

EMI Test Report



**Research In Motion Limited**

**REPORT NO.:** RIM-0206-03

**PRODUCT Model No:** R6220GW  
**Type Name:** BlackBerry 6225 Wireless Handheld  
**FCC ID:** L6AR6220GW  
**IC:** 2503A-R6220GW

**Approved by:** Paul G. Cardinal  
Paul G. Cardinal, Ph.D.  
Manager, Compliance and Certification

**Date:** 24 June 2002



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## A) Scope

This report details the results of compliance tests which were performed in accordance with the requirements of:

FCC CFR 47 Part 15, Subpart B, Class B Digital Devices, Unintentional Radiators

IC ICES-003, Class B Digital Devices, Unintentional Radiators

## 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.net](http://www.rim.net)

The testing began on June 20, 2002 and was completed on June 21, 2002. The sample equipment under test (EUT) included:

1. BlackBerry 6225 Wireless Handheld, model number R6220GW, PIN 2001B917, FCC ID L6AR6220GW, IC: 2503A-R6220GW.
2. USB data cable, model number HDW-04162-001, 1.5 metres long.
3. Travel Charger, model number PSM05R-050Q, RIM part number ASY-04078-001 with an output voltage of 5.0 volts dc.
4. Headset, model number HDW-03458-001

The transmit frequency ranges for the BlackBerry 6225 Wireless Handheld are: GSM band, 880 to 915MHz and PCS band, 1850 to 1910 MHz. Only the PCS band emissions were measured since the GSM band is not available in North America and therefore cannot be used.

## C) Support Equipment Used for the Testing of the EUT

1. PC, Dell, model number MMP, serial number 6SPS20B
2. Monitor, KDS, model number KD-1460, serial number 4530019652
3. Printer, H/P, model number C5884A, serial number US8251W0VQ

## D) Test Voltage

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

**E) Test Results Chart**

SPECIFICATION	Test Type	MEETS REQUIREMENTS	Performed By
FCC CFR 47 Part 15, Subpart B IC ICES-003	Class B	Yes	Masud Attayi

**F) Modifications to EUT**

No modifications were required on the EUT.

**G) Summary of Results****1 CONDUCTED EMISSIONS**

The conducted emissions were measured while using the test procedure outlined in CISPR Recommendation 22 through a 50 $\Omega$  Line Impedance Stabilization Network (LISN), which was inserted in the power line to the equipment to provide the specified impedance for measurements. The EUT was placed on a nonconductive wooden table, 80 cm high that was positioned 40 cm from a vertical ground plane. The RF output of the network was connected to a spectrum analyzer system with characteristics that duplicate those of the receiver specified in CISPR Publication 16. The following test configurations were measured:

- The Travel Charger was connected to the handheld. The ac input to the Travel Charger was 120 volts, 60 Hz.
- The handheld was connected to the support PC by the USB data cable. The ac input to the support PC was 120 volts, 60 Hz.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart B/IC ICES-003, Class B limit. The sample EUT had a worse case test margin of 16.68 dB at 0.450 MHz.

**Measurement Uncertainty  $\pm 2.0$  dB**

To view the test data/plots, see APPENDIX 1.

## 2 RADIATED EMISSIONS

The radiated emissions from the EUT were measured while using the methods outlined in CISPR Recommendation 22. The EUT was placed on a nonconductive wooden table, 80 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 measurements were done in a semi-anechoic chamber. The semi-anechoic chamber FCC registration number is **778487** and the Industry Canada file number is **IC4240**. The turntable was rotated to determine the azimuth of the peak emissions. At this point the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The maximum emissions level was recorded. The frequency range measured was from 30 MHz to 9 GHz which is the 5<sup>th</sup> harmonic of the highest RF local oscillator (LO) in the PCS band. Both the horizontal and vertical polarizations of the emissions were measured:

The EUT was configured and operated to produce the maximum radiated emissions while still keeping within RIM's specifications. The following test configurations were measured:

- The handheld was connected to the Travel Charger.
- The handheld was connected to the PC via the USB data cable for charging and data link.

The system's radiated emission levels in idle mode were compared with respect to the FCC CFR 47 Part 15, Subpart B/IC ICES-003, Class B limit.

The system **passed** with a worse case emission test margin of 5.46 dB at 894.80 MHz.

The EUT's IF LO emissions were measured in the low channel and high channel up to the 5<sup>th</sup> harmonic with the handheld in idle mode connected to the travel charger and headset.

Both the horizontal and vertical polarizations of the emissions were measured. No harmonics of the IF LO were found.

The LO harmonic emissions were measured on the low, middle and high channels (512, 661 and 810) in the worse configuration of handheld connected to the travel charger and headset. Both the horizontal and vertical polarizations of the emissions were examined. The Los were measured up to the 5th harmonic. No harmonics of the RF LO were found.

### **Sample Calculation:**

Field Strength (dB $\mu$ V/M) is calculated as follows:

$$FS = \text{Measured Level (dB}\mu\text{V)} + A.F. \text{ (dB/m)} + \text{Cable Loss (dB)} - \text{preamp (dB)} + \text{filter loss (dB)}$$

### **Measurement Uncertainty $\pm 4.0$ dB**

To view the test data see APPENDIX 2.

## H) Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL</u> / <u>SERIAL NUMBER</u>	<u>CAL DUE</u> <u>DATE</u>	<u>USE</u>
Preamplifier system	TDK RF Solutions	PA-02 080010	02-06-21	Radiated Emissions
Preamplifier	Sonoma	310N/11909A 185831	02-06-21	Radiated Emissions
EMC Analyzer	Agilent	E7405A US40240226	03-03-21	Radiated Emissions
L.I.S.N.	Emco	3816/2 1120	02-06-21	Conducted Emissions
L.I.S.N.	Emco	3816/2 1118	02-06-21	Conducted Emissions
Impulse Limiter	Rohde & Schwarz	ESHS-Z2 836248/052	02-06-21	Conducted Emissions
EMI Receiver	Agilent	85462A 3942A00517	03-04-04	Conducted Emissions
RF Filter Section	Agilent	85460A 3704A00481	03-04-04	Conducted Emissions
Hybrid Log Antenna	TDK	HLP-3003C 17301	02-10-03	Radiated Emissions
Horn Antenna	TDK	HRN-0118 090301	02-10-03	Radiated Emissions
Horn Antenna	TDK	HRN-0118 090601	02-10-03	Radiated Emissions
Signal Generator	HP	83630B 3844A00927	03-04-30	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP 1006	03-03-05	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP 1007	03-03-05	Radiated Emissions

## K) Declaration

### Statement of Performance:

The test sample BlackBerry 6225 Wireless Handheld model R6220GW tested with the following accessories: Travel Charger model number PSM05R-050Q RIM part number ASY-04078-001, Headset model number HDW-03458-001 and USB data cable model number HDW-04162-001 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 manufacturer's published specifications.

The test equipment was used within its published operating parameters.

The test methods were consistent with the methods described in the relevant standards.

### Tested by:

Masud S. Attayi, P.Eng.

Senior Engineer, Compliance and Certification

Date: \_\_21 June 2002\_\_



### Reviewed and Approved by:

Date: \_\_24 June 2002\_\_



Paul G. Cardinal, Ph.D.

Manager, Compliance and Certification

## APPENDIX 1

### CONDUCTED EMISSIONS TEST DATA/PLOTS



### Conducted Emissions Test Results

#### FCC CFR 47 Part 15, Subpart B, Class B

The Travel Charger was connected to the handheld. The ac input to the Travel Charger was 120 volts, 60 Hz. All emissions were greater than 20 dB margin.

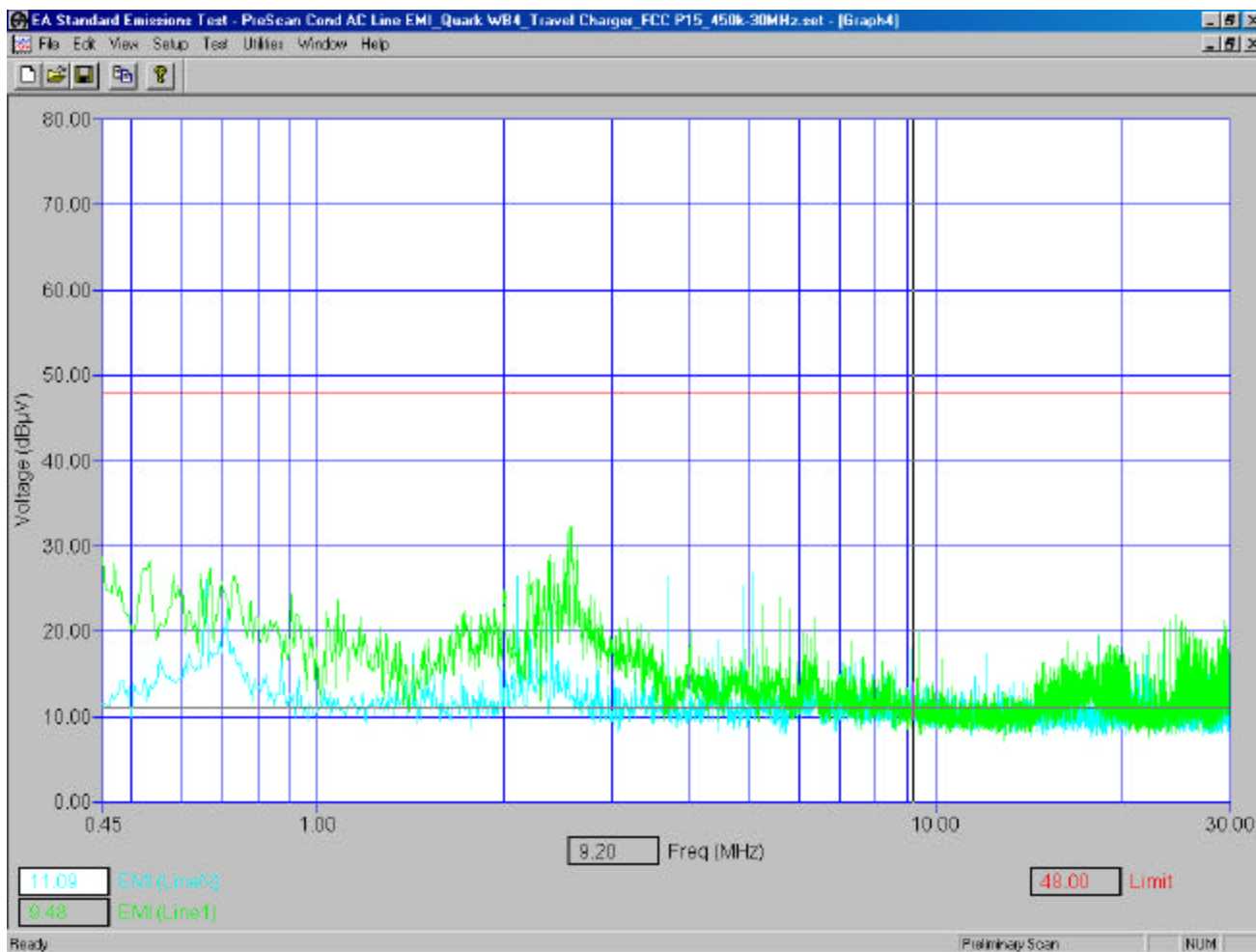
#### FCC CFR 47 Part 15, Subpart B, Class B

<u>FREQ.</u> (MHz)	<u>LINE</u>	<u>READING</u> Quasi-Peak (dBμV)	<u>Impulse</u> Limiter Loss (dB)	<u>Cable Loss+</u> <u>LISN Factor</u> (dB)	<u>LIMIT</u> (dBμV)	<u>MARGIN</u> (dB)
0.450	L1	21.26	10.0	0.06	48.0	-16.68
0.450	L2	19.83	10.0	0.06	48.0	-18.11
0.560	L1	19.17	10.0	0.08	48.0	-18.75
0.790	L1	19.23	10.0	0.08	48.0	-18.69
0.790	L2	17.62	10.0	0.08	48.0	-20.30
0.970	L1	16.62	10.0	0.10	48.0	-21.28
0.970	L2	16.65	10.0	0.10	48.0	-21.25
1.140	L1	17.90	10.0	0.10	48.0	-20.00
1.650	L1	14.69	10.0	0.11	48.0	-23.20
11.180	L1	16.19	10.0	0.14	48.0	-21.67
19.170	L1	18.79	10.0	0.24	48.0	-18.97
19.170	L2	19.09	10.0	0.24	48.0	-18.67

The handheld was connected to the support PC by the USB data cable. The ac input to the support PC was 120 volts, 60 Hz.

Conducted Emission Graph

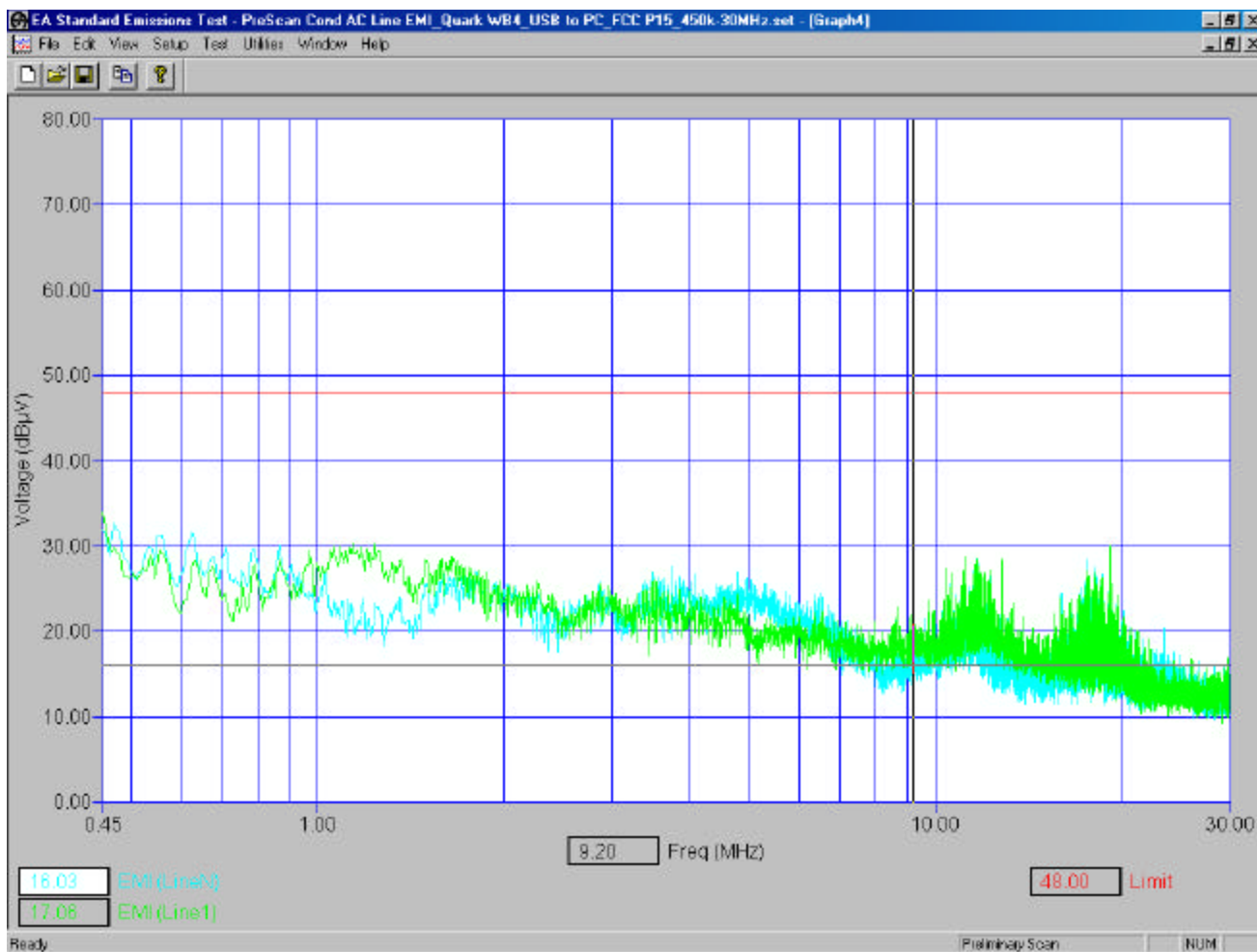
## FCC CFR 47 Part 15, Subpart B, Class B



120 volt, 60 Hz ac input to ac Travel Charger, model number PSM05R-050Q, RIM part number ASY-04078-001 connected to model number R6220GW.

Conducted Emission Graph

FCC CFR 47 Part 15, Subpart B, Class B



The ac input was 120 volts, 60 Hz to the support PC which was connected to the handheld via the USB data cable.

Conducted Emission Test-Setup Photo

FCC CFR 47 Part 15, Subpart B, Class B



## APPENDIX 2

### RADIATED EMISSIONS TEST DATA/PLOTS

### Radiated Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B

June 20, 2002

**Operating Mode:** The handheld was connected to the PC via the USB cable. The headset was connected to the handheld. The PC system included the printer and monitor. The ac input was 120 volts, 60 Hz. The handheld was in idle mode.

Frequency (MHz)	Pol (V/H)	Detector (Q.P. or Peak)	Reading @ 3.0 M (dBμV)	Correction Factors for antennae/cables (dB/m)	Level (corr.+ meas.) (dBμV/m)	Limit @ 3.0 M (dBμV/m)	Test Margin (dB)
83.200	V	Q.P.	44.9	-20.5	24.4	40.0	-15.60
197.700	V	Q.P.	45.80	-15.49	30.31	43.5	-13.19
198.200	H	Q.P.	45.90	-15.5	30.40	43.5	-13.10
360.200	V	Q.P.	51.00	-11.81	39.19	46.0	-6.81
375.000	H	Q.P.	52.22	-11.72	40.50	46.0	-5.50
596.600	V	Q.P.	39.00	-5.85	33.15	46.0	-12.85
598.400	H	Q.P.	44.30	-5.79	38.51	46.0	-7.49
894.800	V	Q.P.	42.00	-8.54	40.54	46.0	-5.46
899.500	V	Q.P.	41.10	-1.4	39.70	46.0	-6.30

**Operating Mode:** The handheld was connected to the Travel Charger. The handheld was in idle mode. The ac input was 120 volts, 60 Hz.

Frequency (MHz)	Pol (V/H)	Detector (Q.P. or Peak)	Reading @ 3.0 M (dBμV)	Correction Factors for antennae/cables (dB/m)	Level (corr.+ meas.) (dBμV/m)	Limit @ 3.0 M (dBμV/m)	Test Margin (dB)
83.200	H	Q.P.	44.90	-20.5	24.40	40.0	-15.60
197.700	V	Q.P.	45.80	-15.49	30.31	43.5	-13.19
198.200	V	Q.P.	45.90	-15.41	30.49	43.5	-13.01

Note: All other emission frequencies were greater than 20 dB margin.

Radiated Emissions Test Data con't

Type	Channel	Frequency	Antenna		Reading	Corrected Reading	Limit	Diff. To Limit
		(MHz)	Type	Pol	(dBuV)	(dBuV)	(dBuv/m)	(dB)
PCS BAND (Local Oscillator)								
Transmit RF Local Oscillator (LO)								
Low Channel								
F0	512	1719.2	Horn	V	NF	NF	54	
F0	512	1719.2	Horn	H	NF			
The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor.								
Middle Channel								
F0	661	1749	Horn	V	NF	NF	54	
F0	661	1749	Horn	H	NF			
The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor.								
High Channel								
F0	810	1778.8	Horn	V	NF	NF	54	
F0	810	1778.8	Horn	H	NF			
The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor.								

### Radiated Emissions Test Data con't

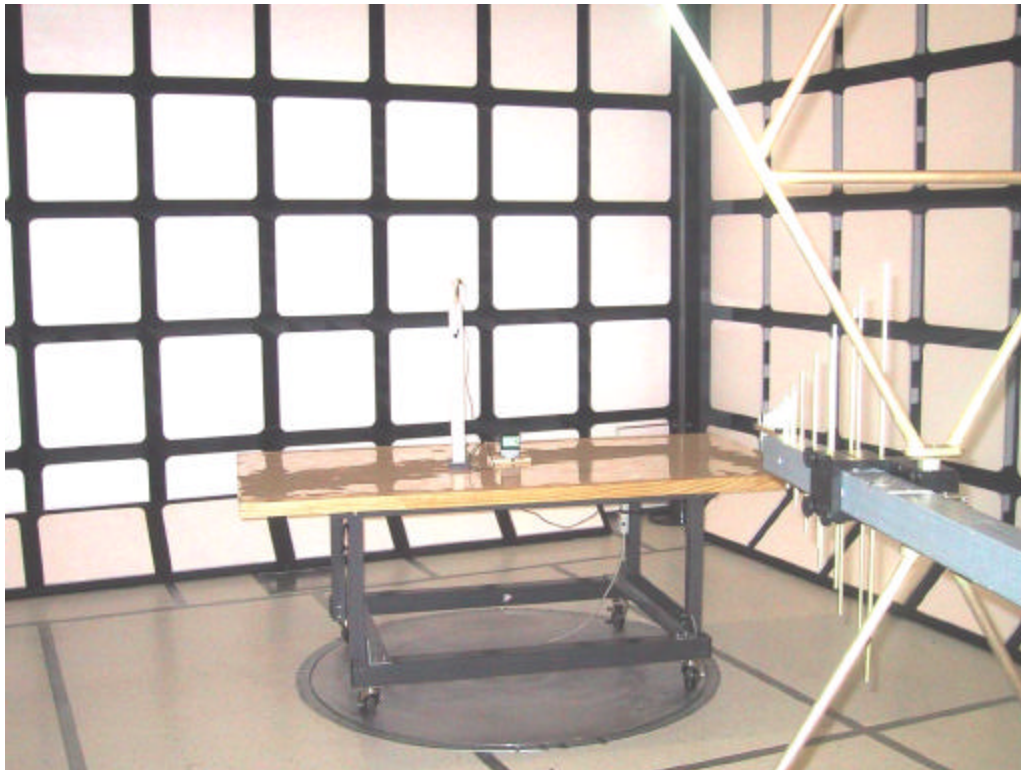
Type	Channel	Frequency	Antenna		Reading	Corrected Reading	Limit	Diff. To Limit
		(MHz)	Type	Pol	(dBuV)	(dBuV)	(dBuv/m)	(dB)
Receive RF Local Oscillator (LO)								
Low Channel								
F0	512	1705.2	Horn	V	NF	NF	54	
F0	512	1705.2	Horn	H	NF			
The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor.								
Middle Channel								
F0	661	1735	Horn	V	NF	NF	54	
F0	661	1735	Horn	H	NF			
The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor.								
High Channel								
F0	810	1764.8	Horn	V	NF	NF	54	
F0	810	1764.8	Horn	H	NF			
The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor.								



### Radiated Emissions Test Data con't

Type	Channel	Frequency	Antenna		Reading	Corrected Reading	Limit	Diff. To Limit
		(MHz)	Type	Pol	(dBuV)	(dBuV)	(dBuv/m)	(dB)
IF Local Oscillator (VCO) - (Checked in Idle Mode)								
Low Channel								
F0		1048	Horn	V	NF	NF	54	
F0		1048	Horn	H	NF			
The LO was measured up to the 5 th harmonic								
No Emissions could be seen above the spectrum analyzer noise floor.								
High Channel								
F0		1080	Horn	V	NF	NF	54	
F0		1080	Horn	H	NF			
The LO was measured up to the 5 th harmonic								
No Emissions could be seen above the spectrum analyzer noise floor.								

Radiated emissions in semi- anechoic chamber. Test distance is three metres.



Radiated emissions in semi- anechoic chamber. Test distance is three metres.

