EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 15, Subpart B
&
Industry Canada (IC), ICES-003

A division of Research In Motion Limited

REPORT NO.: RTS-2604-1106-133B

PRODUCT MODEL NO.: RDR61CW, RDZ21CW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARDR60CW, L6ARDZ20CW
IC: 2503A-RDR60CW, 2503A-RDZ20CW

DATE: August 03, 2011

Statement of Performance:

The BlackBerry® smartphone, model RDR61CW, part number CER-41454-001 Rev. 4 and accessories when configured and operated per RIM's operation instructions, and performs within the requirements of the test standards.

The BlackBerry® smartphone, model RDZ21CW, part number CER-39236-001 Rev. 1 and accessories when configured and operated per RIM's operation instructions, and performs within the requirements of the test standards.

Declaration:

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

Documented by:

Shuo Wang
Regulatory Compliance Specialist
Date: August 03, 2011

Reviewed by:

Heng Lin
Regulatory Compliance Specialist
Date: August 03, 2011

Reviewed and Approved by:

Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: August 03, 2011

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A. Scope

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

- FCC CFR 47 Part 15, Subpart B, October, 2010 Class B Digital Devices, Unintentional Radiators
- IC ICES-003 Issue 4, February 2004, Class B Digital Devices, Unintentional Radiators

B. Associated Documents

1) BlackBerrySystemSimilarity_RDR61CW-RDZ21CW

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 EMI test facilities

305 Phillip Street	440 Phillip Street
Waterloo, Ontario	Waterloo, Ontario
Canada, N2L 3W8	Canada, N2L 5R9
Phone: 519 888 7465	Phone: 519 888 7465
Fax: 519 888 6906	Fax: 519 888 6906

The testing was performed from June 16 to July 26, 2011.

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN	Software
1	RDR61CW	CER-41454-001 Rev 4	32EFD957	V7.0.0.100 Bundle 848
2	RDR61CW	CER-41454-001 Rev 4	32EFD941	V7.0.0.100 Bundle 848
3	RDZ21CW	CER-39236-001 Rev 1	32F66A21	V7.0.0.238 Bundle 1292

AC conducted testing was performed on sample 1.
Radiated Emissions testing was performed on sample 2 and 3.

Only the characteristics that may have been affected by the changes from model RDR61CW to RDZ21CW were re-tested. For more information, see BlackBerrySystemSimilarity_RDR61CW-RDZ21CW.

BlackBerry® smartphone Accessories Tested

1) Fixed Blade Charger Rev.1, part number HDW-24481-001 (model number RIM-C-0004ADUUS-001), with an output current of 750mA and voltage of 5.0 volts dc.
2) Alt. Fixed Blade Charger Rev.2, part number HDW-24481-001 (model number RIM-C-0004ADUUS-001 with an output current of 750mA and voltage of 5.0 volts dc.
3) Alt.1 Fixed Blade Charger part number HDW-24481-001 (model number PSM04A-050QRIM) with an output current of 750mA and voltage of 5.0 volts dc.
4) Captive Cable Charger, part number HDW-17957-003 with an output voltage of 5.0 volts dc, 750 mA.
5) Premium Stereo Headset, part number HDW-15766-005, 1.3 meters long.
6) Stereo Headset, part number HDW-24529-001, with a lead length of 1.1 meters.
7) Alt. Stereo Headset, part number HDW-24529-001, with a lead length of 1.1 meters.
8) Straight Jack Stereo Headset, part number HDW-24529-004, with a lead length of 1.1 meters.
9) Bluetooth Headset part number HDW-25937-001.
10) USB Data Cable, part number HDW-06610-005, 1.5 meters long.
11) USB Data Cable, part number HDW-06619-009, 1.0 meters long.
12) USB Data Cable, part number HDW-06610-013, 0.3 meters long.
13) USB Data Cable, part number HDW-28109-003, 1.2 meters long.
14) USB Data Y-Cale, part number HDW-19137-002.

D. Support Equipment Used for the Testing of the EUT

1) IBM Thinkpad Lenovo T60p laptop, type 8742-C2U, product ID 8742C2U

E. Summary of Results

SPECIFICATION		TEST TYPE	Meets Requirement	Test Data APPENDIX
FCC CFR 47	IC			
Part 15, Subpart B	ICES-003	Conducted AC Line Emission	Yes	1
Part 15, Subpart B	ICES-003	Radiated Unintentional Spurious Emissions	Yes	2

a) AC CONDUCTED EMISSIONS

The conducted emissions were measured 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 an EMI receiver system with characteristics that duplicate those of the receiver specified in CISPR Publication 16. BlackBerry® smartphone was in battery charging mode. The input voltage was 120 V, 60 Hz.

The following test configurations were measured for model RDR61CW:

Test Configuration	Operating Mode(s)	Charger + Accessories
1	GSM 850 Idle, Audio Playback	Fixed Blade Charger Premium Stereo Headset 1.5m USB cable
2	GSM1900 Idle, Video Playback	Alt. Fixed Blade Charger Alt. Stereo Headset 1.2m USB Cable
3	CDMA Cellular Idle	Fixed Blade Charger Bluetooth Headset 1.2m USB Cable
4	CDMA PCS Idle	Alt.1 Fixed Blade Charger Stereo Headset USB Y-Cable

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 7.49 dB below the QP limit at 0.524 MHz using the quasi-peak detector, Test Configuration 1.

Measurement Uncertainty ±3.0 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 styrofoam table, 80 cm high that was positioned on a remote controlled 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. Then 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 5.0 GHz. Both the horizontal and vertical polarizations of the emissions were measured.
The measurements were done in a semi-anechoic chamber. The FCC registration number is **778487** and the Industry Canada(IC) file number is **2503B-1**. The EUT was configured and operated to produce the maximum radiated emissions while still keeping within RIM's specifications.
The BlackBerry® smartphone was in battery charging mode for all configurations. The ac input voltage was 120V, 60Hz.

The following test configurations were measured for model RDR61CW:

Test Configuration	Operating Mode(s)	Charger + Accessories
1	Bluetooth, Tx	Alt. Fixed Blade Charger + 1.0m USB Cable + Bluetooth Headset + USB Y-Cable
2	802.11b Tx	Alt. 1 Fixed Blade Charger + 0.3m USB Cable+ Alt. 1 Stereo Headset
3	GSM 850 Idle	Fixed Blade Charger + 1.5m USB Cable + Premium Stereo Headset
4	CDMA PCS Idle	Fixed Blade Charger + 1.2m USB Cable + Premium Stereo Headset
5	CDMA CELL Idle	Fixed Blade Charger + 0.3m USB Cable + Premium Stereo Headset
6	PCS 1900 Idle	Captive Cable Charger + Stereo Headset

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

The system met the requirements with a worst case emission test margin of 10.20 dB at 52.85MHz using quasi-peak detector in Test Configuration 5.

The following test configurations were measured for model RDZ21CW:

Test Configuration	Operating Mode(s)	Charger + Accessories
7	CDMA CELL Idle	Fixed Blade Charger + 0.3m USB Cable + Premium Stereo Headset
8	PCS 1900 Idle	Captive Cable Charger + Stereo Headset

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

The system met the requirements with a worst case emission test margin of 7.67 dB at 51.50MHz using quasi-peak detector in Test Configuration 7.

To view the test data see APPENDIX 2.

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 ±4.6 dB

F. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	11-11-14	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	11-09-13	Radiated Emissions
EMC Analyzer	Rohde & Schwarz	ESIB 40	3942A00517	11-11-28	Radiated Emissions
Digital Multimeter	Hewlett Packard	34401A	US36042324	11-10-28	Conducted/Radiated Emissions
T/RH Meter	OMEGA	iTHX-SD	0380561	11-10-13	Radiated Emission
T/RH Meter	OMEGA	iTHX-SD	0380567	11-10-13	Radiated Emission
L.I.S.N.	Rohde & Schwarz	ENV216	100060	11-12-10	Conducted Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017401	12-01-14	Radiated Emissions
Horn Antenna	EMC Automation	HRN-0118	030101	12-07-20	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	11-09-23	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	112394	11-11-29	Radiated/Conducted Emissions
EMI Test Receiver	Rohde & Schwarz	ESU 40	100162	11-10-30	Radiated/Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT	100368	11-11-27	Radiated Emissions
Bluetooth Tester	Rohde & Schwarz	CBT	100370	11-11-29	Radiated/Conducted Emissions

APPENDIX 1 - AC CONDUCTED EMISSIONS TEST DATA

AC Conducted Emissions Test Results

The following test configurations were measured for model RDR61CW.

The following tests were performed by Savtej Sandhu.

Test Configuration 1

Date of the test: July 26, 2011
The environmental conditions were: Temperature: 25.2 °C
Humidity: 42.0 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.150	N	43.46	11.23	54.70	66.00	56.00	-11.30
0.155	L1	43.96	11.17	55.13	65.80	55.80	-10.67
0.159	N	42.17	11.17	53.34	65.50	55.50	-12.16
0.164	L1	42.85	11.11	53.96	65.30	55.30	-11.34
0.168	N	40.98	11.11	52.09	65.10	55.10	-13.01
0.177	L1	41.18	11.02	52.20	64.60	54.60	-12.40
0.191	N	38.84	10.95	49.79	64.00	54.00	-14.21
0.200	L1	38.88	10.86	49.74	63.60	53.60	-13.86
0.209	L1	37.96	10.80	48.76	63.30	53.30	-14.54
0.227	N	36.01	10.69	46.71	62.60	52.60	-15.89
0.236	N	34.82	10.63	45.46	62.30	52.30	-16.84
0.254	L1	33.85	10.48	44.34	61.60	51.60	-17.26
0.290	N	30.52	10.25	40.77	60.50	50.50	-19.73
0.308	L1	29.69	10.15	39.84	60.00	50.00	-20.16
0.317	L1	28.79	10.14	38.93	59.80	49.80	-20.87
0.524	L1	38.61	9.90	48.51	56.00	46.00	**-7.49**
0.533	N	34.68	9.90	44.58	56.00	46.00	-11.43
0.542	N	35.27	9.89	45.16	56.00	46.00	-10.84
0.987	N	32.14	9.81	41.95	56.00	46.00	-14.05
1.118	L1	33.25	9.80	43.05	56.00	46.00	-12.95
1.532	L1	31.07	9.80	40.87	56.00	46.00	-15.13

AC Conducted Emissions Test Results

Test Configuration 1 cont'd

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
1.824	N	28.41	9.82	38.23	56.00	46.00	-17.77
2.499	L1	29.05	9.85	38.90	56.00	46.00	-17.10
2.508	N	27.41	9.85	37.26	56.00	46.00	-18.74
3.647	N	24.10	9.90	34.00	56.00	46.00	-22.00
3.822	L1	25.19	9.90	35.09	56.00	46.00	-20.91
10.140	L1	25.80	9.97	35.77	60.00	50.00	-24.23
11.045	L1	27.73	9.98	37.71	60.00	50.00	-22.29

AC Conducted Emissions Test Results

Test Configuration 1 cont'd

Frequency (MHz)	Line	Reading (AVG) (dBµV)	Correction Factor (dB)	Corrected Reading (AVG) (dBµV)	Limit (AV) (dBµV)	Margin (AVG) Limits (dB)
0.150	N	22.42	11.23	33.66	46.00	-22.34
0.227	N	18.28	10.69	28.97	42.60	-23.63
0.524	L1	25.69	9.90	35.59	36.00	-10.42
0.533	N	21.08	9.90	30.98	36.00	-15.02
0.542	N	18.77	9.89	28.66	36.00	-17.34
0.987	N	16.82	9.81	26.63	36.00	-19.37
1.118	L1	20.03	9.80	29.84	36.00	-16.16
1.532	L1	18.37	9.80	28.18	36.00	-17.82
1.824	N	15.04	9.82	24.86	36.00	-21.14
2.499	L1	17.96	9.85	27.81	36.00	-18.19
2.508	N	13.84	9.85	23.69	36.00	-22.31
3.647	N	11.97	9.90	21.87	36.00	-24.13
3.822	L1	15.06	9.90	24.96	36.00	-21.04
10.140	L1	15.33	9.97	25.30	40.00	-24.70
11.045	L1	17.49	9.98	27.48	40.00	-22.52

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak and average detectors. See figure 1-1 and figure 1-2 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

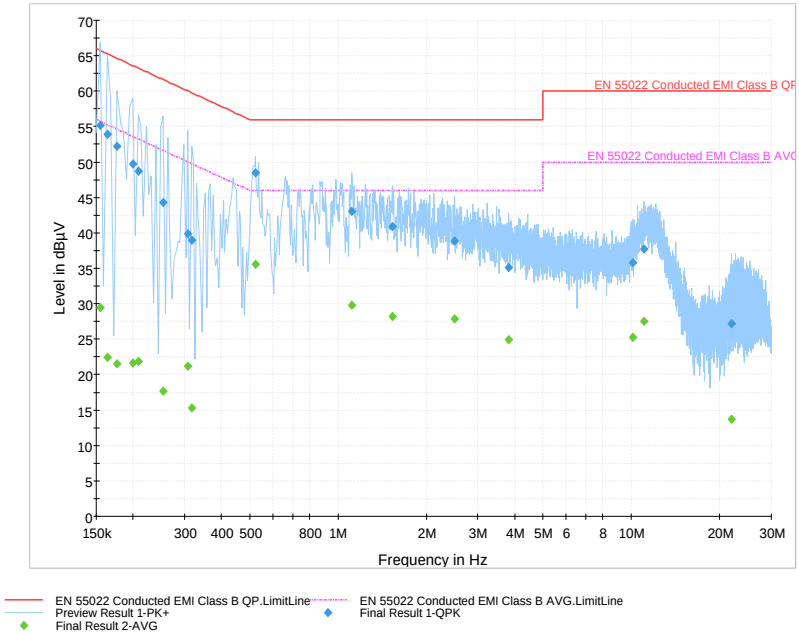
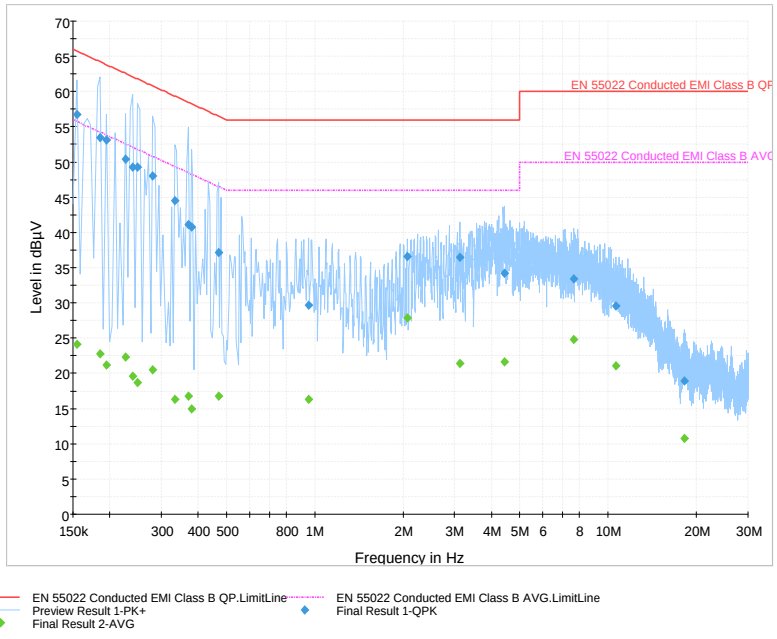


Figure 1-2: N Lines



AC Conducted Emissions Test Results cont'd

The following tests were performed by Savtej Sandhu.

Test Configuration 2

Date of the test: July 26, 2011
The environmental conditions were: Temperature: 25.2 °C
Humidity: 42.0 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.150	N	46.07	11.23	57.30	66.00	56.00	-8.70
0.155	L1	46.55	11.17	57.73	65.80	55.80	-8.08
0.164	N	45.21	11.14	56.35	65.30	55.30	-8.95
0.173	0	44.25	11.08	55.33	64.80	54.80	-9.47
0.177	L1	45.15	11.02	56.16	64.60	54.60	-8.44
0.186	L1	44.60	10.95	55.55	64.20	54.20	-8.65
0.200	L1	43.47	10.86	54.33	63.60	53.60	-9.27
0.204	N	41.96	10.85	52.81	63.40	53.40	-10.59
0.213	N	41.01	10.79	51.81	63.10	53.10	-11.30
0.227	N	40.06	10.69	50.76	62.60	52.60	-11.84
0.231	L1	41.29	10.64	51.93	62.40	52.40	-10.47
0.245	L1	40.04	10.55	50.59	61.90	51.90	-11.32
0.254	L1	39.30	10.48	49.78	61.60	51.60	-11.82
0.263	N	38.74	10.44	49.18	61.40	51.40	-12.22
0.272	N	38.01	10.38	48.39	61.10	51.10	-12.71
0.281	N	37.55	10.31	47.86	60.80	50.80	-12.94
0.285	L1	37.53	10.26	47.79	60.70	50.70	-12.91
0.344	L1	34.79	10.10	44.88	59.10	49.10	-14.22
0.353	L1	33.59	10.08	43.67	58.90	48.90	-15.23
0.371	N	31.42	10.07	41.49	58.50	48.50	-17.01
0.438	N	27.84	9.96	37.80	57.10	47.10	-19.30
0.443	L1	29.60	9.95	39.55	57.00	47.00	-17.46

AC Conducted Emissions Test Results

Test Configuration 2 cont'd

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.942	N	29.32	9.81	39.13	56.00	46.00	-16.87
1.014	L1	24.21	9.80	34.01	56.00	46.00	-21.99
1.271	L1	29.19	9.80	38.99	56.00	46.00	-17.01
1.410	N	24.33	9.81	34.13	56.00	46.00	-21.87
2.391	L1	27.88	9.84	37.72	56.00	46.00	-18.28
3.179	N	25.32	9.89	35.20	56.00	46.00	-20.80
4.164	L1	30.96	9.90	40.86	56.00	46.00	-15.14
4.178	N	26.25	9.91	36.16	56.00	46.00	-19.84
6.176	L1	26.42	9.92	36.35	60.00	50.00	-23.65

AC Conducted Emissions Test Results

Test Configuration 2 cont'd

Frequency (MHz)	Line	Reading (AVG) (dBµV)	Correction Factor (dB)	Corrected Reading (AVG) (dBµV)	Limit (AVG) (dBµV)	Margin (AVG) Limits (dB)
0.164	N	19.17	11.14	30.31	45.30	-24.99
0.245	L1	17.39	10.55	27.94	41.90	-23.96
0.344	L1	23.20	10.10	33.30	39.10	-15.81
0.353	L1	26.03	10.08	36.11	38.90	-12.79
0.443	L1	17.93	9.95	27.88	37.00	-19.12
0.942	N	15.51	9.81	25.32	36.00	-20.68
1.014	L1	17.28	9.80	27.08	36.00	-18.92
1.271	L1	22.74	9.80	32.55	36.00	-13.45
2.391	L1	21.77	9.84	31.61	36.00	-14.39
3.179	N	11.55	9.89	21.44	36.00	-24.56
4.164	L1	23.11	9.90	33.01	36.00	-12.99
4.178	N	16.84	9.91	26.75	36.00	-19.25
6.176	L1	18.54	9.92	28.46	40.00	-21.54

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak and average detectors. See figure 1-3 and figure 1-4 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

AC Conducted Emissions Test Graphs

Test Configuration 2

Figure 1-3: L1 lines

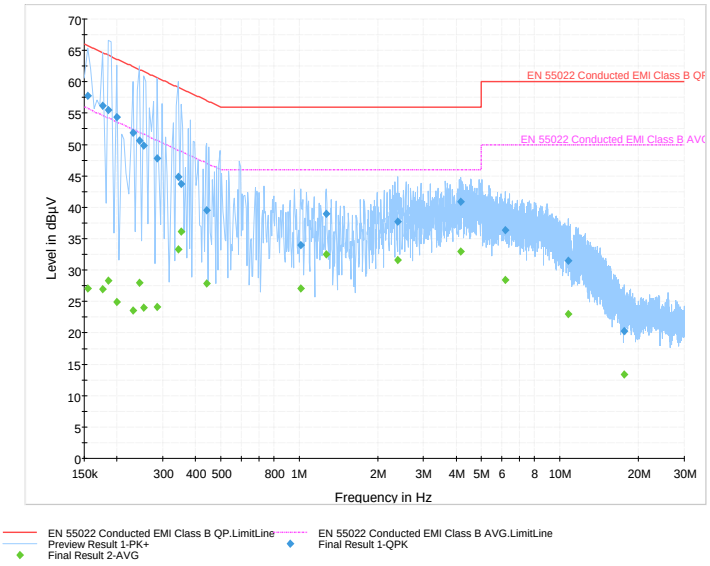
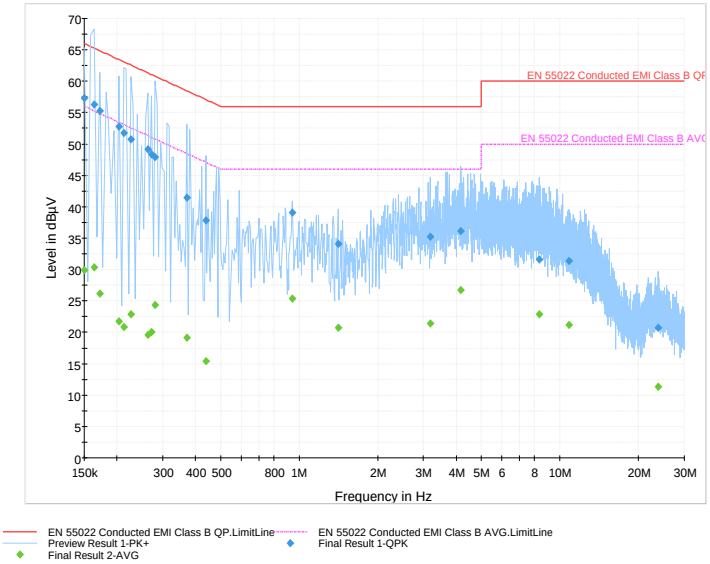


Figure 1-4: N Lines



AC Conducted Emissions Test Results cont'd

The following tests were performed by Savtej Sandhu.

Test Configuration 3

Date of the test: July 26, 2011
The environmental conditions were: Temperature: 25.2 °C
Humidity: 42.0%

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.150	L1	46.63	11.20	57.84	66.00	56.00	-8.17
0.155	N	43.19	11.20	54.39	65.80	55.80	-11.41
0.168	N	42.01	11.11	53.12	65.10	55.10	-11.98
0.173	L1	42.77	11.05	53.82	64.80	54.80	-10.98
0.182	L1	42.12	10.99	53.11	64.40	54.40	-11.29
0.191	L1	41.13	10.92	52.05	64.00	54.00	-11.95
0.191	N	40.09	10.95	51.04	64.00	54.00	-12.96
0.200	N	39.01	10.89	49.89	63.60	53.60	-13.71
0.213	L1	39.18	10.77	49.94	63.10	53.10	-13.16
0.227	L1	38.35	10.67	49.02	62.60	52.60	-13.58
0.236	N	35.79	10.63	46.43	62.30	52.30	-15.87
0.245	N	35.00	10.57	45.57	61.90	51.90	-16.33
0.254	N	34.16	10.50	44.67	61.60	51.60	-16.94
0.272	L1	34.35	10.36	44.71	61.10	51.10	-16.40
0.281	L1	34.01	10.29	44.31	60.80	50.80	-16.49
0.290	N	31.44	10.25	41.68	60.50	50.50	-18.82
0.380	L1	29.04	10.04	39.08	58.30	48.30	-19.22
0.533	N	34.71	9.90	44.61	56.00	46.00	-11.39
0.551	L1	32.96	9.88	42.84	56.00	46.00	-13.16
0.681	N	33.13	9.84	42.98	56.00	46.00	-13.02
0.888	L1	32.41	9.81	42.22	56.00	46.00	-13.78
0.987	N	30.45	9.81	40.26	56.00	46.00	-15.74
1.266	L1	30.73	9.80	40.53	56.00	46.00	-15.47

AC Conducted Emissions Test Results

Test Configuration 3 cont'd

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
1.617	N	27.86	9.82	37.67	56.00	46.00	-18.33
2.531	L1	26.87	9.85	36.72	56.00	46.00	-19.28
2.576	N	24.99	9.86	34.85	56.00	46.00	-21.15
4.079	N	24.22	9.90	34.13	56.00	46.00	-21.87
4.641	L1	24.58	9.90	34.48	56.00	46.00	-21.52
12.089	L1	27.47	10.03	37.49	60.00	50.00	-22.51

AC Conducted Emissions Test Results

Test Configuration 3 cont'd

Frequency (MHz)	Line	Reading (AVG) (dBµV)	Correction Factor (dB)	Corrected Reading (AVG) (dBµV)	Limit (AVG) (dBµV)	Margin (AVG) Limits (dB)
0.150	L1	24.81	11.20	36.02	46.00	-19.98
0.227	L1	21.00	10.67	31.67	42.60	-20.93
0.380	L1	14.40	10.04	24.44	38.30	-23.86
0.533	N	21.51	9.90	31.41	36.00	-14.59
0.551	L1	18.62	9.88	28.50	36.00	-17.50
0.681	N	18.02	9.84	27.86	36.00	-18.14
0.888	L1	20.60	9.81	30.41	36.00	-15.59
0.987	N	15.98	9.81	25.79	36.00	-20.21
1.266	L1	18.57	9.80	28.37	36.00	-17.63
1.617	N	14.43	9.82	24.24	36.00	-21.76
2.531	L1	16.78	9.85	26.63	36.00	-19.37
2.576	N	13.07	9.86	22.93	36.00	-23.07
4.079	N	11.95	9.90	21.85	36.00	-24.15
4.641	L1	14.02	9.90	23.92	36.00	-22.08
12.089	L1	17.29	10.03	27.32	40.00	-22.68

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak and average detectors.
See figure 1-5 and figure 1-6 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

AC Conducted Emissions Test Graphs

Test Configuration 3

Figure 1-5: L1 lines

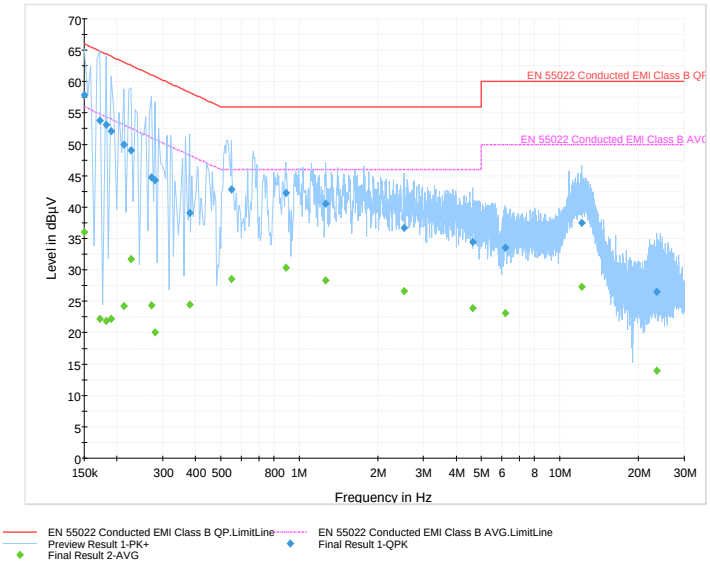
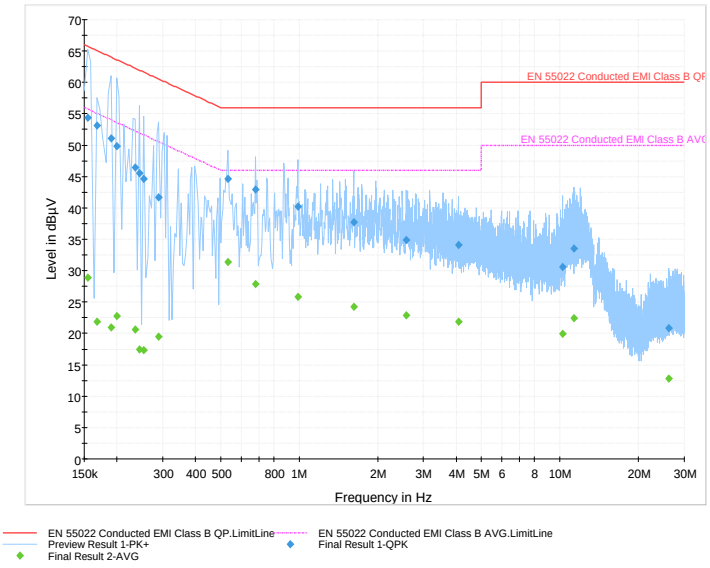


Figure 1-6: N Lines



AC Conducted Emissions Test Results cont'd

Test Configuration 4

The following tests were performed by Savtej Sandhu.

Date of the test: July 26, 2011
The environmental conditions were: Temperature: 25.2 °C
Humidity: 42.0 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.150	L1	34.05	11.20	45.26	66.00	56.00	-20.74
0.155	N	29.86	11.20	41.07	65.80	55.80	-24.73
0.168	L1	31.14	11.08	42.22	65.10	55.10	-22.88
0.177	L1	29.77	11.02	40.78	64.60	54.60	-23.82
0.362	L1	27.03	10.07	37.10	58.70	48.70	-21.60
0.411	L1	25.67	9.99	35.66	57.60	47.60	-21.94
0.618	L1	24.10	9.85	33.95	56.00	46.00	-22.05
0.834	L1	24.36	9.82	34.17	56.00	46.00	-21.83
2.049	L1	22.06	9.83	31.89	56.00	46.00	-24.11
2.364	L1	24.34	9.84	34.18	56.00	46.00	-21.82
2.810	L1	24.49	9.87	34.36	56.00	46.00	-21.64
3.305	L1	24.06	9.89	33.95	56.00	46.00	-22.05
3.467	N	21.79	9.89	31.68	56.00	46.00	-24.32
3.552	L1	24.59	9.89	34.48	56.00	46.00	-21.52
4.250	N	23.99	9.91	33.90	56.00	46.00	-22.10
4.295	L1	25.43	9.90	35.33	56.00	46.00	-20.67

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak and the average detector.
See figure 1-7 and figure 1-8 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

AC Conducted Emissions Test Graphs

Test Configuration 4

Figure 1-7: L1 lines

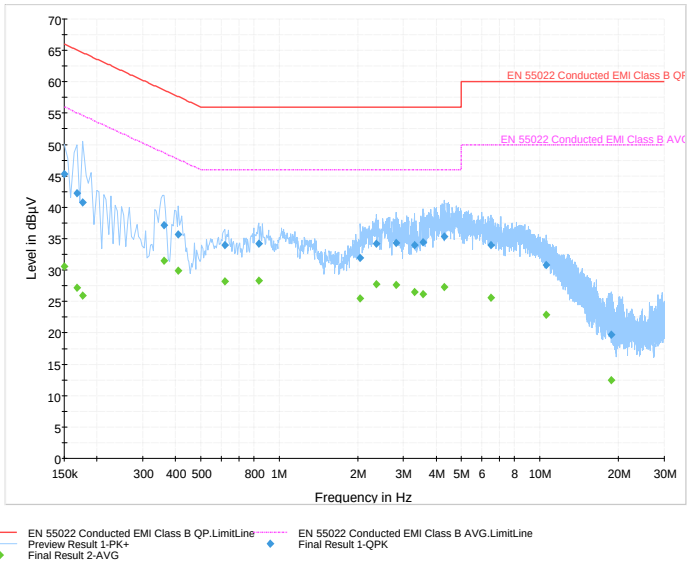
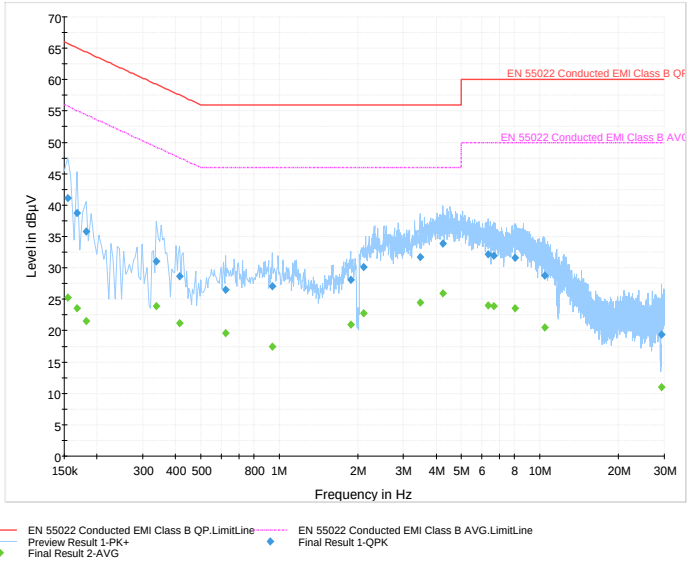


Figure 1-8: N Lines



APPENDIX 2 - RADIATED EMISSIONS TEST DATA (RDR61CW)

Radiated Emissions Test Results

The following test configuration was measured for model RDR61CW.

The following tests were performed by Quan Ma

Test Configuration 1

Date of the test: June 16, 2011
The environmental conditions were: Temperature: 25.1 °C
Humidity: 32.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
40.650	V	1.40	354.00	Q.P.	30.75	-15.61	15.14	40.00	-24.86
43.850	V	1.40	354.00	Q.P.	41.01	-16.34	24.67	40.00	-15.33
52.200	H	3.63	189.00	Q.P.	23.81	-17.31	6.50	40.00	-33.50
52.350	V	1.40	354.00	Q.P.	32.64	-17.31	15.33	40.00	-24.67
870.700	H	3.38	194.00	Q.P.	23.23	6.39	29.62	46.00	-16.38

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

Radiated Emissions Test Results cont'd

Test Configuration 2

Date of the test: June 17, 2011
The environmental conditions were: Temperature: 25.1 °C
Humidity: 32.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
42.900	V	1.40	320.00	Q.P.	39.32	-16.15	23.17	40.00	-16.83
52.900	V	1.40	354.00	Q.P.	42.33	-17.30	25.03	40.00	-14.97
79.000	H	3.99	354.00	Q.P.	34.23	-15.25	18.98	40.00	-21.02
87.450	V	1.40	342.00	Q.P.	38.59	-14.50	24.09	40.00	-15.91
635.150	H	1.00	142.00	Q.P.	24.06	0.55	24.61	46.00	-21.39
769.850	V	3.16	94.00	Q.P.	21.28	4.56	25.84	46.00	-20.16
797.750	H	1.03	287.00	Q.P.	21.78	3.98	25.76	46.00	-20.24

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

Radiated Emissions Test Results cont'd

Test Configuration 3

Date of the test: June 16, 2011
The environmental conditions were: Temperature: 25.1 °C
Humidity: 32.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading +corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
40.750	V	1.40	270.00	Q.P.	40.64	-15.63	25.01	40.00	-14.99
51.250	H	3.98	6.00	Q.P.	34.95	-17.24	17.71	40.00	-22.29
52.000	V	1.40	83.00	Q.P.	42.00	-17.31	24.69	40.00	-15.31
63.800	H	1.00	336.00	Q.P.	33.64	-16.94	16.70	40.00	-23.30

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

Radiated Emissions Test Results cont'd

Test Configuration 4

Date of the test: June 16, 2011
The environmental conditions were: Temperature: 25.1 °C
Humidity: 32.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading +corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
42.850	V	1.40	293.00	Q.P.	43.39	-16.14	27.25	40.00	-12.75
53.950	V	1.40	39.00	Q.P.	39.16	-17.48	21.68	40.00	-18.32
63.300	H	1.00	325.00	Q.P.	34.29	-16.96	17.33	40.00	-22.67
65.700	V	1.40	354.00	Q.P.	41.22	-16.79	24.43	40.00	-15.57
85.000	V	1.40	32.00	Q.P.	37.46	-14.71	22.75	40.00	-17.25

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

Radiated Emissions Test Results cont'd

Test Configuration 5

Date of the test: June 17, 2011
The environmental conditions were: Temperature: 25.1 °C
Humidity: 32.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
40.750	V	1.37	320.00	Q.P.	43.91	-15.63	28.28	40.00	-11.72
40.950	H	3.23	354.00	Q.P.	33.35	-15.67	17.68	40.00	-22.32
52.850	V	1.40	29.00	Q.P.	47.10	-17.30	29.80	40.00	**-10.20**
74.350	H	2.14	188.00	Q.P.	38.56	-15.83	22.73	40.00	-17.27
78.100	V	2.41	354.00	Q.P.	34.62	-15.36	19.26	40.00	-20.74
122.350	H	2.65	163.00	Q.P.	31.56	-12.21	19.35	43.50	-24.15
651.850	H	1.17	292.00	Q.P.	29.23	1.43	30.66	46.00	-15.34
749.500	V	1.40	274.00	Q.P.	23.89	4.02	27.91	46.00	-18.09
814.950	V	1.97	330.00	Q.P.	28.73	4.40	33.13	46.00	-12.87

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

Radiated Emissions Test Results cont'd

Test Configuration 6

Date of the test: June 17, 2011
The environmental conditions were: Temperature: 25.1 °C
Humidity: 32.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
41.750	V	1.40	167.00	Q.P.	45.44	-15.90	29.54	40.00	-10.46
42.350	H	3.33	7.00	Q.P.	33.03	-16.04	16.99	40.00	-23.01
63.050	H	1.00	330.00	Q.P.	35.75	-16.97	18.78	40.00	-21.22
65.950	V	1.40	354.00	Q.P.	38.03	-16.82	21.21	40.00	-18.79
86.100	V	1.40	354.00	Q.P.	31.40	-14.60	16.80	40.00	-23.20

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

Radiated Emissions Test Results cont'd

The following test configuration was measured for model RDZ21CW.

The following tests were performed by Ven Olis

Test Configuration 7

Date of the test: July 26, 2011
The environmental conditions were: Temperature: 23.9 °C
Humidity: 43.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading +corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
40.350	V	1.40	159.00	Q.P.	31.90	-15.56	16.34	40.00	-23.66
49.900	H	3.30	354.00	Q.P.	34.14	-17.19	16.95	40.00	-23.05
51.500	V	1.40	108.00	Q.P.	49.59	-17.26	32.33	40.00	**-7.67**
75.250	V	1.87	112.00	Q.P.	35.80	-15.69	20.11	40.00	-19.89
76.300	H	2.09	5.00	Q.P.	33.91	-15.59	18.32	40.00	-21.68

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

Radiated Emissions Test Results cont'd

Test Configuration 8

Date of the test: July 26, 2011
The environmental conditions were: Temperature: 23.9 °C
Humidity: 43.3 %

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading +corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
38.650	V	2.59	183.00	Q.P.	34.81	-15.10	19.71	40.00	-20.29
48.400	V	3.58	138.00	Q.P.	36.25	-16.96	19.29	40.00	-20.71
48.900	H	3.31	6.00	Q.P.	32.70	-17.01	15.69	40.00	-24.31
67.200	V	1.40	89.00	Q.P.	39.03	-16.59	22.44	40.00	-17.56
94.200	V	1.40	104.00	Q.P.	38.24	-13.70	24.54	43.50	-18.96

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