EMI Test Report

Research In Motion Limited

REPORT NO.: RIM-0041-0305-02

PRODUCT MODEL NO.: R6230GN
TYPE NAME: BlackBerry Wireless Handheld
FCC ID: L6AR6230GN
IC: 2503A-R6230GN

Date: 10 June 2003

Statement of Performance:

The BlackBerry Wireless Handheld, model R6230GN ASY-06471-001, tested with the following accessories: Travel Charger model number PSM05R-050Q part number ASY-04078-001, USB data cable model number HDW-04162-001 and Audio Headset part number HDW-03458-001 when configured and operated per RIM's operation instructions, performs within the requirements of the test standards.

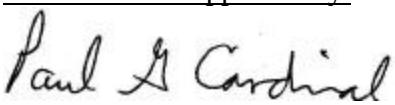
Declaration:

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

Tested by:

Masud S. Attayi, P.Eng.
Senior Compliance Engineer Date: 12 June 2003

Reviewed and Approved by:



Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification Date: 13 June 2003

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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, Oct. 1, 2000, Class B Digital Devices, Unintentional Radiators
IC ICES-003, Nov. 22, 1997, 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

The testing began on June 02, 2003 and completed on June 02, 2003. The sample equipment under test (EUT) included:

1) BlackBerry Wireless Handheld, model number R6230GN, ASY-06471-001, RF PCB version 004, PIN 20036A96, IMEI 001020.00.027694.0, FCC ID L6AR6230GN, IC: 2503A-R6230GN.
2) Travel Charger, model number PSM05R-050Q, part number ASY-04078-001 with an output voltage of 5.0 volts dc.
3) USB data cable, model number HDW-04162-001, 1.45 metres long.
4) Headset, model number HDW-03458-001. The lead length was 1.25 metres long.

Only the GSM band and PCS band emission results are presented here.

C) Support Equipment Used for the Testing of the EUT

1) Rohde & Schwarz, Universal Radio Communication Tester, model CMU200, serial number 837493/073
2) PC System, Myraid, model EN-P3B-7, serial number CCC0004078
3) Monitor, ViewSonic, model number VCDTS23103-2M, serial number 24B022952648
4) Printer, H/P, model number C5884A, serial number US8251W0VQ

D) Test Voltage

The ac input voltage was 120 volts, 60 Hz and 230 volts, 50 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

a) CONDUCTED EMISSIONS

The conducted emissions were measured while using the test procedure outlined in CISPR Recommendation 22 through a 50 Ohm 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 Travel Charger was connected to the Handheld in battery charge mode. The ac input to the Travel Charger was 120 volts, 60 Hz.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart B and IC ICES-003, Class B limit. The sample EUT had a worse case test margin of 15.86 dB at 2.676 MHz.

Measurement Uncertainty ±2.0 dB

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

b) RADIATED EMISSIONS

The radiated emissions from the EUT were measured 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 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 emission level was recorded. The frequency range measured was from 30 MHz to 1.0 GHz. Both the horizontal and vertical polarisations of the emissions were measured.
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 EUT was configured and operated to produce the maximum radiated emissions while still keeping within RIM's specifications.
The following test configuration was measured:

- The Handheld was connected to the Travel Charger.
- The Handheld was connected to the support 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 and IC ICES-003, Class B limit.
The system **passed** with a worse case emission test margin of 2.36 dB at 43.441 MHz.

The EUT's transmit RF local oscillator emissions (transmit/receive mode) were measured in the GSM850 band on the low, middle and high channels (128, 195 and 251) in the standalone configuration in the upright position. Both the horizontal and vertical polarizations were measured up to the 5^{th} harmonic. No harmonics of the RF local oscillator were found.
The EUT's transmit RF local oscillator emissions (transmit/receive mode) were measured in the PCS band on the low, middle and high channels (512, 661 and 810) in the standalone configuration in the upright position. Both the horizontal and vertical polarizations were measured up to the 5^{th} harmonic. The worse case emission test margin was 23.75 dB at 1423.20 MHz.

The EUT's receive RF local oscillator emissions(transmit/receive mode) were measured in the GSM850 band on the low, middle and high channels (128, 195 and 251) in the standalone configuration in the upright position. Both the horizontal and vertical polarizations were measured up to the 5^{th} harmonic. No harmonics of the RF local oscillator were found.
The EUT's receive RF local oscillator emissions (transmit/receive mode) were measured in the PCS band on the low, middle and high channels (512, 661 and 810) in the standalone configuration in the upright position. Both the horizontal and vertical polarizations were measured up to the 5^{th} harmonic. No harmonics of the RF local oscillator were found.

The EUT's IF local oscillator emissions in the GSM850 band were measured in the middle channel up to the 5th harmonic (Tx/Rx mode).
Both the horizontal and vertical polarizations of the emissions were measured. The worse case emission test margin was 19.24 dB at 896.0 MHz.
The EUT's IF local oscillator emissions in the PCS band were measured in the middle channel up to the 5th harmonic (Tx/Rx mode).
Both the horizontal and vertical polarizations of the emissions were measured. The worse case emission test margin was 12.24 dB at 854.0 MHz.

Sample Calculation:

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

Measurement Uncertainty ±4.0 dB

To view the test data see APPENDIX 2.

H) Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL / SERIAL NUMBER	CAL DUE DATE (YY MO DD)	USE
Preamplifier	Sonoma	310N/11909A 185831	03-10-02	Radiated Emissions
Preamplifier system	TDK	PA-02 080010	03-10-02	Radiated Emissions
EMC Analyzer	Agilent	E7405A US40240226	03-09-21	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C 017301	03-12-11	Radiated Emissions
Horn Antenna	TDK	HRN-0118 130092	03-08-14	Radiated Emissions
Horn Antenna	TDK	HRN-0118 030201	03-12-11	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU200 837493/073	04-04-05	Radiated Emissions
L.I.S.N.	Emco	3816/2 1120	03-08-29	Conducted Emissions
L.I.S.N.	Emco	3816/2 1118	03-08-29	Conducted Emissions
Impulse Limiter	Rohde & Schwarz	ESHS-Z2 836248/052	03-10-04	Conducted Emissions
EMI Receiver	Agilent	85462A 3942A00517	03-10-04	Conducted Emissions
RF Filter Section	Agilent	85460A 3704A00481	03-10-04	Conducted Emissions

APPENDIX 1

CONDUCTED EMISSIONS TEST DATA/PLOTS

Report No. RIM-0041-0305-02 Test Date: June 02, 2003

Conducted Emissions Test Results

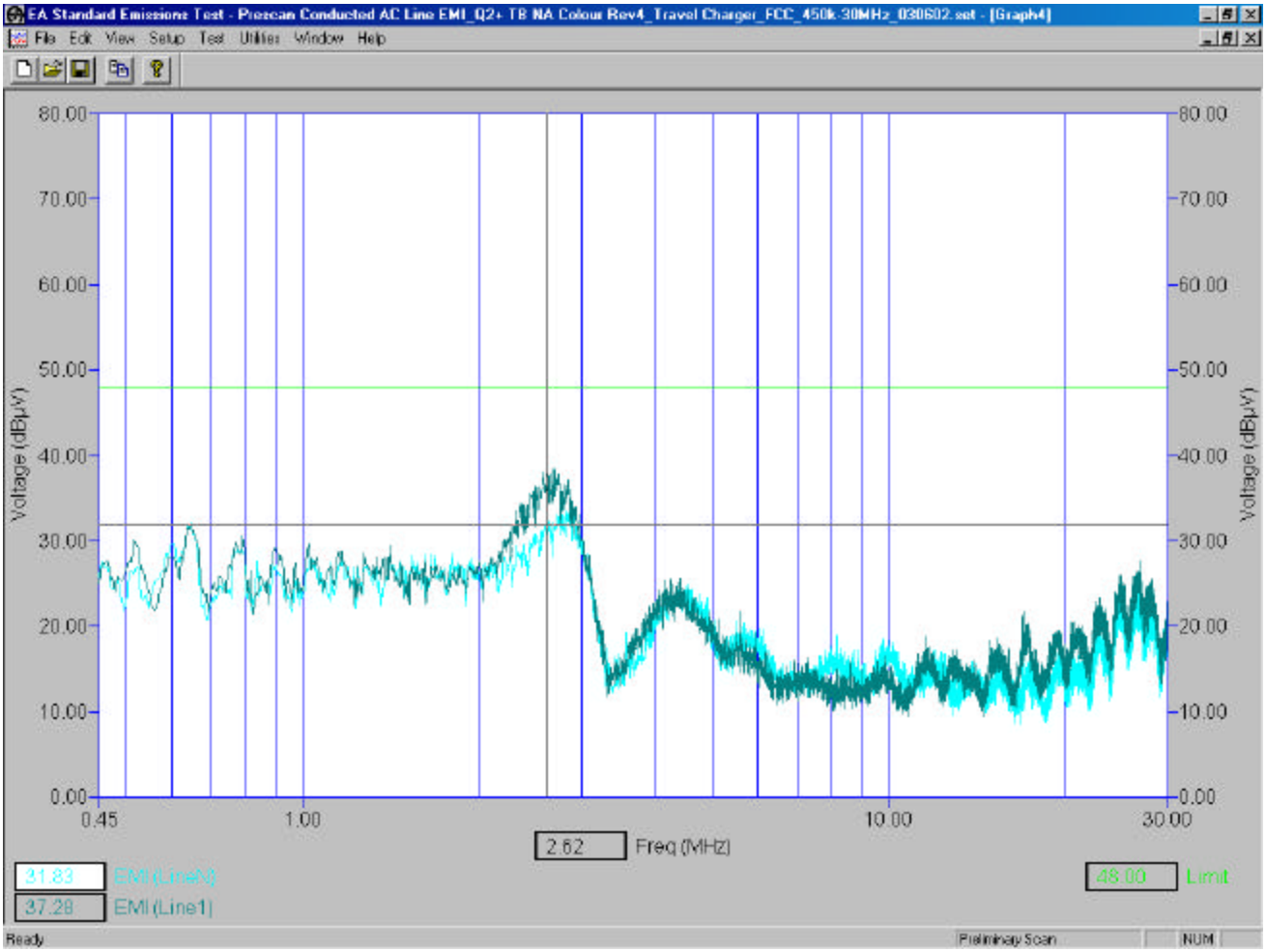
FCC CFR 47 Part 15, Subpart B, Class B June 02, 2003

Operating Mode: The Travel Charger was connected to the Handheld in battery charge mode. The ac input to the Travel Charger was 120 volts, 60 Hz.

Frequency (MHz)	Line	READING Quasi-Peak (dBµV)	Correction Factors for Impulse Limiter, LISN, Cable (dB)	QP Level (reading + Corr.Factor) (dB)	Limit (dBµV)	Margin (dB)
0.517	L1	17.22	9.78	27.00	48.0	-21.00
0.638	N	20.60	9.79	30.39	48.0	-17.61
0.640	L1	20.21	9.79	30.00	48.0	-18.00
0.783	N	17.00	9.81	26.81	48.0	-21.19
0.790	L1	16.66	9.81	26.47	48.0	-21.53
1.808	N	13.77	9.83	23.60	48.0	-24.40
2.273	N	14.15	9.86	24.01	48.0	-23.99
2.488	L1	22.18	9.88	32.06	48.0	-15.94
2.635	N	18.58	9.89	28.47	48.0	-19.53
2.676	L1	22.24	9.90	32.14	48.0	-15.86
2.825	N	18.84	9.90	28.74	48.0	-19.26
2.847	L1	21.80	9.90	31.70	48.0	16.30

All other emission levels had a test margin of greater than 25 dB.

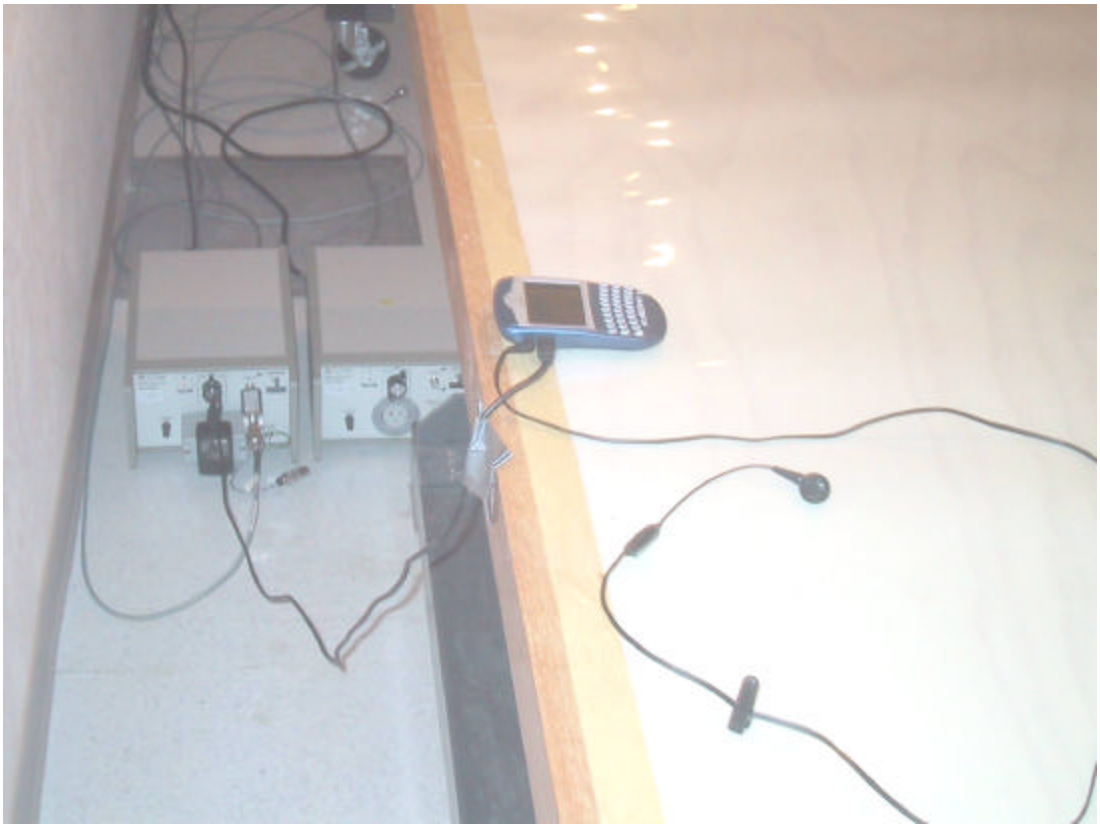
Conducted Emissions Test Graph



The Travel Charger was connected to the Handheld in battery charge mode. The ac input to the Travel Charger was 120 volts, 60 Hz.

Conducted Emission Test-Setup Photo

FCC CFR 47 Part 15, Subpart B, Class B



APPENDIX 2

RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B June 02, 2003

Operating Mode: The Handheld was connected to the Travel Charger. The Handheld was operating in battery charging mode. The Headset was connected to the Handheld.

Test Distance was 3.0 metres.

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factors for preamp/antenna/cables/ filter (dB/m)	Field Strength Level (reading+corr.) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
42.606	H	2.75	0	Q.P.	45.18	-21.14	24.04	40.0	-15.96
43.441	V	1.41	156	Q.P.	58.93	-21.29	37.64	40.0	-2.36
43.506	H	3.34	289	Q.P.	48.21	-21.36	26.85	40.0	-13.15
72.079	V	1.47	46	Q.P.	54.07	-21.00	33.07	40.0	-6.93
82.402	V	1.92	219	Q.P.	50.67	-20.68	29.99	40.0	-10.01
156.008	H	2.01	51	Q.P.	56.36	-18.52	37.84	43.5	-5.66
166.272	H	1.73	52	Q.P.	50.84	-18.59	32.25	43.5	-11.25
169.006	H	1.61	52	Q.P.	50.61	-18.61	32.00	43.5	-11.50
208.009	H	1.29	164	Q.P.	43.91	-15.60	28.31	43.5	-15.19

All other emission levels had a test margin of greater than 25 dB.

Radiated Emissions Test Results con't

FCC CFR 47 Part 15, Subpart B, Class B June 02, 2003

Operating Mode: The Handheld was connected to the support PC via the USB data cable for charging and data link.

Test Distance was 3.0 metres.

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factors for preamp/antenna/cables/ filter (dB/m)	Field Strength Level (reading+corr.) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
74.762	V	1.46	0	Q.P.	45.46	-20.81	24.65	40.0	-15.35
156.000	H	2.10	32	Q.P.	58.58	-18.52	40.06	43.5	-3.44
162.481	H	2.00	8	Q.P.	53.56	-18.57	34.99	43.5	-8.51
165.756	H	1.59	47	Q.P.	51.06	-18.58	32.48	43.5	-11.02
165.790	V	2.42	200	Q.P.	42.40	-18.58	23.62	43.5	-19.88
207.982	H	3.17	150	Q.P.	48.74	-15.60	33.14	43.5	-10.36
500.861	V	1.39	176	Q.P.	41.68	-8.31	33.37	46.0	-12.63
601.038	H	1.82	190	Q.P.	42.30	-5.68	36.62	46.0	-9.38
604.133	V	2.46	0	Q.P.	29.05	-5.68	23.37	46.0	-22.63
604.148		1.43	0	Q.P.	36.03	-5.68	30.35	46.0	-15.65
901.266	V	2.04	149	Q.P.	31.55	-1.40	30.15	46.0	-15.85
960.122	V	1.85	277	Q.P.	37.48	-0.04	37.44	46.0	-16.56

Radiated Emissions Test Results con't

The measurements were performed with the handheld in standalone upright position.

Test Distance was 3.0 metres. GSM850 Band June 02, 2003

Type	Channel	Frequency	Antenna		Reading	Corrected Reading	Limit	Diff. To Limit
		(MHz)	Type	Pol	(dBuV)	(dBuV)	(dBuv/m)	(dB)
GSM850 BAND (Local Oscillator) Receive RF Local Oscillator (LO) Tx/Rx mode **Low Channel**								
F0	128	1272.20	Horn	V	NF	NF	54	
F0	128	1272.20	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen. **Middle Channel**								
F0	195	1284.60	Horn	V	NF	NF	54	
F0	195	1284.60	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen. **High Channel**								
F0	251	1296.80	Horn	V	NF	NF	54	
F0	251	1296.80	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen.								

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)
GSM850 BAND (Local Oscillator) Transmit RF Local Oscillator (LO) Tx/Rx mode **Low Channel**								
F0	128	1738.20	Horn	V	NF	NF	54	
F0	128	1738.20	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen.								
Middle Channel								
F0	195	1763.00	Horn	V	NF	NF	54	
F0	195	1763.00	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen.								
High Channel								
F0	251	1787.40	Horn	V	NF	NF	54	
F0	251	1787.40	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen.								

Type	Channel	Frequency	Antenna		Reading	Corrected Reading	Limit	Diff. To Limit
		(MHz)	Type	Pol	(dBuV)	(dBuV)	(dBuv/m)	(dB)
GSM850 BAND IF Local Oscillator (Tx/Rx mode @ middle Channel 195, 837.6 MHz)								
F0		896.0	Dipole	V	27.30	26.76	46	-19.24
F0		896.0	Dipole	H	23.80	23.26		
The LO was measured up to the 5th harmonic. No Emissions could be seen above the fundamental frequency.								

Radiated Emissions Test Data con't

Test Distance was 3.0 metres. PCS Band June 02, 2003

Type	Channel	Frequency	Antenna		Reading	Corrected Reading	Limit	Diff. To Limit
		(MHz)	Type	Pol	(dBuV)	(dBuV)	(dBuv/m)	(dB)
PCS BAND (Local Oscillator) Receive RF Local Oscillator (LO) Tx/Rx mode **Low Channel**								
F0	512	1930.10	Horn	V	NF	NF	54	
F0	512	1930.10	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen. **Middle Channel**								
F0	661	1959.90	Horn	V	NF	NF	54	
F0	661	1959.90	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen. **High Channel**								
F0	810	1989.70	Horn	V	NF	NF	54	
F0	810	1989.70	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen.								

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) Tx/Rx mode **Low Channel**								
F0	512	1423.20	Horn	V	NF	NF	54	
F0	512	1423.20	Horn	H	30.50	30.25		-23.75
The LO was measured up to the 5th harmonic. No Emissions could be seen above the fundamental frequency.								
Middle Channel								
F0	661	1453.00	Horn	V	NF	NF	54	
F0	661	1453.00	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen.								
High Channel								
F0	810	1482.80	Horn	V	NF	NF	54	
F0	810	1482.80	Horn	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen.								

Type	Channel	Frequency	Antenna		Reading	Corrected Reading	Limit	Diff. To Limit
		(MHz)	Type	Pol	(dBuV)	(dBuV)	(dBuv/m)	(dB)
IF Local Oscillator (Tx/Rx mode @ middle Channel 661, 1880 MHz)								
F0		854.00	Dipole	V	34.7	33.76	46	-12.24
F0		854.00	Dipole	H	NF			
The LO was measured up to the 5th harmonic. No Emissions could be seen above the fundamental frequency.								

Radiated Emissions Test Photo