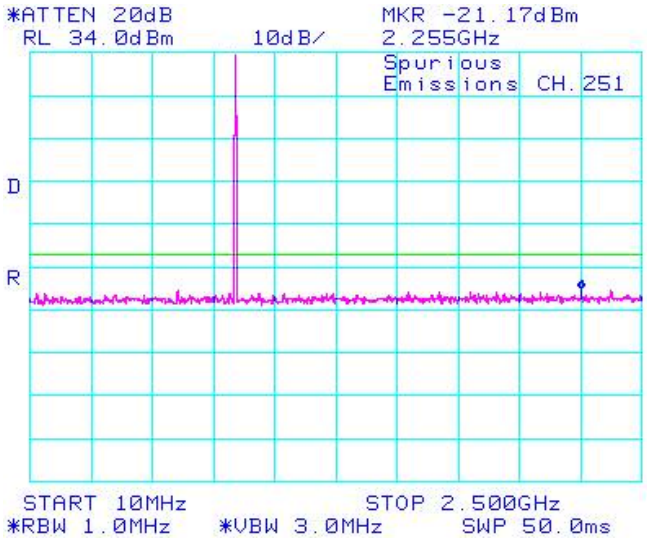


Figure 1-6: GSM850 band, Spurious Conducted Emissions, High Channel

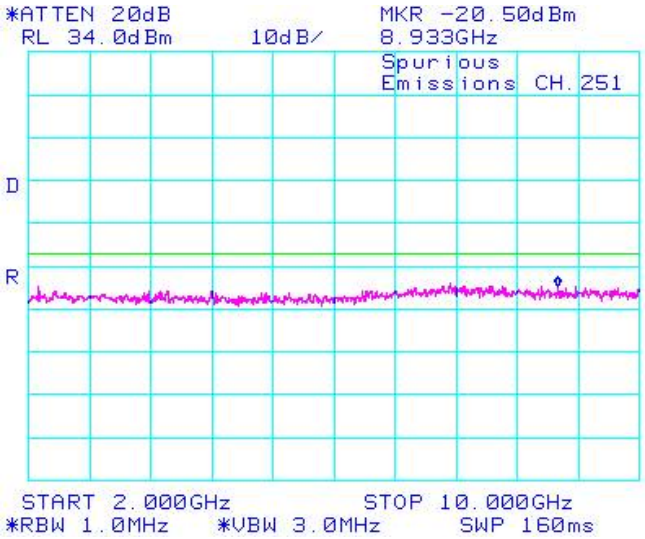


Figure 1-7: PCS1900 band, Spurious Conducted Emissions, Low Channel

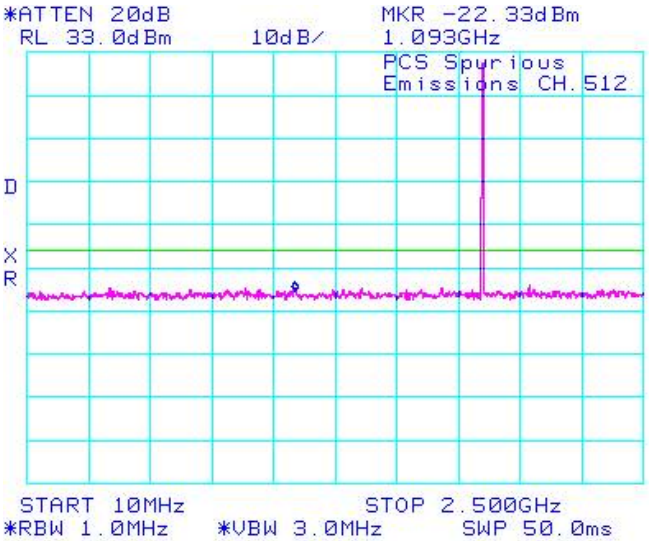
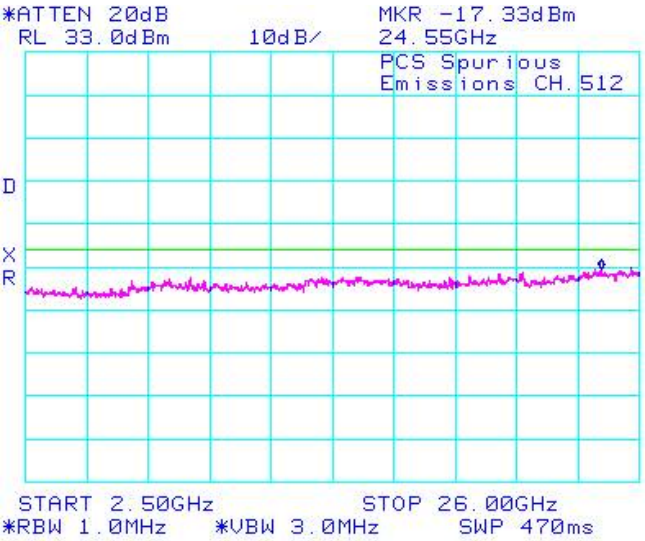


Figure 1-8: PCS1900 band, Spurious Conducted Emissions, Low Channel



Conducted RF Emission Test Data cont'd

Figure 1-9: PCS1900 band, Spurious Conducted Emissions, Middle Channel

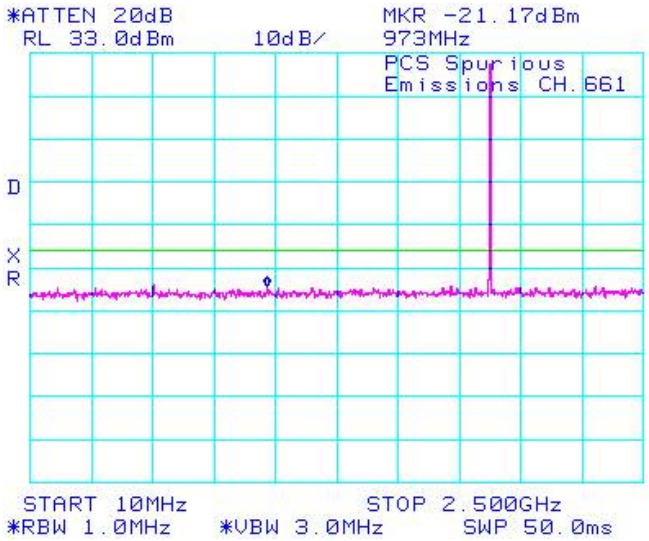


Figure 1-10: PCS1900 band, Spurious Conducted Emissions, Middle Channel

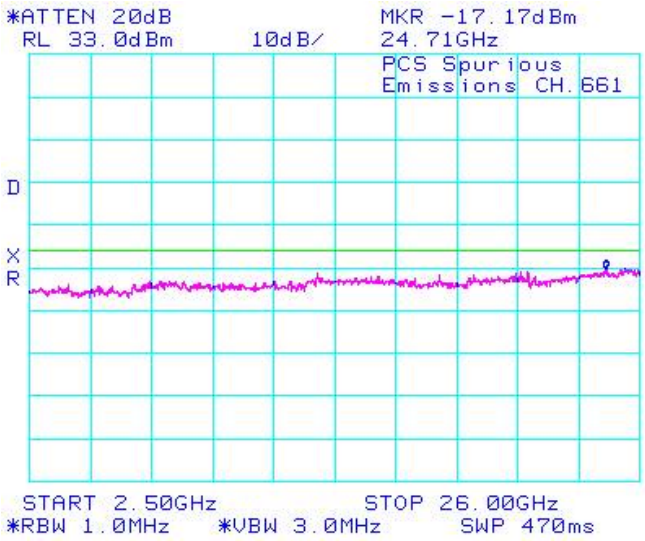


Figure 1-11: PCS1900 band, Spurious Conducted Emissions, High Channel

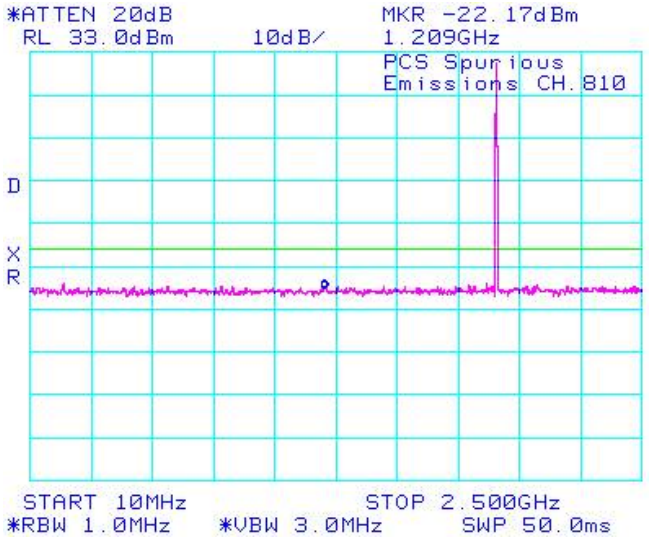
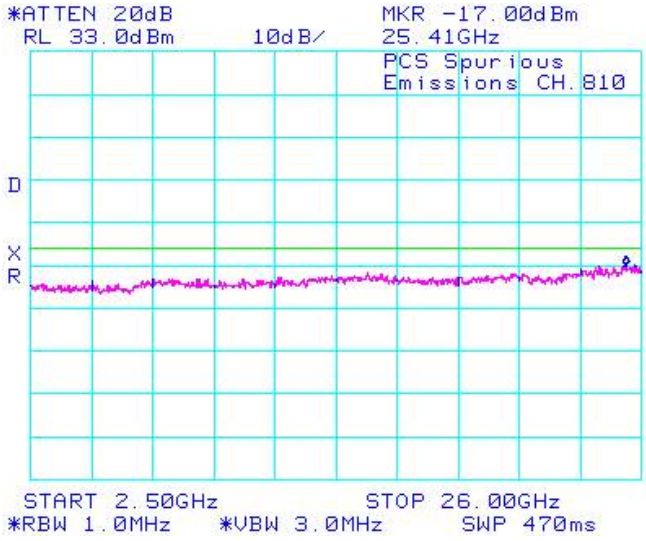


Figure 1-12: PCS1900 band, Spurious Conducted Emissions, High Channel



Conducted RF Emission Test Data cont'd

Figure 1-13: -26dBc bandwidth, GSM850 band Low Channel in GSM mode

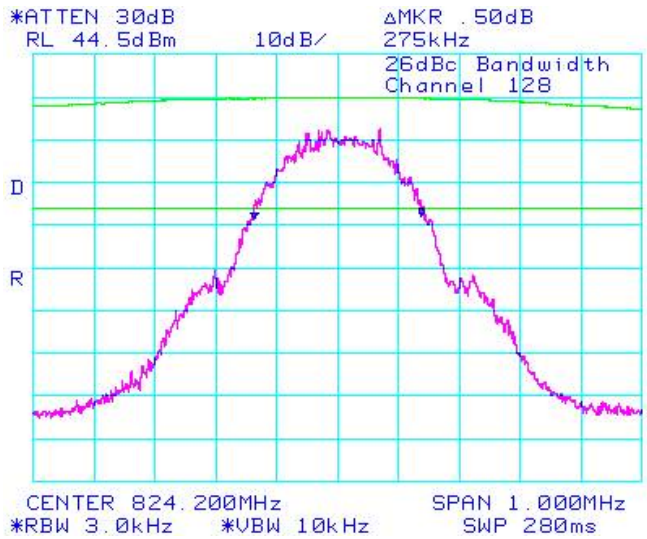


Figure 1-14: Occupied Bandwidth, GSM850 band Low Channel in GSM mode

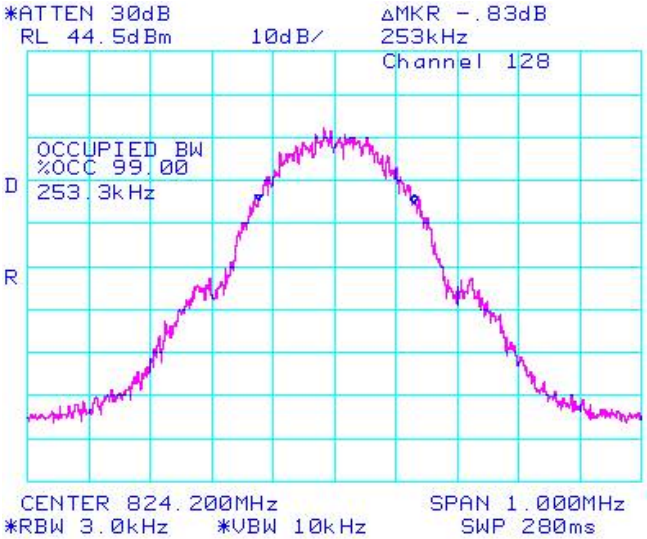


Figure 1-15: -26dBc bandwidth, GSM850 band Middle Channel in GSM mode

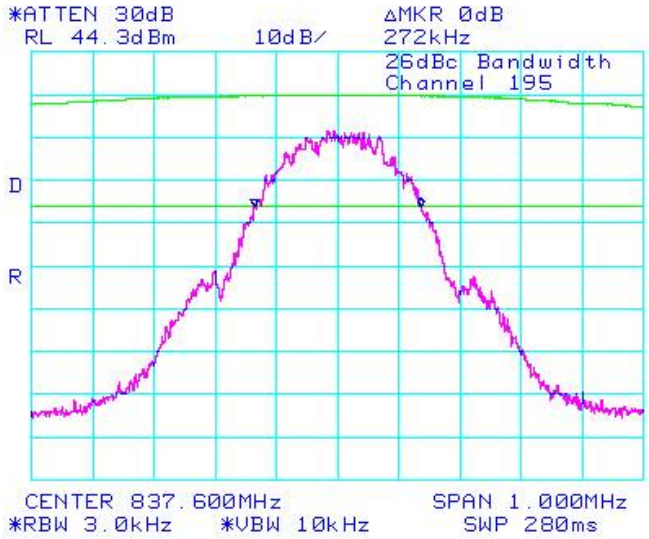
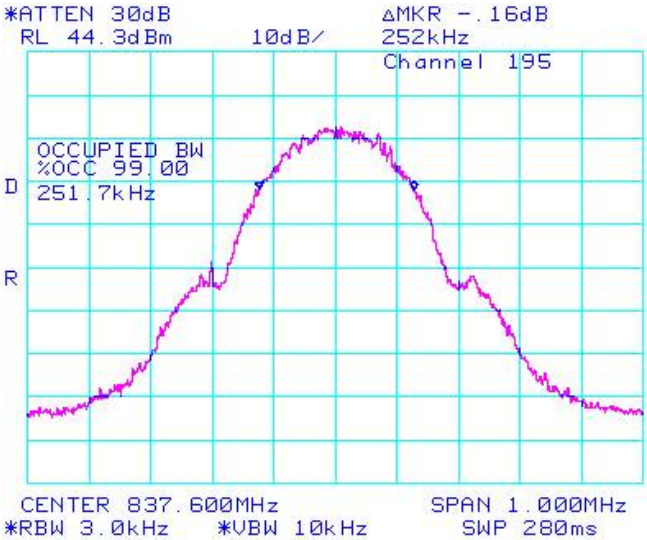


Figure 1-16: Occupied Bandwidth, GSM850 band Middle Channel in GSM mode



Conducted RF Emission Test Data cont'd

Figure 1-17: -26dBc bandwidth, GSM850 band High Channel in GSM mode

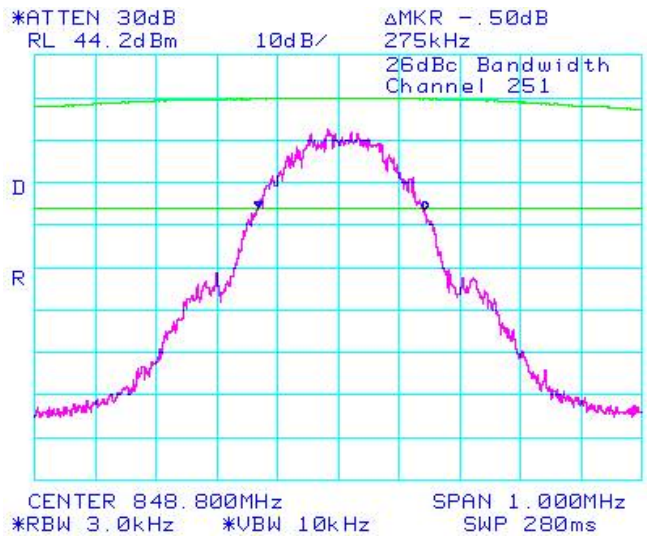


Figure 1-18: Occupied Bandwidth, GSM850 band High Channel in GSM mode

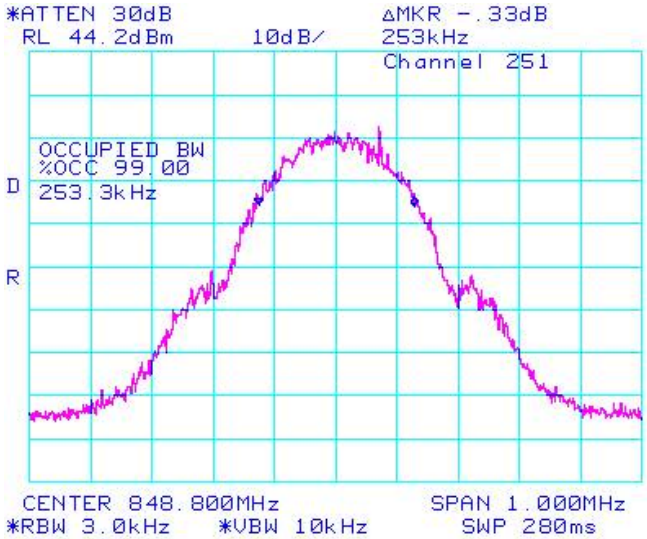


Figure 1-19: -26dBc bandwidth, PCS1900 Low Channel in GSM mode

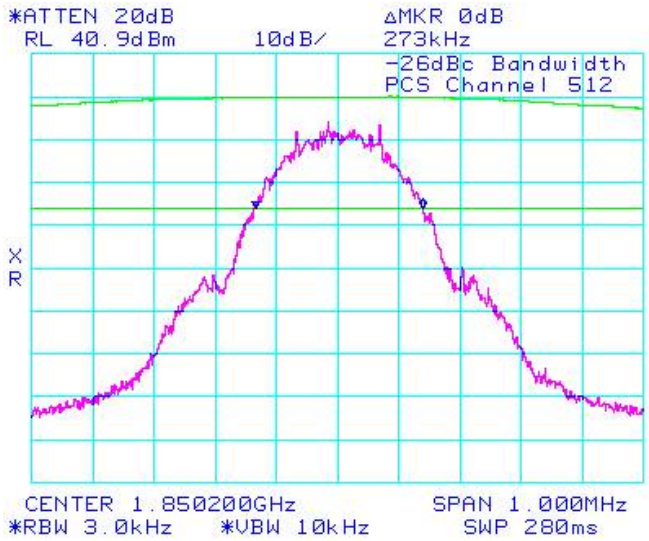
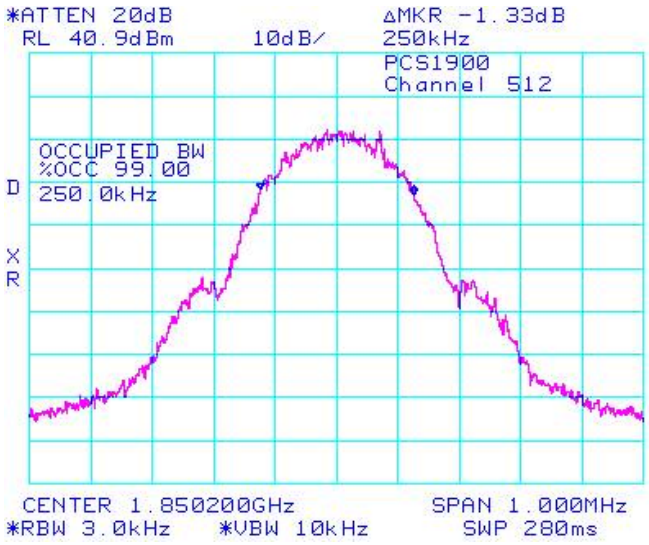


Figure 1-20: Occupied Bandwidth, PCS1900 Low Channel in GSM mode



Conducted RF Emission Test Data cont'd

Figure 1-21: -26dBc bandwidth, PCS1900 Middle Channel in GSM mode

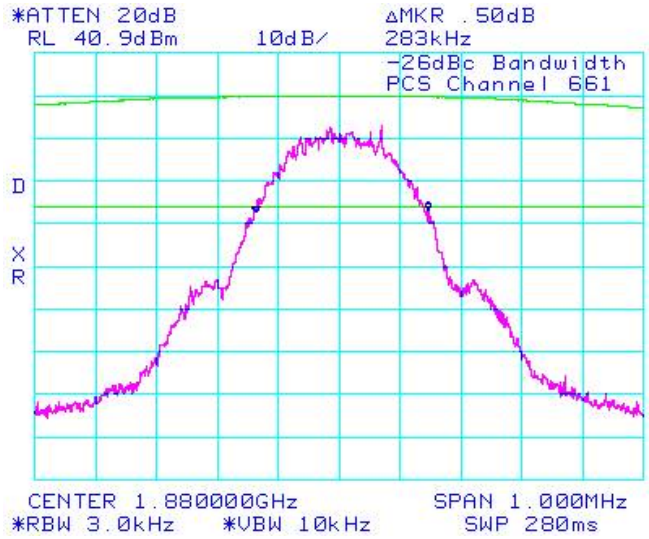


Figure 1-22: Occupied Bandwidth, PCS1900 Middle Channel in GSM mode

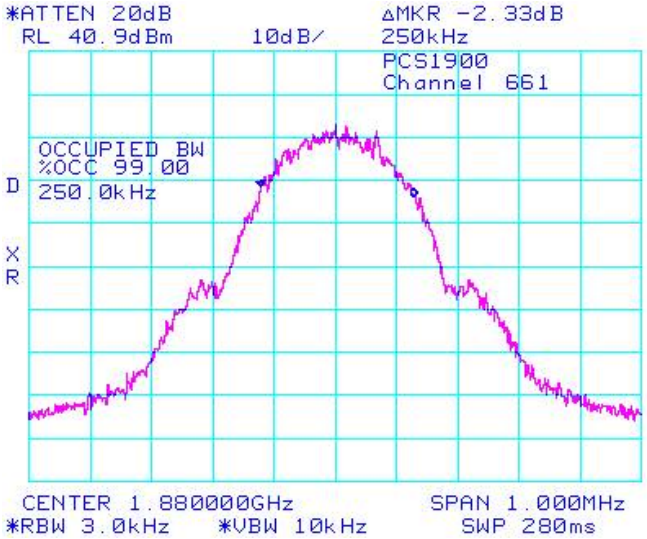


Figure 1-23: -26dBc bandwidth, PCS1900 High Channel in GSM mode

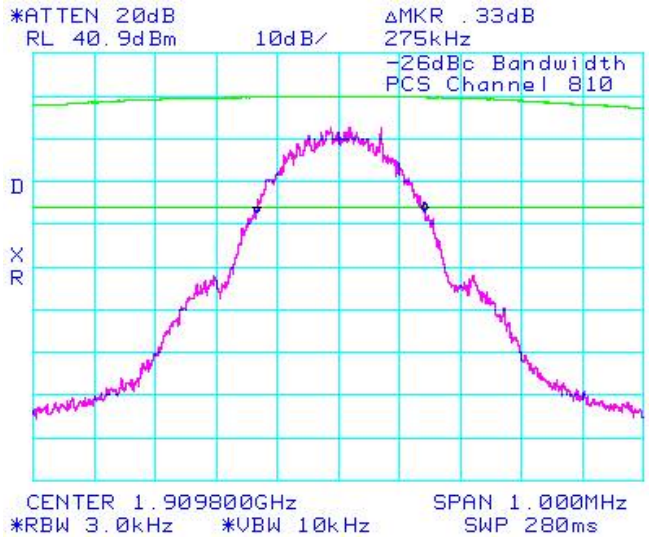
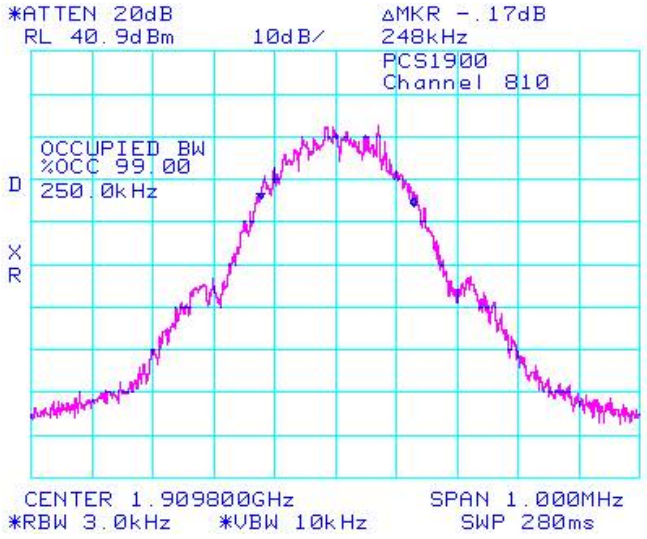


Figure 1-24: Occupied Bandwidth, PCS1900 High Channel in GSM mode



Conducted RF Emission Test Data cont'd

Figure 1-25: GSM850 band, Low Channel Mask in GSM mode

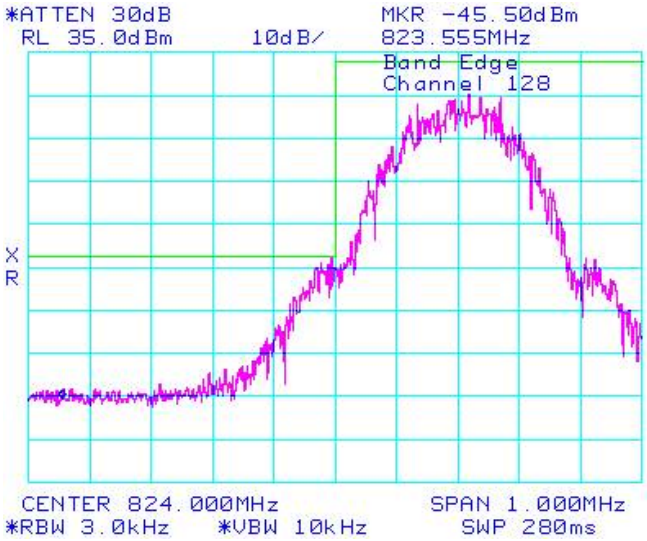


Figure 1-26: GSM850 band High Channel Mask in GSM mode

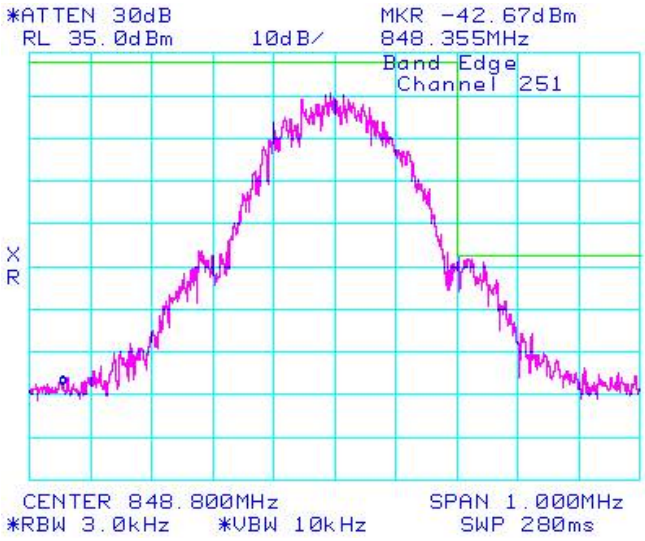


Figure 1-27: PCS1900, Low Channel Mask in GSM mode

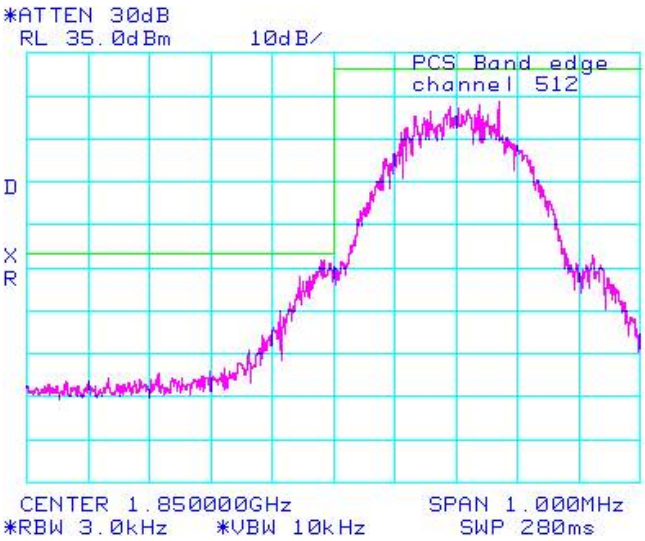
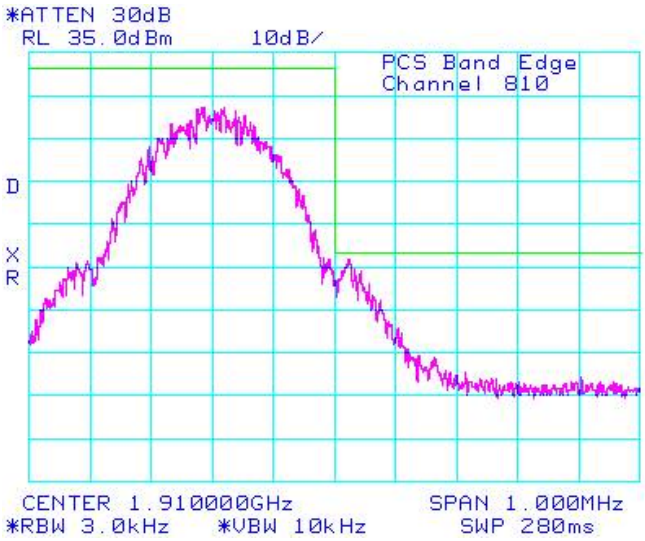


Figure 1-28: PCS1900, High Channel Mask in GSM mode



Conducted RF Emission Test Data cont'd

Figure 1-29: Occupied Bandwidth, GSM850 Band, Low Channel in EDGE mode

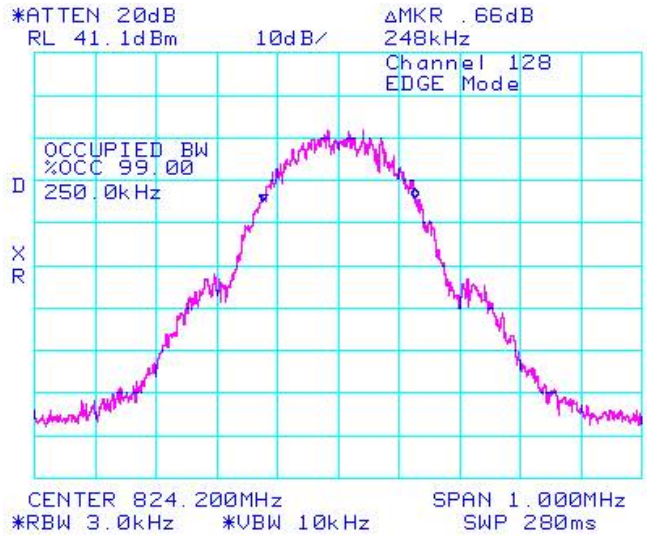


Figure 1-30: Occupied Bandwidth, GSM850 Band, Middle Channel in EDGE mode

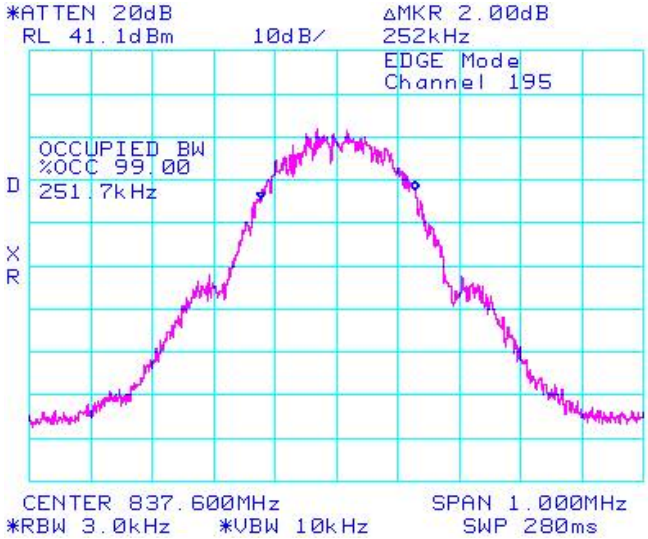


Figure 1-31: Occupied Bandwidth, GSM850 band, High Channel in EDGE mode

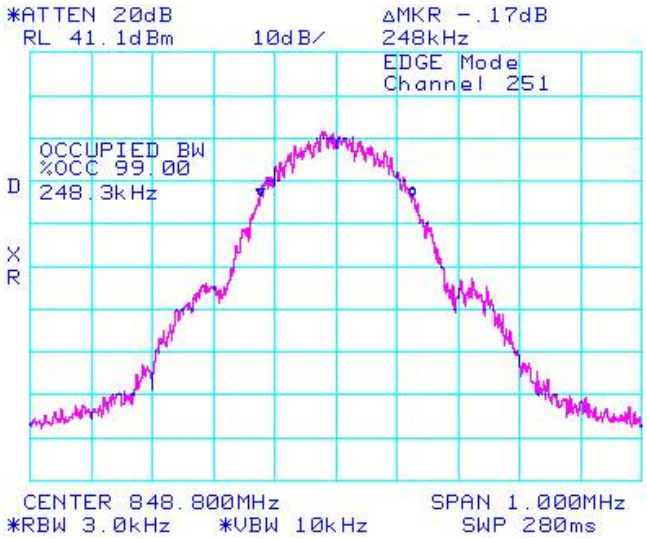
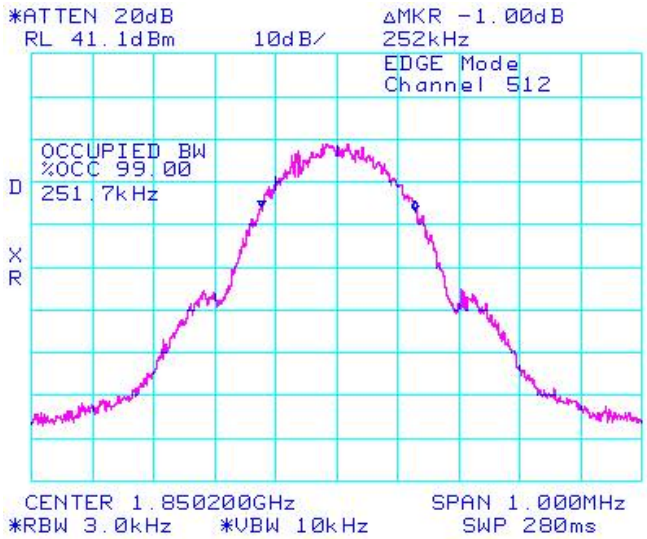


Figure 1-32: Occupied Bandwidth, PCS1900 Band, Low Channel in EDGE mode



Conducted RF Emission Test Data cont'd

Figure 1-33: Occupied Bandwidth, PCS1900 Band, Middle Channel in EDGE mode

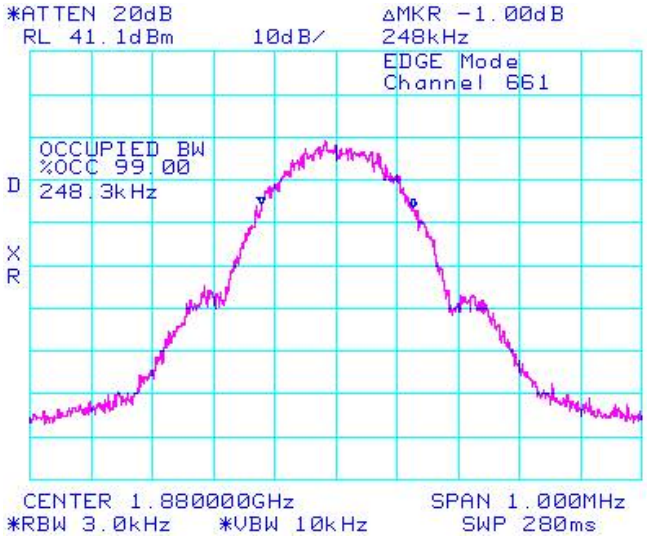
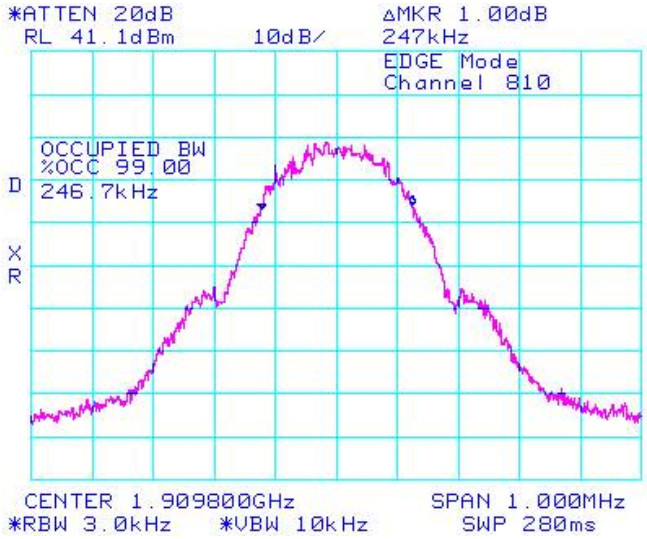


Figure 1-34: Occupied Bandwidth, PCS1900 Band, High Channel in EDGE mode



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 BlackBerry® smartphone was compensated for in the measurements.
Peak nominal output power is 33.5 dBm ±0.5 dB for GSM850 and 30.5 dBm ±0.5 dB for PCS.
Peak nominal output power is 30.6 dBm ±0.5 dB for Edge GSM850 and 27.6 dBm ±0.5 dB for Edge PCS.

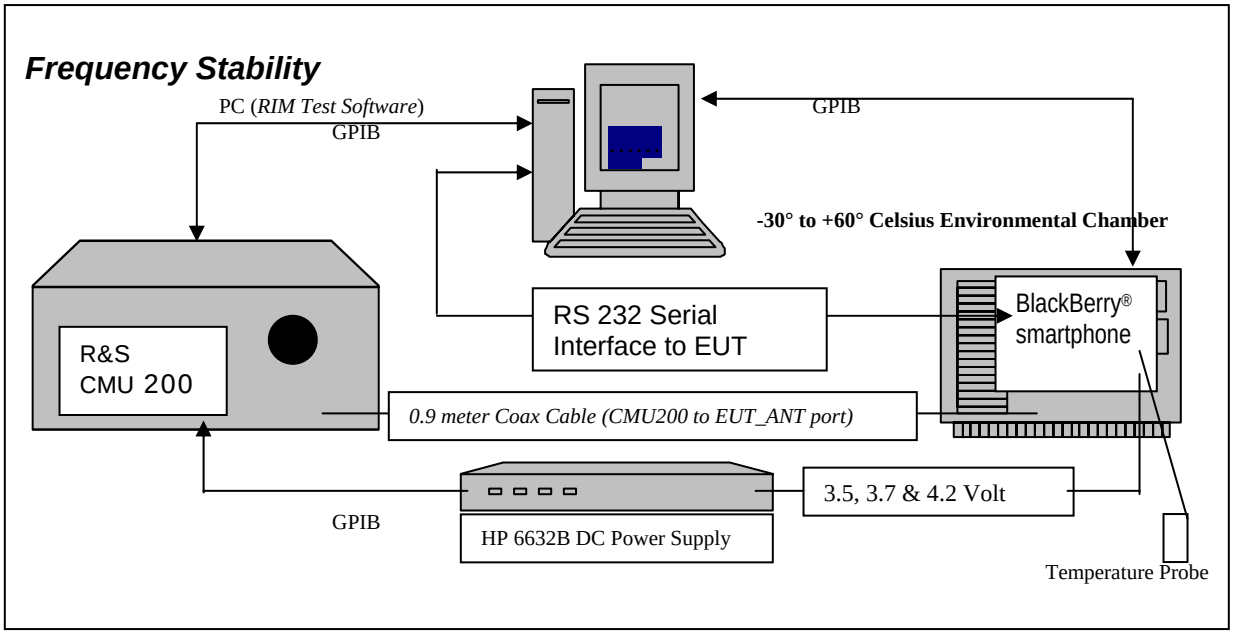
Date of Test: June 26, 2008

The measurements were performed by Maurice Battler.

Channel	Frequency (MHz)	Maximum Output Power (dBm)	Maximum Output Power (Watts)	Channel	Frequency (MHz)	Maximum Output Power (dBm)	Maximum Output Power (Watts)
GSM850				GSM850 EDGE/GPRS/GSM (2-timeslot)			
128	824.20	33.6	2.29	128	824.20	30.6	1.15
189	837.60	33.6	2.29	189	837.60	30.7	1.17
251	848.80	33.6	2.29	251	848.80	30.6	1.15
PCS				PCS EDGE/GPRS/GSM (2-timeslot)			
512	1850.2	30.5	1.12	512	1850.2	27.7	0.59
661	1880.0	30.4	1.10	661	1880.0	27.5	0.56
810	1909.8	30.5	1.12	810	1909.8	27.5	0.56

APPENDIX 3 – FREQUENCY STABILITY TEST DATA

Frequency Stability Test Data



The measurements were performed by Maurice Battler.

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 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.

Calibration for the Cable Loss was performed in the RF Laboratory using the Agilent power meter and Agilent Signal Generator.
The cable assembly from the RF input to the RF output was measured at the following Frequencies:

PCS1900 Frequency (MHz)	Cable loss (dB)
1850.2	1.20
1880.0	1.20
1909.8	1.20

GSM850 Frequency (MHz)	Cable loss (dB)
824.2	0.90
836.4	0.90
848.6	0.90

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 3.7 volts to 4.2 volts maximum 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, 3.7 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 PCS1900 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 and 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 3.7 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, 3.7 and 4.2 volts.

The maximum frequency error in the GSM850 band measured was **0.0971 PPM**.
The maximum frequency error in the PCS1900 band measured was **0.0447 PPM**.

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

Date of Test: August 06, 2008

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.6	20	-32.61	-0.0396
189	836.40	3.6	20	-27.44	-0.0328
250	848.60	3.6	20	-27.31	-0.0322

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.7	20	-44.30	-0.0537
189	836.40	3.7	20	-30.35	-0.0363
250	848.60	3.7	20	-28.54	-0.0336

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.2	20	-20.28	-0.0246
189	836.40	4.2	20	-15.63	-0.0187
250	848.60	4.2	20	-12.79	-0.0151

GSM850 Results: channel 128 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.6	-30	30.03	0.0364
128	824.20	3.6	-20	11.69	0.0142
128	824.20	3.6	-10	8.01	0.0097
128	824.20	3.6	0	8.85	0.0107
128	824.20	3.6	10	-19.89	-0.0241
128	824.20	3.6	20	-32.61	-0.0396
128	824.20	3.6	30	-70.58	-0.0856
128	824.20	3.6	40	-77.29	-0.0938
128	824.20	3.6	50	-78.52	-0.0953
128	824.20	3.6	60	-65.41	-0.0794

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.7	-30	9.62	0.0117
128	824.20	3.7	-20	-20.34	-0.0247
128	824.20	3.7	-10	-19.18	-0.0233
128	824.20	3.7	0	-36.68	-0.0445
128	824.20	3.7	10	-41.97	-0.0509
128	824.20	3.7	20	-44.30	-0.0537
128	824.20	3.7	30	-24.92	-0.0302
128	824.20	3.7	40	-76.32	-0.0926
128	824.20	3.7	50	-80.07	**-0.0971**
128	824.20	3.7	60	-78.91	-0.0957

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.2	-30	6.39	0.0078
128	824.20	4.2	-20	12.66	0.0154
128	824.20	4.2	-10	9.75	0.0118
128	824.20	4.2	0	-6.39	-0.0078
128	824.20	4.2	10	-15.50	-0.0188
128	824.20	4.2	20	-20.28	-0.0246
128	824.20	4.2	30	7.62	0.0092
128	824.20	4.2	40	-45.59	-0.0553
128	824.20	4.2	50	-40.81	-0.0495
128	824.20	4.2	60	-17.95	-0.0218

GSM850 Results: channel 189 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	3.6	-30	20.99	0.0251
189	836.40	3.6	-20	-10.01	-0.0120
189	836.40	3.6	-10	-12.46	-0.0149
189	836.40	3.6	0	-15.50	-0.0185
189	836.40	3.6	10	-23.44	-0.0280
189	836.40	3.6	20	-27.44	-0.0328
189	836.40	3.6	30	-60.44	-0.0723
189	836.40	3.6	40	-61.28	-0.0733
189	836.40	3.6	50	-58.82	-0.0703
189	836.40	3.6	60	-57.99	-0.0693

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	3.7	-30	15.50	0.0185
189	836.40	3.7	-20	-17.11	-0.0205
189	836.40	3.7	-10	-14.14	-0.0169
189	836.40	3.7	0	-29.96	-0.0358
189	836.40	3.7	10	-31.77	-0.0380
189	836.40	3.7	20	-30.35	-0.0363
189	836.40	3.7	30	-11.30	-0.0135
189	836.40	3.7	40	-57.99	-0.0693
189	836.40	3.7	50	-59.28	-0.0709
189	836.40	3.7	60	-47.14	-0.0564

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	4.2	-30	11.88	0.0142
189	836.40	4.2	-20	20.53	0.0245
189	836.40	4.2	-10	12.85	0.0154
189	836.40	4.2	0	9.23	0.0110
189	836.40	4.2	10	-8.14	-0.0097
189	836.40	4.2	20	-15.63	-0.0187
189	836.40	4.2	30	12.98	0.0155
189	836.40	4.2	40	-41.65	-0.0498
189	836.40	4.2	50	-31.58	-0.0378
189	836.40	4.2	60	-13.30	-0.0159

GSM850 Results: channel 250 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.60	3.6	-30	13.17	0.0155
250	848.60	3.6	-20	-13.95	-0.0164
250	848.60	3.6	-10	-12.27	-0.0145
250	848.60	3.6	0	-22.92	-0.0270
250	848.60	3.6	10	-26.80	-0.0316
250	848.60	3.6	20	-27.31	-0.0322
250	848.60	3.6	30	-57.02	-0.0672
250	848.60	3.6	40	-52.30	-0.0616
250	848.60	3.6	50	-52.95	-0.0624
250	848.60	3.6	60	-37.90	-0.0447

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.60	3.7	-30	16.72	0.0197
250	848.60	3.7	-20	-13.75	-0.0162
250	848.60	3.7	-10	-16.27	-0.0192
250	848.60	3.7	0	-28.15	-0.0332
250	848.60	3.7	10	-28.61	-0.0337
250	848.60	3.7	20	-28.54	-0.0336
250	848.60	3.7	30	-5.23	-0.0062
250	848.60	3.7	40	-53.92	-0.0635
250	848.60	3.7	50	-49.91	-0.0588
250	848.60	3.7	60	-36.42	-0.0429

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.60	4.2	-30	14.53	0.0171
250	848.60	4.2	-20	20.08	0.0237
250	848.60	4.2	-10	10.72	0.0126
250	848.60	4.2	0	12.27	0.0145
250	848.60	4.2	10	-13.95	-0.0164
250	848.60	4.2	20	-12.79	-0.0151
250	848.60	4.2	30	13.88	0.0164
250	848.60	4.2	40	-41.91	-0.0494
250	848.60	4.2	50	-31.25	-0.0368
250	848.60	4.2	60	-10.01	-0.0118

PCS1900 Channel results: channels 512, 661, & 810 @ 20°C maximum transmitted power

Date of Test: August 05, 2008

Traffic Channel Number	PCS Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	*PPM*
512	1850.2	3.6	20	-41.52	-0.0224
661	1880.0	3.6	20	-53.47	-0.0284
810	1909.8	3.6	20	-76.00	-0.0398

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.7	20	-82.65	-0.0447
661	1880.0	3.7	20	-71.55	-0.0381
810	1909.8	3.7	20	-19.31	-0.0101

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	4.2	20	12.53	0.0068
661	1880.0	4.2	20	29.25	0.0156
810	1909.8	4.2	20	21.50	0.0113

PCS1900 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	8.59	0.0046
512	1850.2	3.6	-20	-5.94	-0.0032
512	1850.2	3.6	-10	-57.34	-0.0310
512	1850.2	3.6	0	7.17	0.0039
512	1850.2	3.6	10	-45.91	-0.0248
512	1850.2	3.6	20	-41.52	-0.0224
512	1850.2	3.6	30	-73.93	-0.0400
512	1850.2	3.6	40	-43.52	-0.0235
512	1850.2	3.6	50	-43.07	-0.0233
512	1850.2	3.6	60	-28.15	-0.0152

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.7	-30	-27.83	-0.0150
512	1850.2	3.7	-20	-53.59	-0.0290
512	1850.2	3.7	-10	-26.41	-0.0143
512	1850.2	3.7	0	-75.74	-0.0409
512	1850.2	3.7	10	-46.69	-0.0252
512	1850.2	3.7	20	-82.65	**-0.0447**
512	1850.2	3.7	30	-38.87	-0.0210
512	1850.2	3.7	40	-81.36	-0.0440
512	1850.2	3.7	50	-48.95	-0.0265
512	1850.2	3.7	60	-15.69	-0.0085

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	4.2	-30	21.11	0.0114
512	1850.2	4.2	-20	-10.85	-0.0059
512	1850.2	4.2	-10	7.23	0.0039
512	1850.2	4.2	0	-27.89	-0.0151
512	1850.2	4.2	10	-14.40	-0.0078
512	1850.2	4.2	20	12.53	0.0068
512	1850.2	4.2	30	-26.41	-0.0143
512	1850.2	4.2	40	17.11	0.0092
512	1850.2	4.2	50	-19.82	-0.0107
512	1850.2	4.2	60	30.41	0.0164

PCS1900 Results: channel 661 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880	3.6	-30	-9.43	-0.0050
661	1880	3.6	-20	-31.51	-0.0168
661	1880	3.6	-10	-7.30	-0.0039
661	1880	3.6	0	-33.64	-0.0179
661	1880	3.6	10	-68.58	-0.0365
661	1880	3.6	20	-53.47	-0.0284
661	1880	3.6	30	-22.15	-0.0118
661	1880	3.6	40	-58.24	-0.0310
661	1880	3.6	50	-66.64	-0.0354
661	1880	3.6	60	-50.37	-0.0268

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880	3.7	-30	-9.56	-0.0051
661	1880	3.7	-20	-46.43	-0.0247
661	1880	3.7	-10	-23.57	-0.0125
661	1880	3.7	0	-64.06	-0.0341
661	1880	3.7	10	-35.71	-0.0190
661	1880	3.7	20	-71.55	-0.0381
661	1880	3.7	30	-32.87	-0.0175
661	1880	3.7	40	7.17	0.0038
661	1880	3.7	50	-37.00	-0.0197
661	1880	3.7	60	7.30	0.0039

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880	4.2	-30	-41.71	-0.0222
661	1880	4.2	-20	44.75	0.0238
661	1880	4.2	-10	14.08	0.0075
661	1880	4.2	0	19.50	0.0104
661	1880	4.2	10	-5.81	-0.0031
661	1880	4.2	20	16.66	0.0089
661	1880	4.2	30	29.25	0.0156
661	1880	4.2	40	-14.92	-0.0079
661	1880	4.2	50	28.09	0.0149
661	1880	4.2	60	8.85	0.0047

PCS1900 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	-29.83	-0.0156
810	1909.8	3.6	-20	-50.37	-0.0264
810	1909.8	3.6	-10	-23.50	-0.0123
810	1909.8	3.6	0	-62.25	-0.0326
810	1909.8	3.6	10	-38.03	-0.0199
810	1909.8	3.6	20	-76.00	-0.0398
810	1909.8	3.6	30	-30.41	-0.0159
810	1909.8	3.6	40	-75.03	-0.0393
810	1909.8	3.6	50	-40.87	-0.0214
810	1909.8	3.6	60	-71.22	-0.0373

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	3.7	-30	-16.27	-0.0085
810	1909.8	3.7	-20	-54.30	-0.0284
810	1909.8	3.7	-10	-31.12	-0.0163
810	1909.8	3.7	0	-74.77	-0.0392
810	1909.8	3.7	10	-45.78	-0.0240
810	1909.8	3.7	20	-19.31	-0.0101
810	1909.8	3.7	30	-42.88	-0.0225
810	1909.8	3.7	40	-9.62	-0.0050
810	1909.8	3.7	50	-46.56	-0.0244
810	1909.8	3.7	60	-13.37	-0.0070

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	4.2	-30	34.55	0.0181
810	1909.8	4.2	-20	11.62	0.0061
810	1909.8	4.2	-10	13.43	0.0070
810	1909.8	4.2	0	-10.33	-0.0054
810	1909.8	4.2	10	9.49	0.0050
810	1909.8	4.2	20	21.50	0.0113
810	1909.8	4.2	30	-24.99	-0.0131
810	1909.8	4.2	40	19.44	0.0102
810	1909.8	4.2	50	-10.46	-0.0055
810	1909.8	4.2	60	-31.64	-0.0166