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Supplemental “Transmit Simultaneously” Test Report

REPORT NO.: RF130802E06A-2 R1

MODEL NO.: RE4000W

FCC ID: Q87-RE4000W

RECEIVED: Aug. 02, 2013

TESTED: Aug. 07 to 14, 2013

ISSUED: Mar. 11, 2014

APPLICANT: Linksys LLC

ADDRESS: 131 Theory Drive, Irvine, CA 92617, USA

ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130802E06A-2	Original release	Feb. 12, 2014
RF130802E06A R1	Cancel Model No.: RE2000 V2	Mar. 11, 2014



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1. CERTIFICATION

PRODUCT : Dual-band Wireless-N Range Extender
BRAND NAME : Linksys
MODEL NO. : RE4000W
TEST ITEM: ENGINEERING SAMPLE
APPLICANT : Linksys LLC
TESTED: Aug. 07 to 14, 2013
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009

The above equipment (Model: RE4000W) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Midoli Peng , **DATE:** Mar. 11, 2014
(Midoli Peng, Specialist)

APPROVED BY : May Chen , **DATE:** Mar. 11, 2014
(May Chen, Manager)



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2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -3.40dB at 0.45469MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.0dB at 38.92MHz

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.46 dB
Radiated emissions (1GHz -6GHz)	3.73 dB
Radiated emissions (6GHz -18GHz)	3.90 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Dual-band Wireless-N Range Extender
MODEL NO.	RE4000W
POWER SUPPLY	DC 12V from internal power supply
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11g/a: up to 54Mbps 802.11n: up to 300Mbps
OPERATING FREQUENCY	For 15.407 5.18 ~ 5.24GHz
	For 15.247 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz
	For 15.407 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
NUMBER OF CHANNEL	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
	For 15.247 (5GHz) 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
	For 15.407 802.11a: 38.282mW 802.11n (HT20): 43.205mW 802.11n (HT40): 45.073mW
MAXIMUM OUTPUT POWER	For 15.247 (2.4GHz) 802.11b: 110.662mW 802.11g: 247.172mW 802.11n (HT20): 407.900mW 802.11n (HT40): 284.887mW
	For 15.247 (5GHz) 802.11a: 242.661mW 802.11n (HT20): 272.227mW 802.11n (HT40): 294.594mW

ANTENNA TYPE	Please see NOTE
DATA CABLE	RJ-45 cable (unshielded, 1.5m)
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

- There are 2.4GHz and 5GHz WLAN technology used for the EUT.
- The EUT must be supplied with an internal power supply as following table:

No	Brand	Model No.	Spec.
1	HON-KWANG ELECTRIC CO., LTD	HK-XX06-A12	Input: 100-240V, 300-200mA Output: 12V, 500 mA Power cord: 1.6m, unshielded
2	KUANTECH INCORPORATED COMPANY	KSP20A1200050	Input: 100-240V, 100mA Output: 12V, 500 mA Power cord: 1.6m, unshielded
For radiated emissions test, the EUT was pre-tested with above internal power supplies 1~2, the worst case was found in internal power supply 2. Therefore only the test data of the internal power supply was recorded in this report.			

- The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Antenna Type	Antenna Gain (dBi)	Connector	Frequency range (MHz to MHz)
Chain (0) < Side antenna >	Dipole	2.88	NA	2400~2500
	Dipole	2.93	NA	5150~5825
Chain (1) < BOT antenna >	Dipole	1.22	NA	2400~2500
	Dipole	4.58	NA	5150~5825

Note: For 802.11abg mode will fix transmission on Chain (0).

- The EUT incorporates a MIMO function without beam forming.

MODULATION MODE	TX/RX FUNCTION
802.11a	1TX/2RX
802.11b	1TX/2RX
802.11g	1TX/2RX
802.11n (HT20)	2TX/2RX
802.11n (HT40)	2TX/2RX

- When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
- The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	OB	
1	√	-	-	-	Adapter 1
2	√	√	√	√	Adapter 2

Where **PLC**: Power Line Conducted Emission

RE < 1G: Radiated Emission below 1GHz

RE ³ 1G: Radiated Emission above 1GHz

OB: Conducted Out-Band Emission Measurement

NOTE: 1. "-" means no effect.

2. The EUT had been pre-tested on the positioned of each 2 axis. The radiated emission worst case was found when positioned on **Y-plane**

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4 GHz 802.11n (HT20) +	1 to 11	6	OFDM	BPSK	6.5
5 GHz 802.11n (HT40)	151 to 159	159	OFDM	BPSK	13.5



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RADIATED EMISSION TEST:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT40)	1 to 11	6	OFDM	BPSK	6.5
	151 to 159	159	OFDM	BPSK	13.5

CONDUCTED OUT-BAND EMISSION MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT40)	1 to 11	6	OFDM	BPSK	6.5
	151 to 159	159	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	26deg. C, 60%RH	120Vac, 60Hz	Scott Chen
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Tim Ho
RE ³ 1G	23deg. C, 68%RH	120Vac, 60Hz	Robert Cheng
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng



3.3 DESCRIPTION OF SUPPORT UNITS

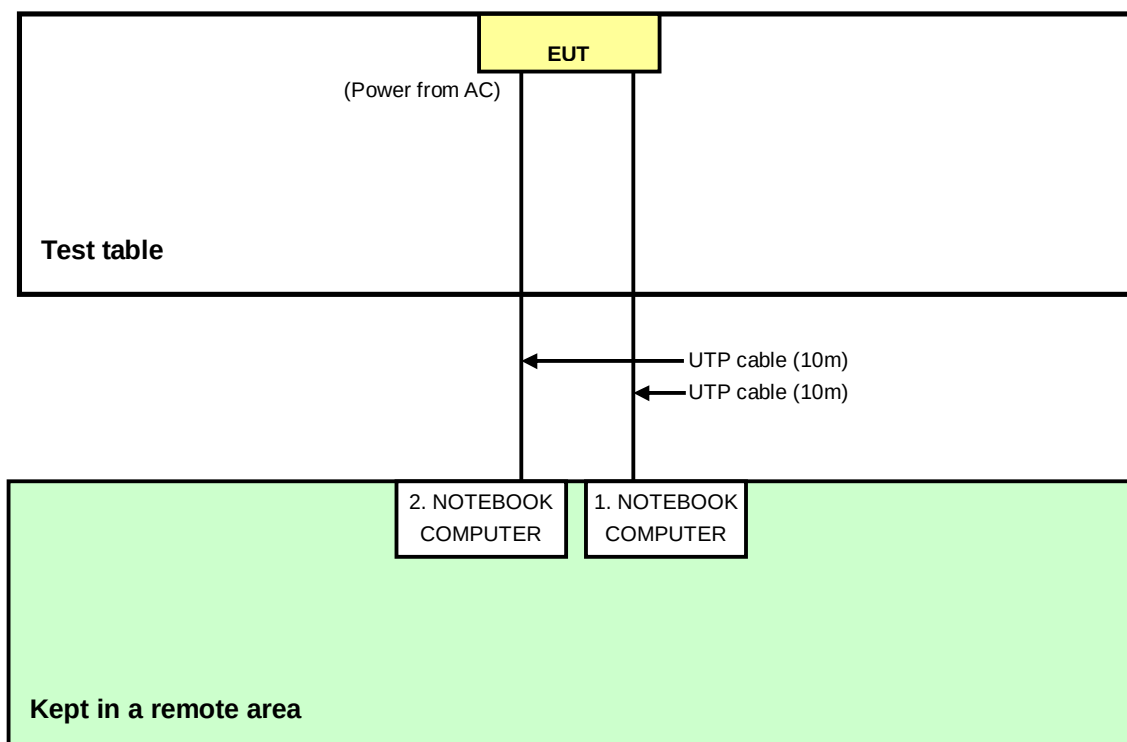
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable, 10m
2	UTP cable, 10m

NOTE: All power cords of the above support units are non shielded (1.8m).

3.4 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 07, 2013	June 06, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
Software ADT	BV ADT_Cond_V7.3.7. 3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Aug. 07, 2013

4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
- b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

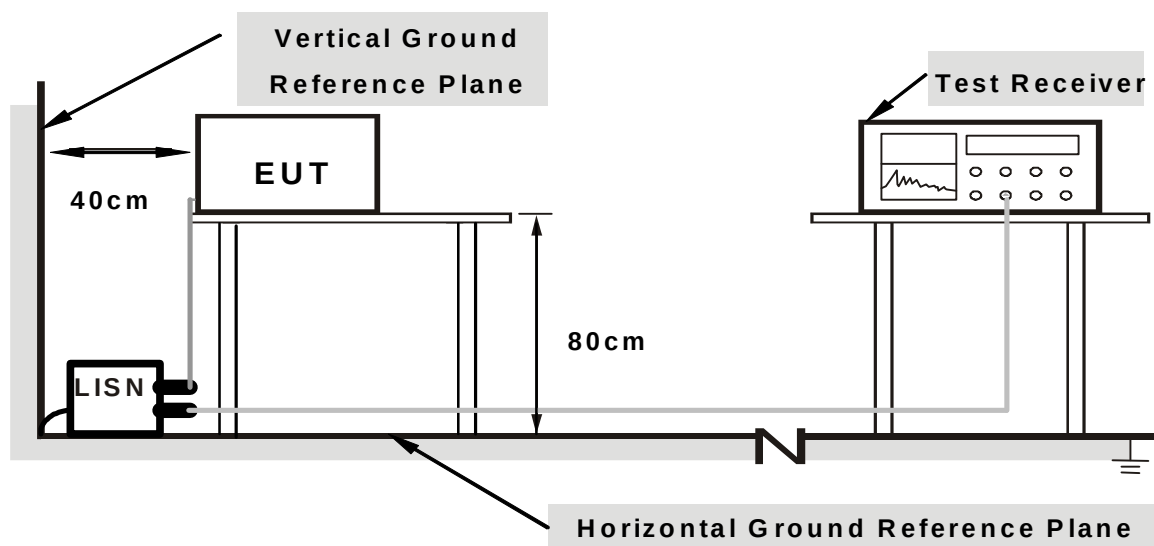
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

1. Turn on the power of EUT.
2. The communication partner run test program “MT7620 V1.0.6.0 & RT5x9xQA.exe V1.0.9.0” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

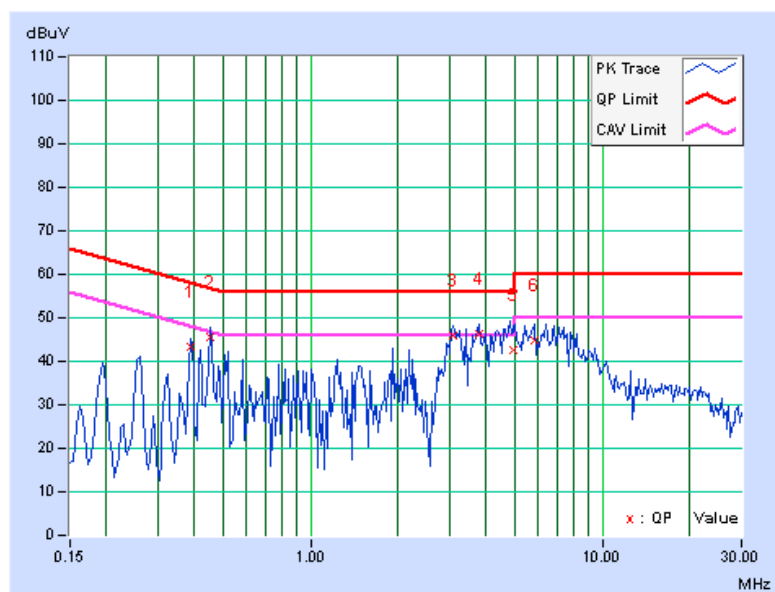
4.1.7 TEST RESULTS (MODE 1)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.38828	0.20	43.04	39.00	43.24	39.20	58.10	48.10	-14.86	-8.90
2	0.45606	0.20	45.27	41.27	45.47	41.47	56.76	46.76	-11.29	-5.29
3	3.08203	0.41	45.44	37.83	45.85	38.24	56.00	46.00	-10.15	-7.76
4	3.76563	0.45	45.77	38.19	46.22	38.64	56.00	46.00	-9.78	-7.36
5	4.96875	0.54	41.94	34.05	42.48	34.59	56.00	46.00	-13.52	-11.41
6	5.84375	0.60	44.14	32.08	44.74	32.68	60.00	50.00	-15.26	-17.32

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

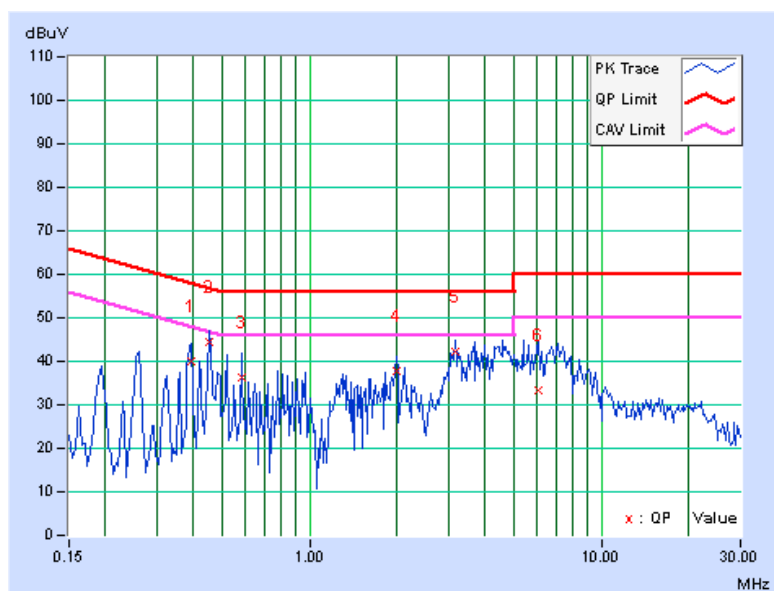


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.39219	0.19	39.85	37.27	40.04	37.46	58.02	48.02	-17.98	-10.56
2	0.45469	0.19	44.24	43.20	44.43	43.39	56.79	46.79	-12.36	-3.40
3	0.58359	0.20	36.15	35.11	36.35	35.31	56.00	46.00	-19.65	-10.69
4	1.98047	0.30	37.60	31.71	37.90	32.01	56.00	46.00	-18.10	-13.99
5	3.14453	0.37	41.92	35.62	42.29	35.99	56.00	46.00	-13.71	-10.01
6	6.10547	0.54	32.78	24.24	33.32	24.78	60.00	50.00	-26.68	-25.22

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



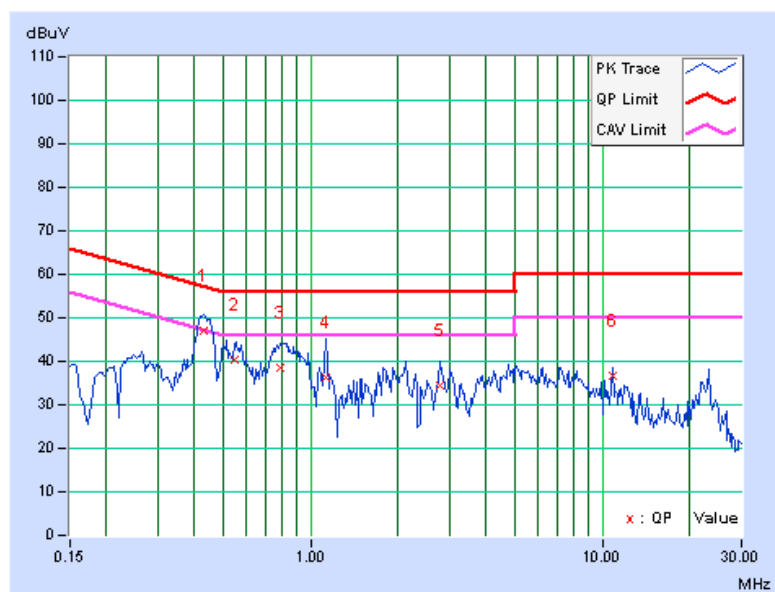
4.1.8 TEST RESULTS (MODE 2)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.43125	0.20	46.89	33.34	47.09	33.54	57.23	47.23	-10.14	-13.69
2	0.54844	0.21	40.14	29.14	40.35	29.35	56.00	46.00	-15.65	-16.65
3	0.78672	0.23	38.19	28.12	38.42	28.35	56.00	46.00	-17.58	-17.65
4	1.12500	0.26	36.07	26.33	36.33	26.59	56.00	46.00	-19.67	-19.41
5	2.78125	0.39	34.18	24.89	34.57	25.28	56.00	46.00	-21.43	-20.72
6	10.79297	0.95	35.60	32.49	36.55	33.44	60.00	50.00	-23.45	-16.56

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

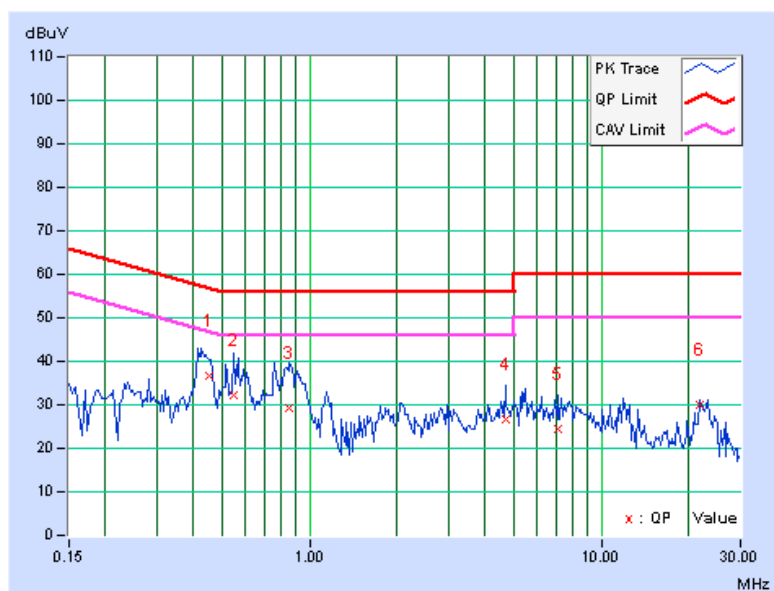


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.45372	0.19	36.49	27.06	36.68	27.25	56.81	46.81	-20.12	-19.55
2	0.54844	0.20	32.15	23.58	32.35	23.78	56.00	46.00	-23.65	-22.22
3	0.85313	0.21	28.97	21.42	29.18	21.63	56.00	46.00	-26.82	-24.37
4	4.69141	0.47	26.17	18.88	26.64	19.35	56.00	46.00	-29.36	-26.65
5	7.08203	0.59	23.94	17.58	24.53	18.17	60.00	50.00	-35.47	-31.83
6	21.65941	1.17	28.76	26.15	29.93	27.32	60.00	50.00	-30.07	-22.68

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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4.2.2 TEST INSTRUMENTS

For below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
Loop Antenna ^(*) R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
- 5 The CANADA Site Registration No. is IC 7450H-3.
- 6 Tested Date: Aug. 10, 2013



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For above 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
Pre-Amplifier SPACEK LABS	SLK Ka-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
- 5 The VCCI Site Registration No. is G-137.
- 6 The CANADA Site Registration No. is IC 7450H-2.
- 7 Tested Date: Aug. 14, 2013

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

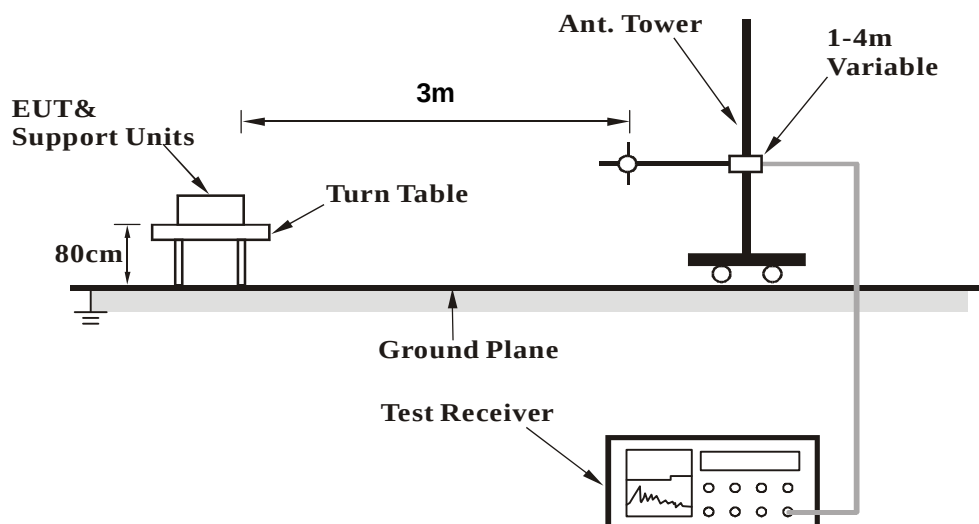
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz DATA :

CHANNEL	2.4 GHz 802.11n (HT20) / ch6 + 5 GHz 802.11n (HT40) / ch159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	74.57	28.1 QP	40.0	-11.9	1.50 H	269	44.94	-16.81
2	151.54	30.0 QP	43.5	-13.5	3.50 H	70	42.99	-12.96
3	226.91	30.1 QP	46.0	-15.9	2.10 H	255	45.93	-15.80
4	250.00	36.4 QP	46.0	-9.6	2.50 H	199	50.62	-14.18
5	297.82	30.1 QP	46.0	-15.9	2.00 H	286	42.41	-12.28
6	500.01	36.4 QP	46.0	-9.6	2.50 H	231	43.94	-7.53
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	38.92	38.0 QP	40.0	-2.0	1.00 V	283	51.91	-13.87
2	47.80	37.2 QP	40.0	-2.8	1.00 V	330	50.70	-13.48
3	74.57	36.9 QP	40.0	-3.1	1.50 V	150	53.74	-16.81
4	125.01	34.1 QP	43.5	-9.4	1.00 V	345	48.86	-14.79
5	250.00	32.9 QP	46.0	-13.1	2.00 V	245	47.08	-14.18
6	500.01	38.6 QP	46.0	-7.4	1.00 V	353	46.14	-7.53

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz DATA

CHANNEL	2.4 GHz 802.11n (HT20) / ch6 + 5 GHz 802.11n (HT40) / ch159	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4874.00	51.8 PK	74.0	-22.2	1.05 H	203	45.55	6.25
2	4874.00	40.0 AV	54.0	-14.0	1.05 H	203	33.75	6.25
3	7311.00	55.7 PK	74.0	-18.3	1.06 H	198	41.67	14.03
4	7311.00	42.1 AV	54.0	-11.9	1.06 H	198	28.07	14.03
5	11590.00	55.6 PK	74.0	-18.4	1.00 H	111	40.04	15.56
6	11590.00	42.1 AV	54.0	-11.9	1.00 H	111	26.54	15.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4874.00	57.1 PK	74.0	-16.9	1.04 V	343	50.85	6.25
2	4874.00	44.1 AV	54.0	-9.9	1.04 V	343	37.85	6.25
3	7311.00	55.9 PK	74.0	-18.1	1.00 V	28	41.87	14.03
4	7311.00	42.7 AV	54.0	-11.3	1.00 V	28	28.67	14.03
5	11590.00	55.6 PK	74.0	-18.4	1.00 V	206	40.04	15.56
6	11590.00	42.8 AV	54.0	-11.2	1.00 V	206	27.24	15.56

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



4.3 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.3.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Jan. 21, 2013	Jan. 20, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Aug. 12, 2013

4.3.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

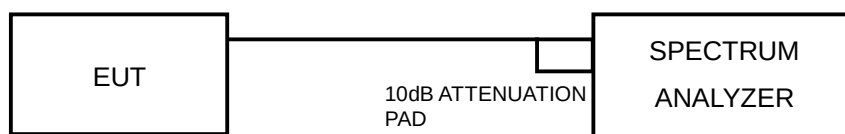
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Set span to encompass the spectrum to be examined.
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITION

Same as Item 4.3.6

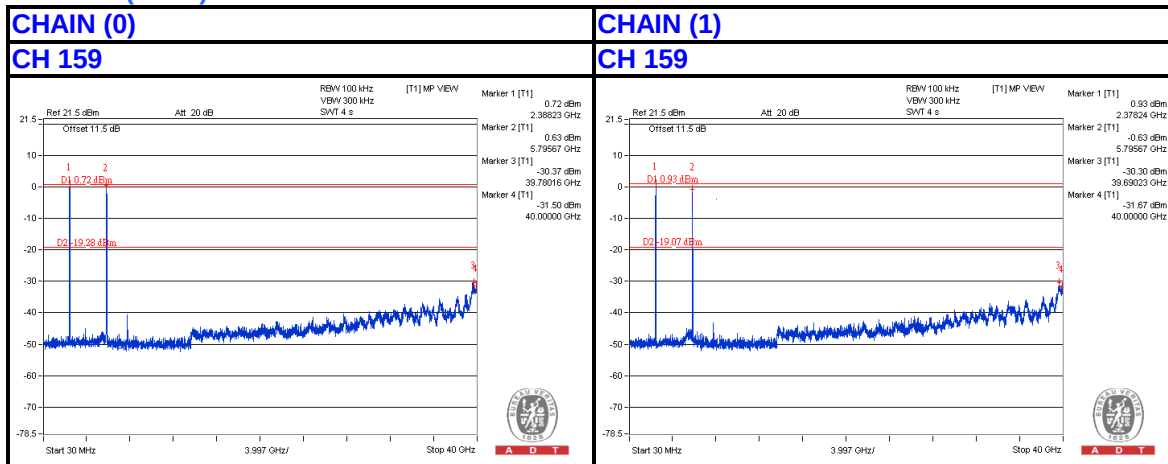
4.3.7 TEST RESULTS

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



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802.11n (HT40)





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4. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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