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Report Reference ID:	155793-3TRFWL
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Test specification:	Title 47 - Telecommunication Chapter I - Federal Communications Commission Subchapter A - General Part 15 - Radio Frequency Devices Subpart C - Intentional Radiators §15.247 - Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz
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Applicant:	BelAir Networks Inc. 603 March Road, Ottawa, ON, Canada K2K 2M5
Apparatus:	DRU 5 GHz radio
Model number:	B5CH114AA
FCC ID:	RAR30005002

Testing laboratory:	Nemko Canada Inc. 303 River Road Ottawa, ON, Canada K1V 1H2 Telephone: (613) 737-9680 Facsimile: (613) 737-9691
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	Name and title	Date
Tested by:	David Duchesne, Wireless/EMC Specialist	December 7, 2010
Reviewed by:	 Richard Brazeau, Laboratory Manager	December 8, 2010



Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada.
The tests included in this report are within the scope of this accreditation.

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Section 1: Report summary

1.1 Test specification

FCC Part 15 Subpart C, 15.247

Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz.

1.2 Statement of compliance

In the configuration tested the EUT was found compliant

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Canada Inc. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003.

See “Summary of test results” for full details.

1.3 Exclusions

None

1.4 Registration number

Test site FCC ID number: 176392 (3 m Semi anechoic chamber)

1.5 Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

1.6 Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 2: Summary of test results

2.1 FCC Part 15 Subpart C – Intentional Radiators, test results

General requirements for FCC Part 15

Part	Test description	Verdict
§15.31(e)	Variation of power source	See Notes 1
§15.31(m)	Number of operating frequencies	See Notes 2
§15.203	Antenna requirement	See Notes 3
§15.207(a)	Conducted limits	Pass

Specific requirements for FCC Part 15 Subpart C, 15.247

Part	Test description	Verdict
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	N/A
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	N/A
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	N/A
§15.247(a)(2)	Minimum 6 dB bandwidth for systems using digital modulation techniques	Pass
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	N/A
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	N/A
§15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	Pass
§15.247(b)(4)	Maximum peak output power	Pass
§15.247(c)(1)	Operation with directional antenna gains greater than 6 dBi	Pass
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	N/A
§15.247(d)	Spurious emissions	Pass
§15.247(e)	Power spectral density for digitally modulated devices	Pass
§15.247(f)	Time of occupancy for hybrid systems	N/A

Notes:

1. Transmit output power was measured while supply voltage was varied from 102 to 138 VAC (85 to 115 % of the nominal rated supply voltage). No change in transmit output power was observed
2. The frequency range over which the device operates is greater than 10 MHz. Tests were performed on three operating channels. (low, mid and high)
3. This requirement does not apply to intentional radiators that must be professionally installed.

Section 3: Equipment under test (EUT) and application details

3.1 Product details

Product name:	DRU 5 GHz radio
Model name/number:	B5CH114AA
Serial number:	A000141488
Equipment class:	DTS

3.2 Sample information

Receipt date:	August 17, 2010
Nemko sample ID number:	Item # 1

3.3 EUT technical specifications

Operating band:	5725 – 5850 MHz
Operating frequency:	5740 – 5835 MHz
Modulation type:	802.11 a, and n
Occupied bandwidth:	20 MHz and 40MHz
Antenna data:	Antenna 1. 7 dBi, Model # BMAG00287 A Antenna 2. 10 dBi, Model # BNISH002-B B02 Antenna 3. 15 dBi, Model # BMDG30083-A01 Antenna 4. 16 dBi, Model # BNCKG0081 Antenna 5. 19 dBi, Model # BNCKG0082 Antenna 6. 22 dBi, Model # BNCKG0017 Antenna 1 is an omni directional Antenna 2, 3, and 4 are directional antenna that can be used for point-to-point (P2P) operations and point to multi point (P2MP) Antenna 5 and 6 are directional antennas used exclusively for point-to-point (P2P) operations.
Power source:	120/60Hz VAC

3.4 EUT description

The EUT is a MIMO combo WiFi module designed to operate in the 2.4–2.4835 GHz band, and 5.725–5.85 GHz band, 2×2 MIMO for 2.4 GHz, and 2×2 MIMO for 5 GHz.

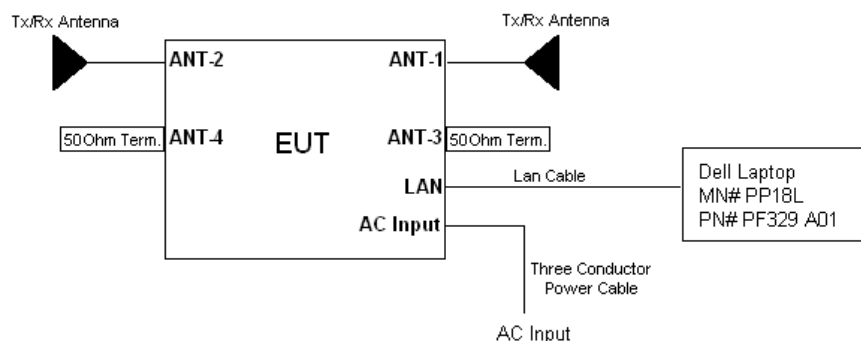
There are two independent radio units. This report covers the 5 GHz radio.

3.5 Operation of the EUT during testing

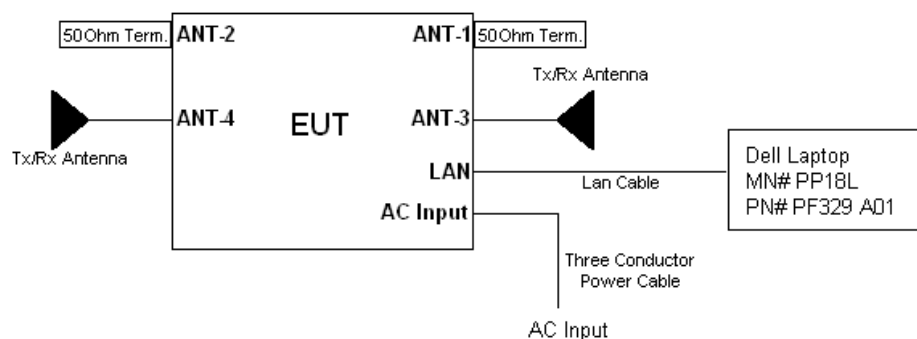
The EUT was controlled to transmit at desired frequency from laptop.

3.6 EUT setup diagram

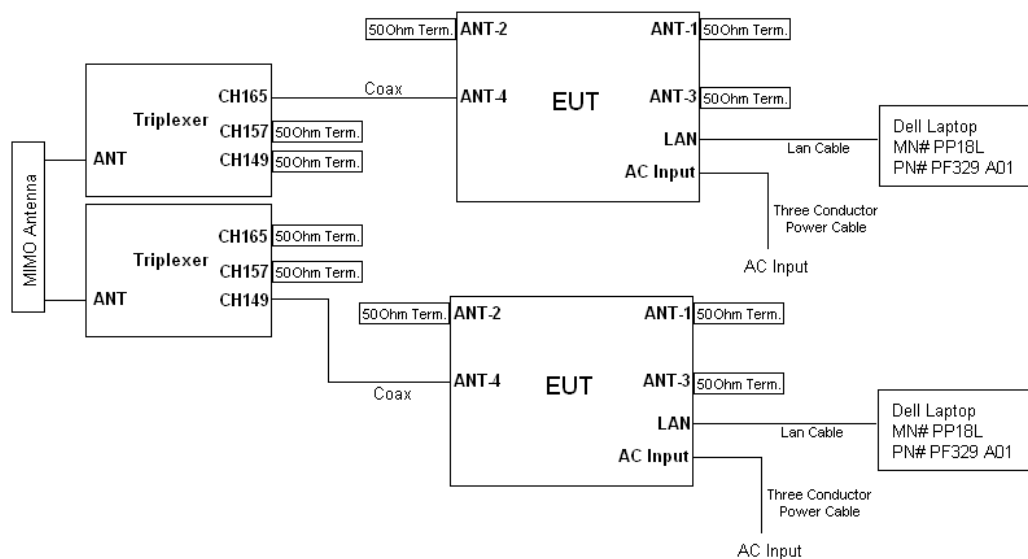
Dual-band omni antenna setup



Directional antenna setup



Directional antenna setup with triplexer



Note: This is only a representative configuration.

Section 4: Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

Section 5: Test conditions

5.1 Power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions

Temperature: 15–30 °C
 Relative humidity: 20–75 %
 Air pressure: 86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Section 6: Measurement uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko Canada document MU-003.

Section 7: Test equipment

7.1 Test equipment list

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
3 m EMI Test Chamber	TDK	SAC-3	FA002047	Mar. 09/11
Horn Antenna #2	EMCO	3115	FA000825	Jan. 18/11
Bilog	Sunol	JB3	FA002108	Jan. 18/11
1–18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 07/10
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Jan. 14/11
Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	Sept. 29/10
LISN	Rohde & Schwarz	ENV216	FA002023	Sept. 08/10
International Power Supply	California Inst.	3001i	FA001021	COU
Combiner	Mini-circuits	ZA3PD-4	FA001156	COU
Attenuator	Narda	776B-20	FA001153	COU
18–40 GHz Horn Antenna	EMCO	3116	FA001847	May 13/11
18–26 GHz Amplifier	NARDA	BBS-1826N612	FA001550	COU
26–40 GHz Amplifier	NARDA	DBL-2640N610	FA001556	COU
5725-5850 MHz Notch Filter	Microwave Circuits	N0257881	FA001921	COU
Note: N/A = Not applicable, NCR = No cal required, COU = Cal on use				

 Nemko Canada Inc., 303 River Rd. Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio	
	Test name: Clause 15.207(a) Conducted limits			
	Test date: August 27, 2010		Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C			

Section 8: Testing data

8.1 Clause 15.207(a) Conducted limits

§ 15.207 Conducted limits.

- (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

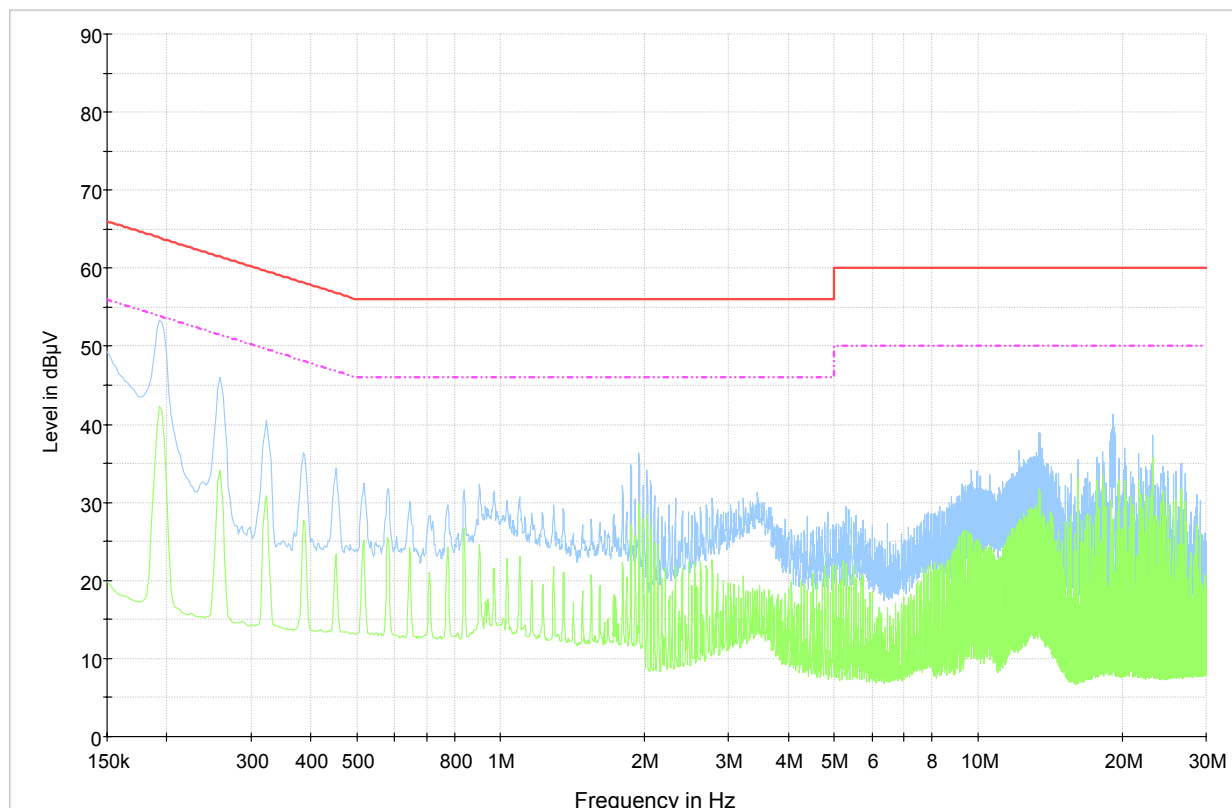
Frequency (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*-Decreases with the logarithm of the frequency.

Special notes

None

Test data



120VAC/60Hz, Phase
 — CISPR 22 Mains QP Class B Limit
 - - - CISPR 22 Mains AV Class B Limit
 — Preview Peak Detector
 — Preview Average Detector

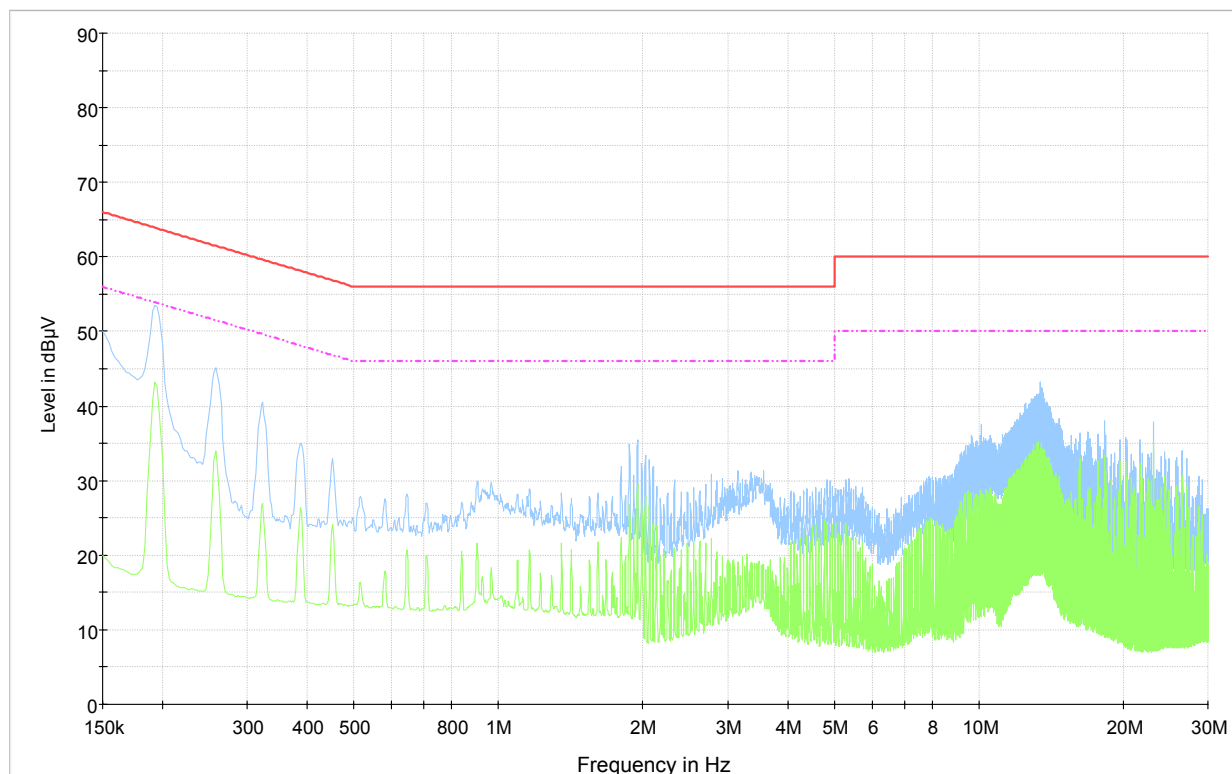
The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver/Spectrum analyzer settings:

Preview measurements	Final measurement
Receiver: 9 kHz RBW, Peak and Average detector, max hold	Receiver: 9 kHz RBW, Quasi-peak and Average detector
Measurement time 100 ms	

Test data, continued



120VAC/60Hz, Neutral
 — CISPR 22 Mains QP Class B Limit
 - - - CISPR 22 Mains AV Class B Limit
 — Preview Peak Detector
 — Preview Average Detector

The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

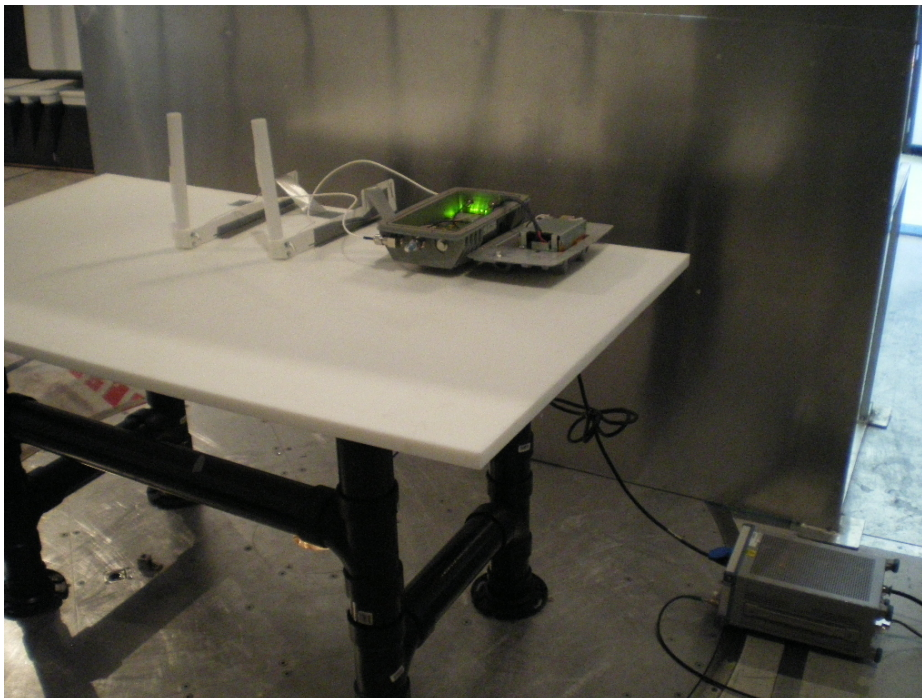
Receiver/Spectrum analyzer settings:

Preview measurements	Final measurement
Receiver: 9 kHz RBW, Peak and Average detector, max hold	Receiver: 9 kHz RBW, Quasi-peak and Average detector
Measurement time 100 ms	

 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio	
	Test name: Clause 15.207(a) Conducted limits			
	Test date: August 27, 2010		Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C			

Test data, continued

Setup photos



8.2 Clause 15.247(a)(2) Minimum 6 dB bandwidth for systems using digital modulation techniques

§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

- (a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
- (2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Special notes

None

Test data

20 MHz channel bandwidth

Modulation	Port	Frequency (MHz)	6 dB bandwidth (MHz)	Limit (MHz)
802.11n	ANT-4	5740	17.69	0.5
		5790	17.63	0.5
		5835	17.76	0.5
802.11a	ANT-4	5740	16.47	0.5
		5790	16.47	0.5
		5835	16.47	0.5
802.11n	ANT-2	5740	17.75	0.5
		5790	17.69	0.5
		5835	17.76	0.5
802.11a	ANT-2	5740	16.6	0.5
		5790	16.47	0.5
		5835	16.53	0.5

40 MHz channel bandwidth

Modulation	Port	Frequency (MHz)	6 dB bandwidth (MHz)	Limit (MHz)
802.11n	ANT-4	5750	36.67	0.5
		5790	36.54	0.5
		5825	36.67	0.5

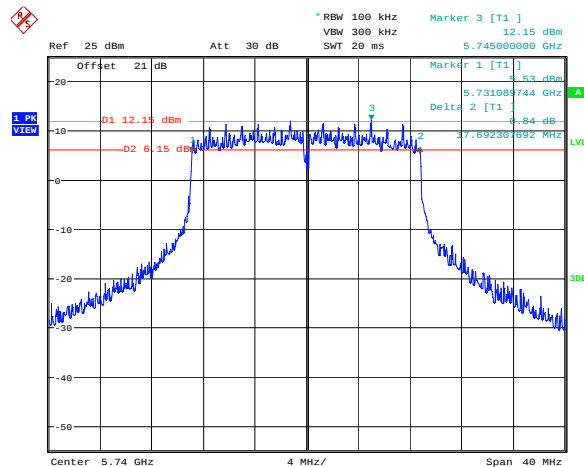
- A peak detector with 100 kHz RBW and 300 kHz VBW was used to perform measurement.
- The span was wider than 6 dB bandwidth.

Section 8: Testing data		Product: DRU 5 GHz radio	
Test name: Clause 15.247(a)(2) Minimum 6 dB bandwidth for systems using digital modulation techniques			
Test date: August 27, 2010		Test engineer: David Duchesne	Verdict: Pass
Specification: FCC Part 15 Subpart C			

Test data, continued

Sample spectral plots

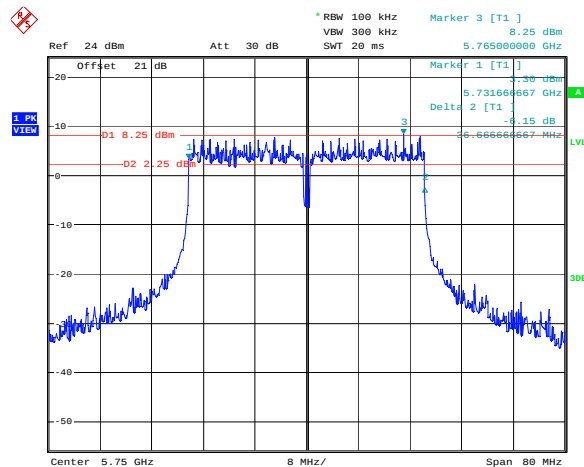
20 MHz Channel bandwidth



Date: 2.SEP.2010 10:34:49

Low channel – 802.11n

40 MHz Channel bandwidth



Date: 2.SEP.2010 13:50:57

Low channel – 802.11n

 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio
	Test name: Clause 15.247(b) (3) and (4) Maximum peak conducted output power and Clause 15.247(c) (1) Operation with directional antenna gains greater than 6 dBi		
	Test date: August 18, 2010	Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C		

8.3 Clause 15.247(b) (3) and (4) Maximum peak conducted output power and Clause 15.247(c) (1) Operation with directional antenna gains greater than 6 dBi

§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

- (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:
- (3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
 - (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
 - (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.
 - (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.
 - (iii) Fixed, point-to-point operation, as used in paragraphs (b)(3)(i) and (b)(3)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio
	Test name: Clause 15.247(b) (3) and (4) Maximum peak conducted output power and Clause 15.247(c) (1) Operation with directional antenna gains greater than 6 dBi		
	Test date: August 18, 2010	Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C		

§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

- (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.
- (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.
- (iii) Fixed, point-to-point operation, as used in paragraphs (c)(1)(i) and (c)(1)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

Special notes

- The output RF power was measured on the antenna port 1, 2, 3 and 4 by means of a spectrum analyzer and following the '*Power Output Option 2, Method 1*' procedure from the FCC guidelines for Measurement of Digital Transmission Systems operating under Section 15.247. The total output power equal to the summary of the output RF power was measured on the antenna port 1 and 2 or antenna port 3 and 4.
- The EUT was additionally tested with BelAir 5 GHz triplexer.

Section 8: Testing data
Product: DRU 5 GHz radio

Test name: Clause 15.247(b) (3) and (4) Maximum peak conducted output power and Clause 15.247(c) (1) Operation with directional antenna gains greater than 6 dBi

Test date: August 18, 2010

Test engineer: David Duchesne

Verdict: Pass

Specification: FCC Part 15 Subpart C

Test data
Omni antenna – 20 MHz channel bandwidth

Modulation	Freq. (MHz)	SW setting	Conducted Avg. power ANT 1 (mW)	Conducted Avg. power ANT 2 (mW)	Combined output power (dBm)	Conducted output power limit (dBm)	Conducted output power margin (dB)	Antenna gain (dBi)	Cable loss (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
802.11n	5740	26	126.996	118.043	23.89	29.50	5.61	7	0.5	30.39	36	5.61
	5790	31	307.101	173.607	26.82	29.50	2.68	7	0.5	33.32	36	2.68
	5835	26	115.304	107.223	23.47	29.50	6.03	7	0.5	29.97	36	6.03
802.11a	5740	26	120.652	111.293	23.65	29.50	5.85	7	0.5	30.15	36	5.85
	5790	31	316.401	176.743	26.93	29.50	2.57	7	0.5	33.43	36	2.57
	5835	26	119.471	109.182	23.59	29.50	5.91	7	0.5	30.09	36	5.91

- Output power limit = 30 dBm – ((antenna gain - cable loss) – 6 dBi) [for antennas greater than 6 dBi]
- Combined output power (dBm) = 10 Log (Conducted Avg. Power ANT-1 (mW) + Conducted Avg. Power ANT-2 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

Directional antennas (Point to Point P2P) – 20 MHz channel bandwidth

Modulation	Freq. (MHz)	SW setting	Conducted Avg. power ANT 3 (mW)	Conducted Avg. power ANT 4 (mW)	Combined output power (dBm)	Conducted output power limit (dBm)	Conducted output power margin (dB)	Antenna gain (dBi)	Cable loss (dB)	EIRP (dBm)
802.11n	5740	26	299.821	306.853	27.83	30	2.17	10	0.5	37.33
	5790	30	433.310	486.893	29.64	30	0.36	10	0.5	39.14
	5835	26	291.557	294.830	27.68	30	2.32	10	0.5	37.18
802.11a	5740	26	313.069	325.990	28.06	30	1.94	10	0.5	37.56
	5790	30	443.220	477.546	29.64	30	0.36	10	0.5	39.14
	5835	26	305.816	298.402	27.81	30	2.19	10	0.5	37.31
802.11n	5740	26	299.821	306.853	27.83	30	2.17	15	0.5	42.33
	5790	30	433.310	486.893	29.64	30	0.36	15	0.5	44.14
	5835	26	291.557	294.830	27.68	30	2.32	15	0.5	42.18
802.11a	5740	26	313.069	325.990	28.06	30	1.94	15	0.5	42.56
	5790	30	443.220	477.546	29.64	30	0.36	15	0.5	44.14
	5835	26	305.816	298.402	27.81	30	2.19	15	0.5	42.31
802.11n	5740	26	299.821	306.853	27.83	30	2.17	16	0.5	43.33
	5790	30	433.310	486.893	29.64	30	0.36	16	0.5	45.14
	5835	26	291.557	294.830	27.68	30	2.32	16	0.5	43.18
802.11a	5740	26	313.069	325.990	28.06	30	1.94	16	0.5	43.56
	5790	30	443.220	477.546	29.64	30	0.36	16	0.5	45.14
	5835	26	305.816	298.402	27.81	30	2.19	16	0.5	43.31
802.11n	5740	26	299.821	306.853	27.83	30	2.17	19	0.5	46.33
	5790	30	433.310	486.893	29.64	30	0.36	19	0.5	48.14
	5835	26	291.557	294.830	27.68	30	2.32	19	0.5	46.18
802.11a	5740	26	313.069	325.990	28.06	30	1.94	19	0.5	46.56
	5790	30	443.220	477.546	29.64	30	0.36	19	0.5	48.14
	5835	26	305.816	298.402	27.81	30	2.19	19	0.5	46.31
802.11n	5740	24	236.877	245.422	26.83	30	3.17	22	0.5	48.33
	5790	30	433.310	486.893	29.64	30	0.36	22	0.5	51.14
	5835	26	291.557	294.830	27.68	30	2.32	22	0.5	49.18
802.11a	5740	24	239.143	253.171	26.92	30	3.08	22	0.5	48.42
	5790	30	443.220	477.546	29.64	30	0.36	22	0.5	51.14
	5835	26	305.816	298.402	27.81	30	2.19	22	0.5	49.31

- Combined output power (dBm) = 10 Log (Conducted Avg. Power ANT- 3 (mW) + Conducted Avg. Power ANT- 4 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

Section 8: Testing data
Product: DRU 5 GHz radio

Test name: Clause 15.247(b) (3) and (4) Maximum peak conducted output power and Clause 15.247(c) (1) Operation with directional antenna gains greater than 6 dBi

Test date: August 18, 2010

Test engineer: David Duchesne

Verdict: Pass

Specification: FCC Part 15 Subpart C

Test data, continued
Directional antenna with triplexer (Point to Point P2P) – 20 MHz channel bandwidth

Modulation	Freq. (MHz)	SW setting	Conducted Avg. power ANT 3 (mW)	Conducted Avg. power ANT 4 (mW)	Combined output power (dBm)	Conducted output power limit (dBm)	Conducted output power margin (dB)	Antenna gain (dBi)	Cable loss (dB)	EIRP (dBm)
802.11n	5745	31	482.531	387.981	29.40	30	0.60	16	0.5	44.90
	5785	33	493.116	432.991	29.67	30	0.33	16	0.5	45.17
	5825	32	511.018	472.266	29.93	30	0.07	16	0.5	45.43
802.11a	5745	31	487.277	398.173	29.47	30	0.53	16	0.5	44.97
	5785	33	504.831	408.838	29.61	30	0.39	16	0.5	45.11
	5825	31	491.989	399.358	29.50	30	0.50	16	0.5	45.00

- Combined output power (dBm) = 10 Log (Conducted Avg. Power ANT- 3 (mW) + Conducted Avg. Power ANT- 4 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

Directional antenna (Point to Multi Point P2MP) – 20 MHz channel bandwidth

Modulation	Freq. (MHz)	SW setting	Conducted Avg. power ANT 3 (mW)	Conducted Avg. power ANT 4 (mW)	Combined output power (dBm)	Conducted output power limit (dBm)	Conducted output power margin (dB)	Antenna gain (dBi)	Cable loss (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
802.11n	5740	22	237.262	174.718	26.15	26.5	0.35	10	0.5	35.65	36	0.35
	5790	22	224.833	170.826	25.97	26.5	0.53	10	0.5	35.47	36	0.53
	5835	22	235.636	181.857	26.21	26.5	0.29	10	0.5	35.71	36	0.29
802.11a	5740	22	251.356	176.405	26.31	26.5	0.19	10	0.5	35.81	36	0.19
	5790	22	229.335	175.211	26.07	26.5	0.43	10	0.5	35.57	36	0.43
	5835	22	243.196	186.738	26.33	26.5	0.17	10	0.5	35.83	36	0.17
802.11n	5740	12	75.573	54.453	21.14	21.5	0.36	15	0.5	35.64	36	0.36
	5790	13	72.607	59.120	21.20	21.5	0.30	15	0.5	35.70	36	0.30
	5835	13	70.138	60.025	21.14	21.5	0.36	15	0.5	35.64	36	0.36
802.11a	5740	12	78.064	55.161	21.25	21.5	0.25	15	0.5	35.75	36	0.25
	5790	13	74.677	61.487	21.34	21.5	0.16	15	0.5	35.84	36	0.16
	5835	12	66.732	53.650	20.81	21.5	0.69	15	0.5	35.31	36	0.69
802.11n	5740	10	56.816	40.502	19.88	20.5	0.62	16	0.5	35.38	36	0.62
	5790	11	58.657	46.418	20.21	20.5	0.29	16	0.5	35.71	36	0.29
	5835	11	56.699	45.430	20.09	20.5	0.41	16	0.5	35.59	36	0.41
802.11a	5740	10	58.328	40.317	19.94	20.5	0.56	16	0.5	35.44	36	0.56
	5790	10	53.580	40.038	19.71	20.5	0.79	16	0.5	35.21	36	0.79
	5835	10	50.699	40.708	19.61	20.5	0.89	16	0.5	35.11	36	0.89

- Output power limit = 30 dBm – ((antenna gain - cable loss) – 6 dBi) [for antennas greater than 6 dBi]
- Combined output power (dBm) = 10 Log (Conducted Avg. Power ANT- 3 (mW) + Conducted Avg. Power ANT- 4 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

Directional antenna with triplexer (Point to Multi Point P2MP) – 20 MHz channel bandwidth

Modulation	Freq. (MHz)	SW setting	Conducted Avg. power ANT 3 (mW)	Conducted Avg. power ANT 4 (mW)	Combined output power (dBm)	Conducted output power limit (dBm)	Conducted output power margin (dB)	Antenna gain (dBi)	Cable loss (dB)	EIRP (dBm)	EIRP Limit (dBm)	EIRP Margin (dB)
802.11n	5745	12	57.505	41.652	19.96	20.5	0.54	16	0.5	35.46	36	0.54
	5785	13	53.864	43.376	19.88	20.5	0.62	16	0.5	35.38	36	0.62
	5825	13	58.618	48.353	20.29	20.5	0.21	16	0.5	35.79	36	0.21
802.11a	5745	12	58.087	41.393	19.98	20.5	0.52	16	0.5	35.48	36	0.52
	5785	13	55.310	45.553	20.04	20.5	0.46	16	0.5	35.54	36	0.46
	5825	13	62.082	49.523	20.48	20.5	0.02	16	0.5	35.98	36	0.02

- Output power limit = 30 dBm – ((antenna gain - cable loss) – 6 dBi) [for antennas greater than 6 dBi]
- Combined output power (dBm) = 10 Log (Conducted Avg. Power ANT- 3 (mW) + Conducted Avg. Power ANT- 4 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

Directional antenna (Point to Point P2P) – 40 MHz channel bandwidth

Modulation	Freq. (MHz)	SW setting	Conducted Avg. power ANT 3 (mW)	Conducted Avg. power ANT 4 (mW)	Combined output power (dBm)	Conducted output power limit (dBm)	Conducted output power margin (dB)	Antenna gain (dBi)	Cable loss (dB)	EIRP (dBm)
802.11n	5750	26	222.324	234.561	26.60	30	3.40	22	0.5	48.10
	5790	32	403.883	438.919	29.26	30	0.74	22	0.5	50.76
	5825	26	204.559	218.638	26.27	30	3.73	22	0.5	47.77

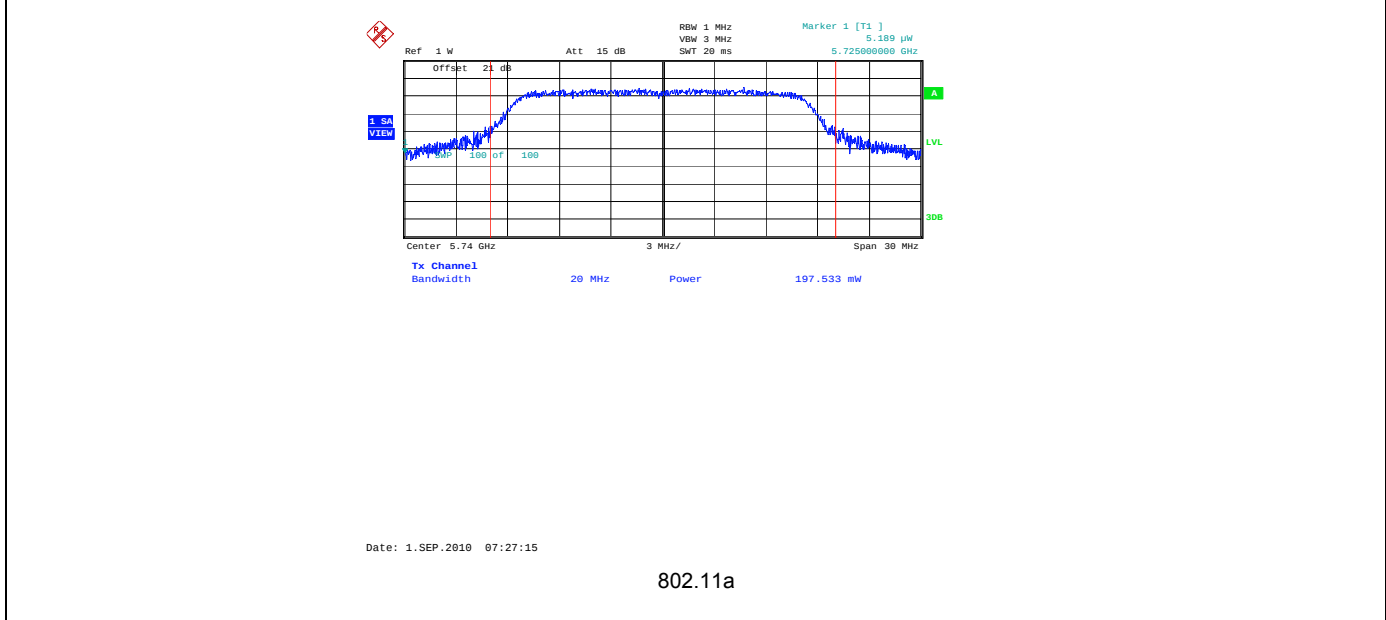
- Combined output power (dBm) = 10 Log (Conducted Avg. Power ANT- 3 (mW) + Conducted Avg. Power ANT- 4 (mW))
- EIRP (dBm) = Combined output power (dBm) + ((Antenna gain (dBi) - Cable loss (dB))

Section 8: Testing data		Product: DRU 5 GHz radio	
Test name: Clause 15.247(b) (3) and (4) Maximum peak conducted output power and Clause 15.247(c) (1) Operation with directional antenna gains greater than 6 dBi			
Test date: August 18, 2010		Test engineer: David Duchesne	Verdict: Pass
Specification: FCC Part 15 Subpart C			

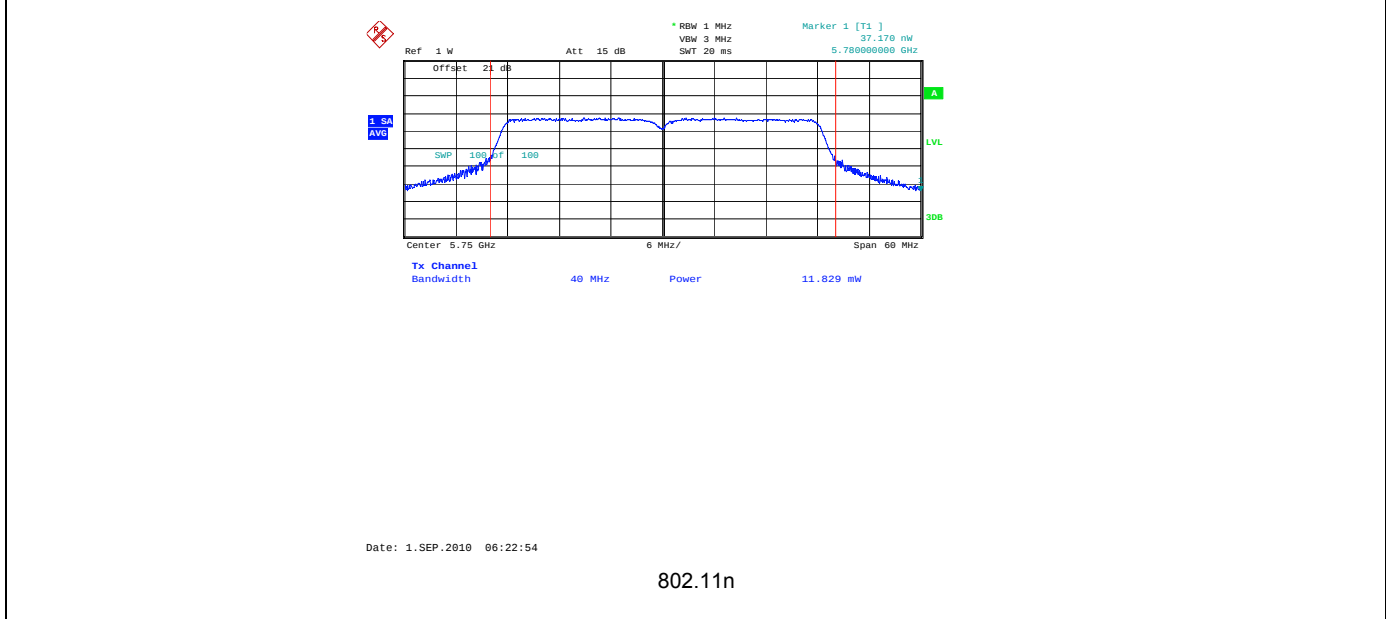
Test data, continued

Sample spectral plots

20 MHz Channel bandwidth



40 MHz Channel bandwidth



Special note: Measured value from sample plot does not reflect the worst case. Plot provided to show spectrum settings.

Section 8: Testing data		Product: DRU 5 GHz radio	
Test name: Clause 15.247(d) Spurious emissions			
Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
Specification: FCC Part 15 Subpart C			

8.4 Clause 15.247(d) Spurious emissions

§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

- (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Special notes

Conducted measurements

- The spectrum was searched from 30 MHz to 40 GHz for low, mid and high carrier frequencies.
- All measurements for spurious emissions were performed conducted using a spectrum analyzer with peak detector with 100 kHz/300 kHz RBW/VBW.
- Spurious emissions were measured individually on antenna port 1 and 2, and combined with antenna port 1 and 2 by using a RF combiner.
- Spurious emissions were measured individually on antenna port 3 and 4, and combined with antenna port 3 and 4 by using a RF combiner.
- Spurious emissions were measured at 5 GHz triplexer output.
- Spurious emissions were measured at triplexer output with multiple operating channels, This was achieved with multiple radio units.
- Only the worst-case test results are provided.
- There were no additional emissions or change in existing emissions when both the 2.4 GHz radio and 5 GHz radios operated simultaneously.

 Nemko Canada Inc., 303 River Rd. Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio	
	Test name: Clause 15.247(d) Spurious emissions			
	Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C			

Special notes, continued

Radiated measurements

§15.209 – Radiated emission limits

Frequency (MHz)	Field strength		Measurement distance (m)
	($\mu\text{V/m}$)	(dB $\mu\text{V/m}$)	
0.009–0.490	2400/F	67.6–20log(F)	300
0.490–1.705	24000/F	87.6–20log(F)	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes:

- F = fundamental frequency in kHz
- In the emission table above, the tighter limit applies at the band edges.
- For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

§15.205 – Restricted bands of operation

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

- The spectrum was searched from 30 MHz to 40 GHz for low, mid and high carrier frequencies.
- These results apply to emissions found in the restricted bands defined in FCC Part 15 Subpart C, 15.205.
- Peak detector with 100 kHz/300 kHz RBW/VBW was used for measurements below 1 GHz and 1 MHz/3 MHz RBW/VBW for frequencies above 1 GHz. Since EUT has 100 % duty cycle average measurements were performed at the frequencies above 1 GHz with 1 MHz/10 Hz RBW/VBW spectrum analyzer settings.
- Spurious emissions were measured with 5 GHz triplexer installed.
- Spurious emissions were measured with triplexer and multiple operating channels, This was achieved with multiple radio units.
- Only the worst-case test results are provided.

 Nemko Canada Inc., 303 River Rd. Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio	
	Test name: Clause 15.247(d) Spurious emissions			
	Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C			

Test data					
Conducted spurious emissions					
Sweep 30 MHz to 40 GHz – 20 MHz channel bandwidth					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 1	5740	802.11n	36.57	30	6.57
ANT 1	5740	802.11a	35.86	30	5.86
ANT 1	5790	802.11n	39.59	30	9.59
ANT 1	5790	802.11a	39.22	30	9.22
ANT 1	5835	802.11n	36.46	30	6.46
ANT 1	5835	802.11a	35.75	30	5.75
ANT 2	5740	802.11n	33.85	30	3.85
ANT 2	5740	802.11a	34.72	30	4.72
ANT 2	5790	802.11n	39.94	30	9.94
ANT 2	5790	802.11a	39.68	30	9.68
ANT 2	5835	802.11n	35.72	30	5.72
ANT 2	5835	802.11a	35.23	30	5.23
ANT 1 and ANT 2	5740	802.11n	30.16	30	0.16
ANT 1 and ANT 2	5740	802.11a	33.87	30	3.87
ANT 1 and ANT 2	5790	802.11n	37.4	30	7.4
ANT 1 and ANT 2	5790	802.11a	36.04	30	6.04
ANT 1 and ANT 2	5835	802.11n	34.63	30	4.63
ANT 1 and ANT 2	5835	802.11a	31.63	30	1.63
ANT 4	5740	802.11n	37.81	30	7.81
ANT 4	5740	802.11a	35.96	30	5.96
ANT 4	5790	802.11n	39.34	30	9.34
ANT 4	5790	802.11a	37.73	30	7.73
ANT 4	5835	802.11n	37.63	30	7.63
ANT 4	5835	802.11a	37	30	7
ANT 3	5740	802.11n	37.03	30	7.03
ANT 3	5740	802.11a	34.76	30	4.76
ANT 3	5790	802.11n	35.84	30	5.84
ANT 3	5790	802.11a	39.47	30	9.47
ANT 3	5835	802.11n	34.96	30	4.96
ANT 3	5835	802.11a	34.9	30	4.9
ANT 3 and ANT 4	5740	802.11n	31.87	30	1.87
ANT 3 and ANT 4	5740	802.11a	32.84	30	2.84
ANT 3 and ANT 4	5790	802.11n	37.26	30	7.26
ANT 3 and ANT 4	5790	802.11a	35.18	30	5.18
ANT 3 and ANT 4	5835	802.11n	32.58	30	2.58
ANT 3 and ANT 4	5835	802.11a	33.48	30	3.48
Sweep 30 MHz to 40 GHz – 40 MHz channel bandwidth					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 4	5750	802.11n	32.65	30	2.65
ANT 4	5790	802.11n	36.64	30	6.64
ANT 4	5825	802.11n	33.06	30	3.06
ANT 3	5750	802.11n	32.79	30	2.79
ANT 3	5790	802.11n	35.16	30	5.16
ANT 3	5825	802.11n	33.03	30	3.03
ANT 3 and ANT 4	5750	802.11n	30.78	30	0.78
ANT 3 and ANT 4	5790	802.11n	33.68	30	3.68
ANT 3 and ANT 4	5825	802.11n	30.3	30	0.3

Test data, continued

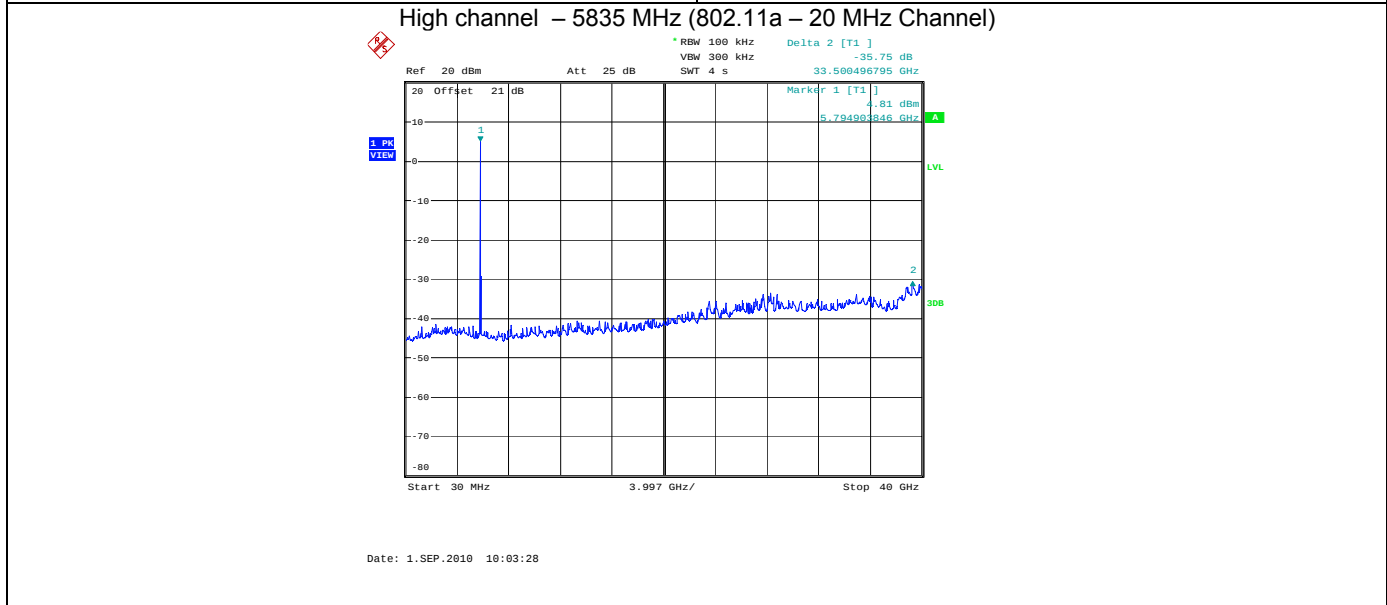
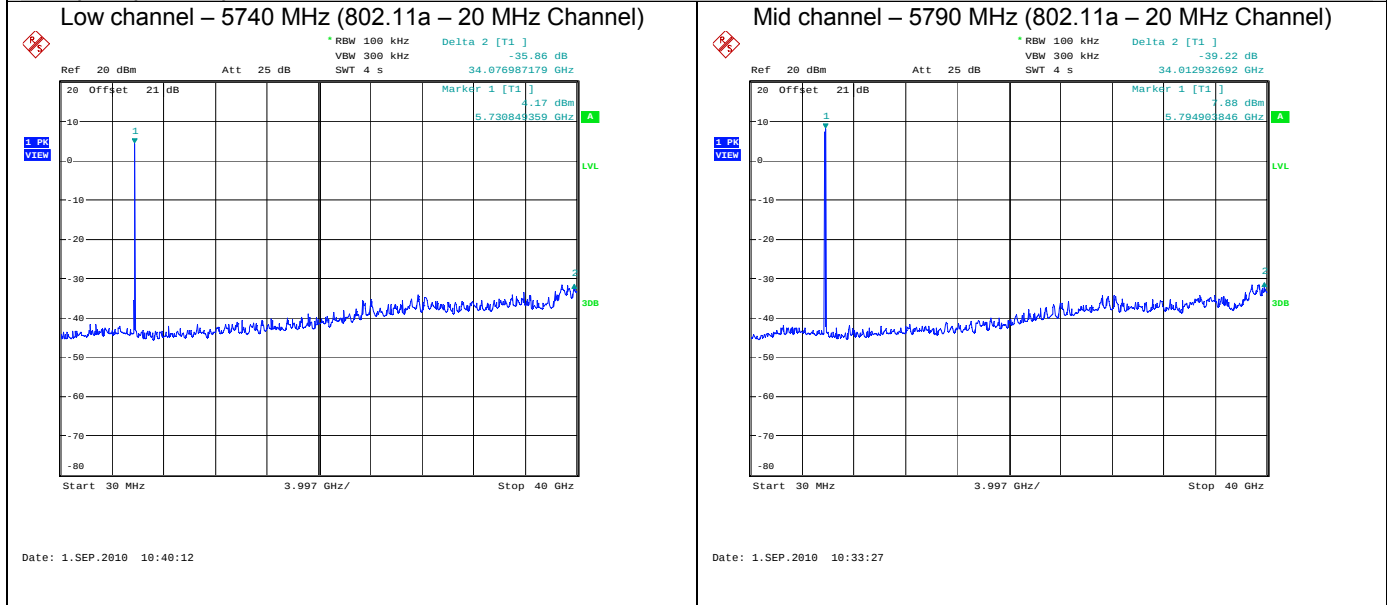
Conducted spurious emissions, continued

Sweep 30 MHz to 40 GHz – 20 MHz channel bandwidth with triplexer (co-channel transmission)

Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 4 and ATN 4	5825-5785	802.11n	37.14	30	7.14
ANT 4 and ATN 4	5825-5745	802.11n	38.5	30	8.5
ANT 4 and ATN 4	5785-5745	802.11n	37.25	30	7.25
ANT 4 and ATN 4	5825-5785	802.11a	35.39	30	5.39
ANT 4 and ATN 4	5825-5745	802.11a	39.2	30	9.2
ANT 4 and ATN 4	5785-5745	802.11a	37.04	30	7.04

Two radios were used to perform measurement.

Sample spectral plots



 Nemko Canada Inc., 303 River Rd. Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio	
	Test name: Clause 15.247(d) Spurious emissions			
	Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C			

Test data, continued					
Conducted spurious emissions, continued					
Lower band edge – 20 MHz channel bandwidth					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 1	5740	802.11n	34.03	30	4.03
ANT 1	5740	802.11a	33.54	30	3.54
ANT 2	5740	802.11n	33.64	30	3.64
ANT 2	5740	802.11a	32.5	30	2.5
ANT 1 and ANT 2	5740	802.11n	35.32	30	5.32
ANT 1 and ANT 2	5740	802.11a	35.36	30	5.36
ANT 4	5740	802.11n	33.21	30	3.21
ANT 4	5740	802.11a	32.16	30	2.16
ANT 3	5740	802.11n	33.01	30	3.01
ANT 3	5740	802.11a	35.2	30	5.2
ANT 3 and ANT 4	5740	802.11n	31.05	30	1.05
ANT 3 and ANT 4	5740	802.11a	34.29	30	4.29
Upper band edge – 20 MHz channel bandwidth					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 1	5835	802.11n	35.96	30	5.96
ANT 1	5835	802.11a	33.99	30	3.99
ANT 2	5835	802.11n	31.25	30	1.25
ANT 2	5835	802.11a	33.48	30	3.48
ANT 1 and ANT 2	5835	802.11n	34.96	30	4.96
ANT 1 and ANT 2	5835	802.11a	31.77	30	1.77
ANT 4	5835	802.11n	31.84	30	1.84
ANT 4	5835	802.11a	32.68	30	2.68
ANT 3	5835	802.11n	34.72	30	4.72
ANT 3	5835	802.11a	32.42	30	2.42
ANT 3 and ANT 4	5835	802.11n	35.01	30	5.01
ANT 3 and ANT 4	5835	802.11a	33.08	30	3.08
Lower band edge – 20 MHz channel bandwidth with triplexer					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 4	5745	802.11n	46.5	30	16.5
ANT 4	5745	802.11a	46.9	30	16.9
ANT 3	5745	802.11n	45.61	30	15.61
ANT 3	5745	802.11a	46.9	30	16.9
Upper band edge – 20 MHz channel bandwidth with triplexer					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 4	5825	802.11n	45.29	30	15.29
ANT 4	5825	802.11a	46.4	30	16.4
ANT 3	5825	802.11n	45.51	30	15.51
ANT 3	5825	802.11a	45.2	30	15.2
Lower band edge – 40 MHz channel bandwidth					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 4	5750	802.11n	30.63	30	0.63
ANT 3	5750	802.11n	33.17	30	3.17
ANT 3 and ANT 4	5750	802.11n	33.17	30	3.17
Upper band edge – 40 MHz channel bandwidth					
Port	Frequency (MHz)	Modulation	Below fundamental (dB)	Limit (dB)	Margin (dB)
ANT 4	5825	802.11n	30.52	30	0.52
ANT 3	5825	802.11n	32.9	30	2.9
ANT 3 and ANT 4	5825	802.11n	35.53	30	5.53

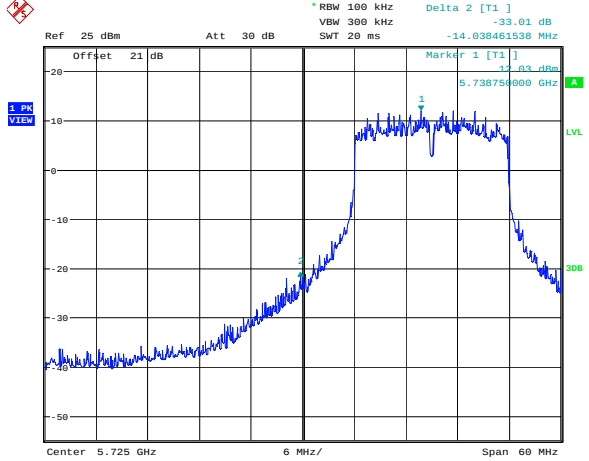
 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	Section 8: Testing data		Product: DRU 5 GHz radio	
	Test name: Clause 15.247(d) Spurious emissions			
	Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
	Specification: FCC Part 15 Subpart C			

Test data, continued

Conducted spurious emissions, continued

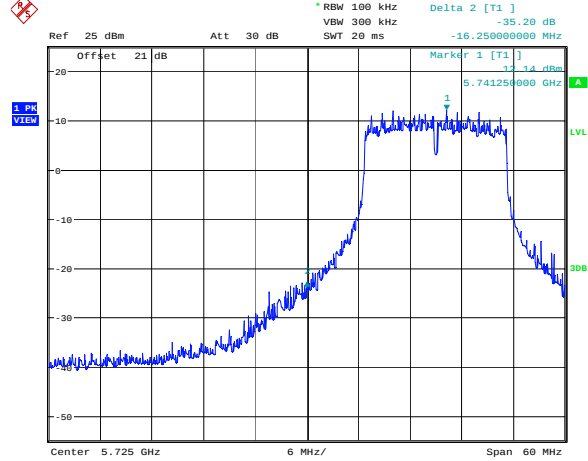
Sample spectral plots LBE

802.11n – 20 MHz Channel bandwidth



Date: 2.SEP.2010 12:40:30

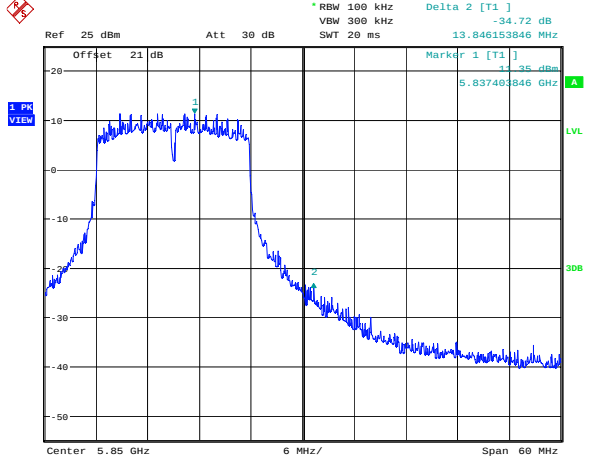
802.11a – 20 MHz Channel bandwidth



Date: 2.SEP.2010 12:39:38

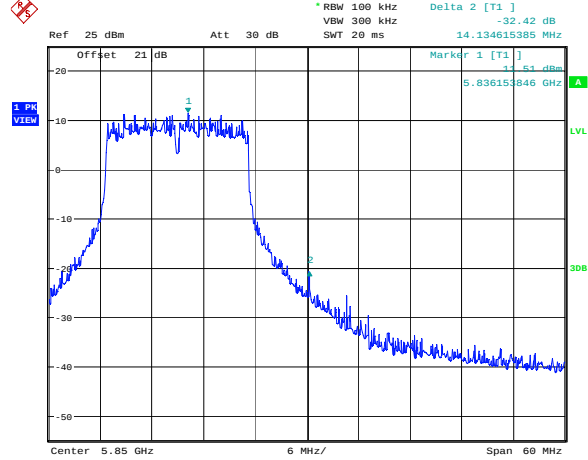
Sample spectral plots UBE

802.11n – 20 MHz Channel bandwidth



Date: 2.SEP.2010 12:43:25

802.11a – 20 MHz Channel bandwidth



Date: 2.SEP.2010 12:44:07

Note: The plots were provided to show measurement settings and technique only; the plots do not necessary reflect actual measurement.

Report reference ID: 155793-3TRFWL

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Section 8: Testing data		Product: DRU 5 GHz radio	
Test name: Clause 15.247(d) Spurious emissions			
Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
Specification: FCC Part 15 Subpart C			

Test data, continued										
Radiated spurious emissions found in the Restricted bands defined in FCC Part 15 Subpart C, 15.205										
20 MHz channel bandwidth										
Modulation	Antenna	Fundamental Freq. (MHz)	SW PWR setting	Freq. (MHz)	FS Peak (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	FS Avg. (dBuV/m)	Avg limit (dBuV/m)	Margin (dB)
802.11n	Omni 7 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Omni 7 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 10 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 10 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 15 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 15 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 16 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 16 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 19 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 19 dBi	5740	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 22 dBi	5740	24	22960	73.90	74.00	0.10	52.31	54.00	1.69
802.11a	Directional 22 dBi	5740	24	22960	73.89	74.00	0.11	52.85	54.00	1.15
802.11n	Omni 7 dBi	5790	34		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Omni 7 dBi	5790	34		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 10 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 10 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 15 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 15 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 16 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 16 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 19 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 19 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 22 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 22 dBi	5790	30		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Omni 7 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Omni 7 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 10 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 10 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 15 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 15 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 16 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 16 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 19 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 19 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 22 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 22 dBi	5835	26		No emissions detected within 10 dB of limit within restricted bands					
- Test distance = 3m										
- Field strength measurement has been corrected with transducer factors (i.e. antenna, cable loss, amplifier, and attenuators)										

Section 8: Testing data		Product: DRU 5 GHz radio	
Test name: Clause 15.247(d) Spurious emissions			
Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
Specification: FCC Part 15 Subpart C			

Test data, continued

Radiated spurious emissions found in the Restricted bands defined in FCC Part 15 Subpart C, 15.205, continued

20 MHz channel bandwidth with triplexer

Modulation	Antenna	Fundamental Freq. (MHz)	SW PWR setting	Freq. (MHz)	FS Peak (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	FS Avg. (dBuV/m)	Avg limit (dBuV/m)	Margin (dB)
802.11n	Directional 16 dBi	5740	34		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 16 dBi	5740	34		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 16 dBi	5790	34		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 16 dBi	5790	34		No emissions detected within 10 dB of limit within restricted bands					
802.11n	Directional 16 dBi	5825	34		No emissions detected within 10 dB of limit within restricted bands					
802.11a	Directional 16 dBi	5825	34		No emissions detected within 10 dB of limit within restricted bands					
- Test distance = 3m - Field strength measurement has been corrected with transducer factors (i.e. antenna, cable loss, amplifier, and attenuators)										

20 MHz channel bandwidth with triplexer (co-channel transmissions)

Modulation	Antenna	Fundamental Freq. (MHz)	SW PWR setting	Freq. (MHz)	FS Peak (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	FS Avg. (dBuV/m)	Avg limit (dBuV/m)	Margin (dB)
802.11n	Directional 16 dBi	5745 and 5785	34	No emissions detected within 10 dB of limit within restricted bands						
802.11a	Directional 16 dBi	5745 and 5785	34	No emissions detected within 10 dB of limit within restricted bands						
802.11n	Directional 16 dBi	5745 and 5825	34	No emissions detected within 10 dB of limit within restricted bands						
802.11a	Directional 16 dBi	5745 and 5825	34	No emissions detected within 10 dB of limit within restricted bands						
802.11n	Directional 16 dBi	5785 and 5825	34	No emissions detected within 10 dB of limit within restricted bands						
802.11a	Directional 16 dBi	5785 and 5825	34	No emissions detected within 10 dB of limit within restricted bands						
- Two radios were used to perform measurement. - Field strength measurement has been corrected with transducer factors (i.e. antenna, cable loss, amplifier, and attenuators) - Test distance = 3m										

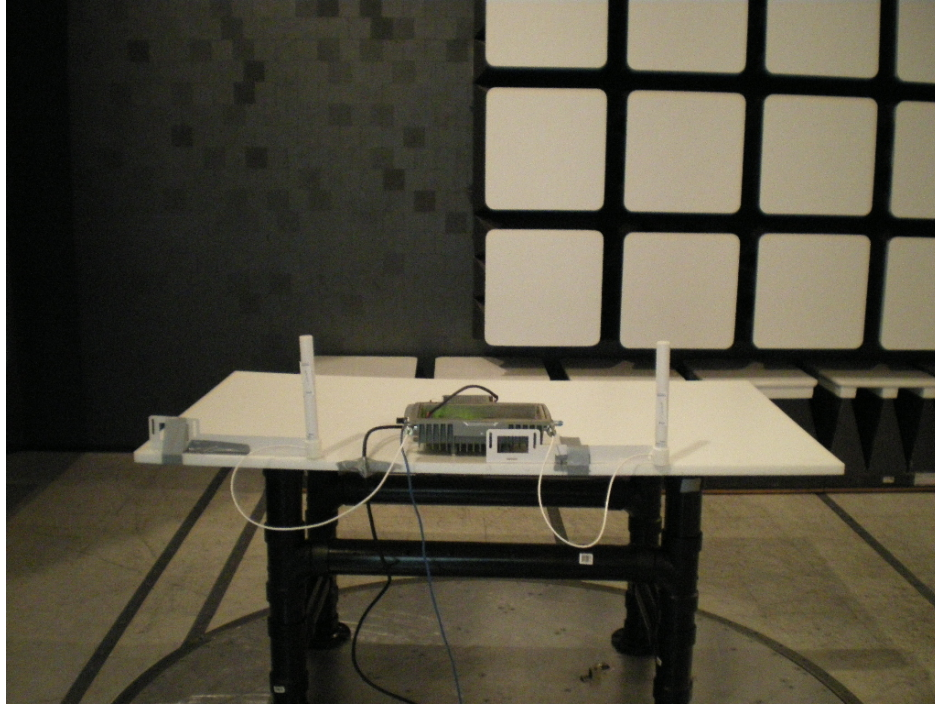
40 MHz channel bandwidth

Modulation	Antenna	Fundamental Freq. (MHz)	SW PWR setting	Freq. (MHz)	FS Peak (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	FS Avg. (dBuV/m)	Avg limit (dBuV/m)	Margin (dB)
802.11n	Directional 22 dBi	5750	26	23000	69.62	74.00	4.38	48.37	54.00	5.63
802.11n	Directional 22 dBi	5790	32	No emissions detected within 10 dB of limit within restricted bands						
802.11n	Directional 22 dBi	5725	26	No emissions detected within 10 dB of limit within restricted bands						
– Test distance = 3m										
– Field strength measurement has been corrected with transducer factors (i.e. antenna, cable loss, amplifier, and attenuators)										

Section 8: Testing data		Product: DRU 5 GHz radio	
Test name: Clause 15.247(d) Spurious emissions			
Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
Specification: FCC Part 15 Subpart C			

Test data, continued

Radiated spurious emissions setup photos





Nemko Canada Inc.,
303 River Rd, Ottawa, ON, Canada, K1V 1H2

Section 8: Testing data

Product: DRU 5 GHz radio

Test name: Clause 15.247(e) Power spectral density for digitally modulated devices

Test date: August 25, 2010

Test engineer: David Duchesne

Verdict: Pass

Specification: FCC Part 15 Subpart C

8.5 Clause 15.247(e) Power spectral density for digitally modulated devices

§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

- (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Special notes

- The power spectral density was measured on the antenna port 1, 2, 3 and 4 individually by means of a spectrum analyzer and following procedure described in 'PSD Option 1' in FCC guidelines for Measurement of Digital Transmission Systems operating under Section 15.247. The total PSD equal to the summary of the PSD was measured on the antenna port 1 and 2 or antenna port 3 and 4.
- The EUT was additionally tested with 5 GHz triplexer.

Test data

20 MHz channel bandwidth

Modulation	Frequency (MHz)	Antenna gain (dBi)	SW setting	Conducted PSD Ant 3 (dBm/3 kHz)	Conducted PSD Ant 4 (dBm/3 kHz)	Combined PSD (dBm/3 kHz)	PSD Limit (dBm/3 kHz)	Margin (dB)
802.11n	5740	10	26	0.30	2.73	4.69	8	3.31
	5790	10	30	2.14	3.34	5.79	8	2.21
	5835	10	26	0.82	0.53	3.69	8	4.31
802.11a	5740	10	26	0.80	0.41	3.62	8	4.38
	5790	10	30	2.08	3.51	5.86	8	2.14
	5835	10	26	1.70	0.21	4.03	8	3.97
802.11n	5740	15	26	0.30	2.73	4.69	8	3.31
	5790	15	30	2.14	3.34	5.79	8	2.21
	5835	15	26	0.82	0.53	3.69	8	4.31
802.11a	5750	15	26	0.80	0.41	3.62	8	4.38
	5790	15	30	2.08	3.51	5.86	8	2.14
	5835	15	26	1.70	0.21	4.03	8	3.97
802.11n	5740	16	26	0.30	2.73	4.69	8	3.31
	5790	16	30	2.14	3.34	5.79	8	2.21
	5835	16	26	0.82	0.53	3.69	8	4.31
802.11a	5750	16	26	0.80	0.41	3.62	8	4.38
	5790	16	30	2.08	3.51	5.86	8	2.14
	5835	16	26	1.70	0.21	4.03	8	3.97
802.11n	5740	19	26	0.30	2.73	4.69	8	3.31
	5790	19	30	2.14	3.34	5.79	8	2.21
	5835	19	26	0.82	0.53	3.69	8	4.31
802.11a	5750	19	26	0.80	0.41	3.62	8	4.38
	5790	19	30	2.08	3.51	5.86	8	2.14
	5835	19	26	1.70	0.21	4.03	8	3.97
802.11n	5740	22	26	0.30	2.73	4.69	8	3.31
	5790	22	30	2.14	3.34	5.79	8	2.21
	5835	22	26	0.82	0.53	3.69	8	4.31
802.11a	5740	22	26	0.80	0.41	3.62	8	4.38
	5790	22	30	2.08	3.51	5.86	8	2.14
	5835	22	26	1.70	0.21	4.03	8	3.97
Modulation	Frequency (MHz)	Antenna gain (dBi)	SW setting	Conducted PSD Ant 1 (dBm/3 kHz)	Conducted PSD Ant 2 (dBm/3 kHz)	Combined PSD (dBm/3 kHz)	PSD limit (dBm/3 kHz)	Margin (dB)
802.11n	5740	7	26	-2.56	-4.27	-0.32	8	8.32
	5790	7	34	0.93	-1.39	2.93	8	5.07
	5835	7	26	-4.01	-4.09	-1.04	8	9.04
802.11a	5740	7	26	-2.69	-4.84	-0.62	8	8.62
	5790	7	34	0.14	-2.46	2.15	8	5.85
	5835	7	26	-3.45	-4.67	-1.01	8	9.01

20 MHz channel bandwidth with Triplexer

Modulation	Frequency (MHz)	Antenna gain (dBi)	SW setting	Conducted PSD Ant 3 (dBm/3 kHz)	Conducted PSD Ant 4 (dBm/3 kHz)	Combined PSD (dBm/3 kHz)	PSD limit (dBm/3 kHz)	Margin (dB)
802.11n	5745	16	34	-0.64	1.74	3.72	8	4.28
	5785	16	34	1.12	0.55	3.85	8	4.15
	5825	16	34	-0.51	3.87	5.22	8	2.78
802.11a	5745	16	34	3.97	1.29	5.84	8	2.16
	5785	16	34	-1.02	2.52	4.11	8	3.89
	5825	16	34	-0.63	4.46	5.63	8	2.37

40 MHz channel bandwidth

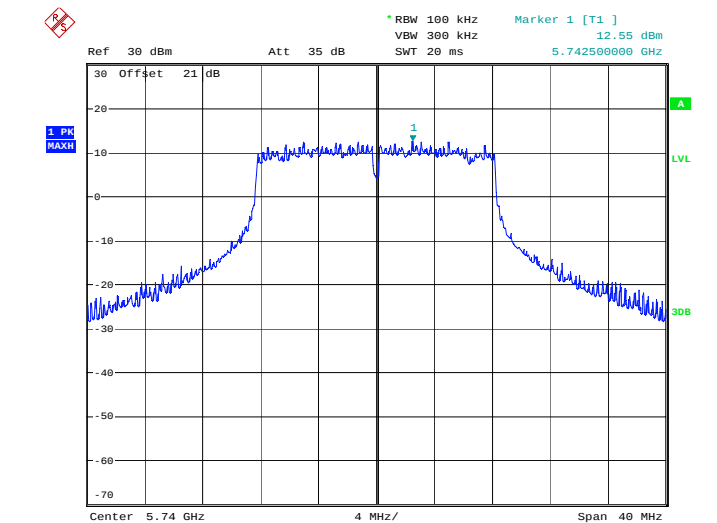
Modulation	Frequency (MHz)	Antenna gain (dBi)	SW setting	Conducted PSD Ant 3 (dBm/3 kHz)	Conducted PSD Ant 4 (dBm/3 kHz)	Combined PSD (dBm/3 kHz)	PSD limit (dBm/3 kHz)	Margin (dB)
802.11n	5750	22	26	-2.98	1.13	2.55	8	5.45
	5790	22	32	-2.64	7.43	7.84	8	0.16
	5825	22	26	-2.50	2.97	4.05	8	3.95

Combined PSD (dBm/MHz) = $10 * \log((10^{\wedge}(\text{Conducted PSD Ant 1 (dBm/MHz) / 10)}) + (10^{\wedge}(\text{Conducted PSD Ant 2 (dBm/MHz) / 10})))$
or
Combined PSD (dBm/MHz) = $10 * \log((10^{\wedge}(\text{Conducted PSD Ant 3 (dBm/MHz) / 10)}) + (10^{\wedge}(\text{Conducted PSD Ant 4 (dBm/MHz) / 10})))$

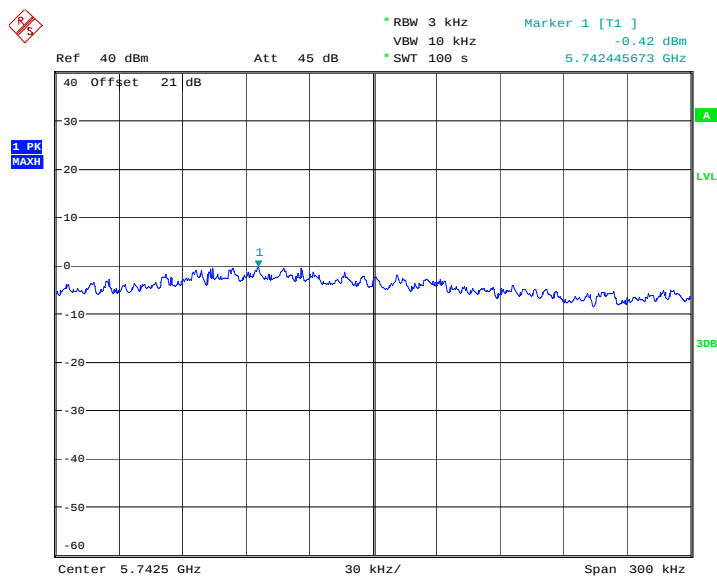
Section 8: Testing data		Product: DRU 5 GHz radio	
Test name: Clause 15.247(e) Power spectral density for digitally modulated devices			
Test date: August 25, 2010		Test engineer: David Duchesne	Verdict: Pass
Specification: FCC Part 15 Subpart C			

Test data, continued

PSD sample spectral plots



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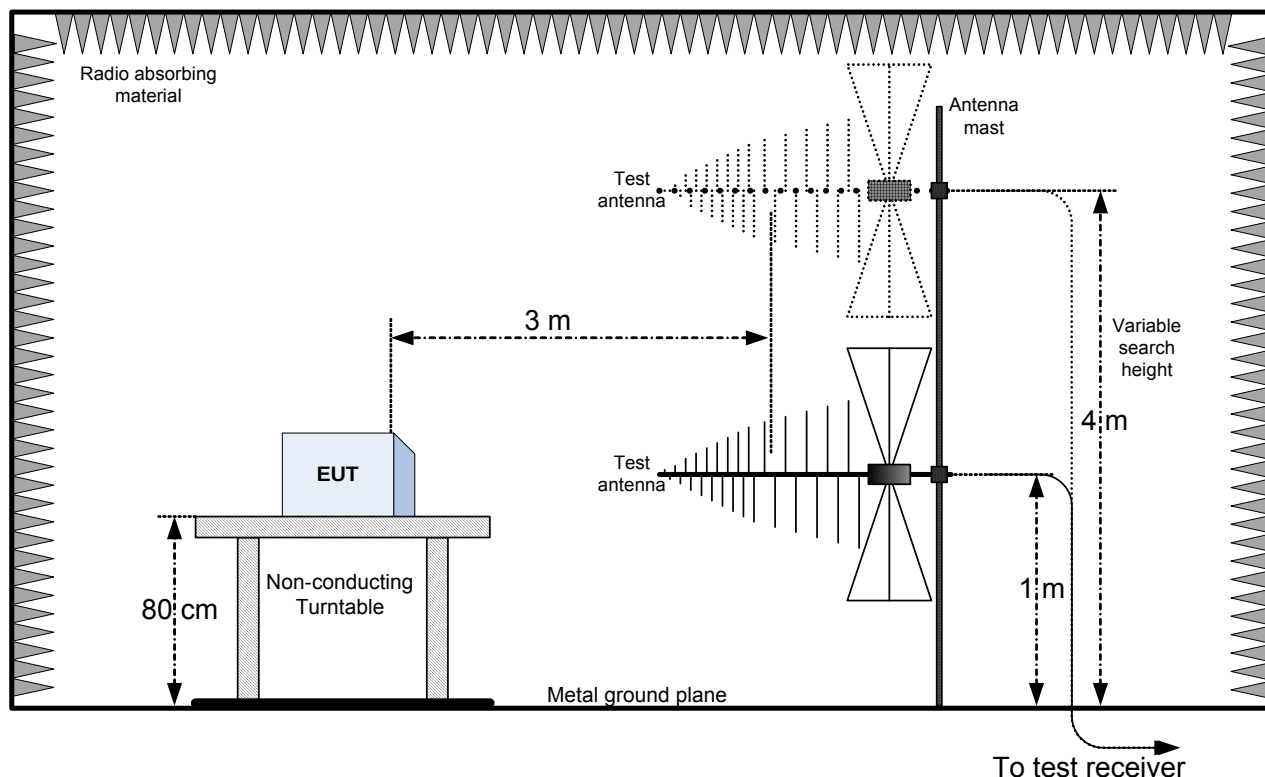


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Note: The plots were provided to show measurement settings and technique only; the plots do not necessary reflect actual measurement.

Section 8: Block diagrams of test set-ups

Radiated emissions set-up



Conducted emissions set-up

