



Supplemental “Transmit Simultaneously” Test Report

REPORT NO.: RF130725E01-2

MODEL NO.: EA6900

FCC ID: Q87-EA6900

RECEIVED: July 25, 2013

TESTED: July 26 to Aug. 09, 2013

ISSUED: Sep. 02, 2013

APPLICANT: Linksys LLC

ADDRESS: 131 Theory Drive, Irvine, California, 92617 United States

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

LAB ADDRESS : No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

TEST LOCATION (1): No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

TEST LOCATION (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification

Table of Contents

RELEASE CONTROL RECORD	3
1. CERTIFICATION	4
2. SUMMARY OF TEST RESULTS	5
2.1 MEASUREMENT UNCERTAINTY	6
3. GENERAL INFORMATION	7
3.1 GENERAL DESCRIPTION OF EUT	7
3.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:	10
3.3 DESCRIPTION OF SUPPORT UNITS	13
3.4 CONFIGURATION OF SYSTEM UNDER TEST	14
4. TEST TYPES AND RESULTS	15
4.1 CONDUCTED EMISSION MEASUREMENT	15
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	15
4.1.2 TEST INSTRUMENTS	15
4.1.3 TEST PROCEDURES	16
4.1.4 DEVIATION FROM TEST STANDARD	16
4.1.5 TEST SETUP	17
4.1.6 EUT OPERATING CONDITIONS	17
4.1.7 TEST RESULTS (MODE 1)	18
4.1.8 TEST RESULTS (MODE 2)	20
4.2 RADIATED EMISSION MEASUREMENT	22
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT	22
4.2.2 TEST INSTRUMENTS	23
4.2.3 TEST PROCEDURES	24
4.2.4 DEVIATION FROM TEST STANDARD	24
4.2.5 TEST SETUP	25
4.2.6 EUT OPERATING CONDITIONS	25
4.2.7 TEST RESULTS	26
4.3 CONDUCTED OUT-BAND EMISSION MEASUREMENT	30
4.3.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT	30
4.3.2 TEST INSTRUMENTS	30
4.3.3 TEST PROCEDURE	30
4.3.4 DEVIATION FROM TEST STANDARD	30
4.3.5 TEST SETUP	31
4.3.6 EUT OPERATING CONDITION	31
4.3.7 TEST RESULTS	31
4. INFORMATION ON THE TESTING LABORATORIES	35



A D T

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130725E01-2	Original release	Sep. 02, 2013




A D T

1. CERTIFICATION

PRODUCT : Linksys Smart Wi-Fi Router AC1900
BRAND NAME : Linksys
MODEL NO. : EA6900
TEST ITEM: ENGINEERING SAMPLE
APPLICANT : Linksys LLC
TESTED: July 26 to Aug. 09, 2013
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009

The above equipment (Model: EA6900) 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 :  , **DATE:** Sep. 02, 2013
(Claire Kuan, Specialist)

APPROVED BY :  , **DATE:** Sep. 02, 2013
(May Chen, Manager)



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 -7.50dB at 0.16172MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.8dB at 37.50MHz

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)	5.63 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	Linksys Smart Wi-Fi Router AC1900
MODEL NO.	EA6900
POWER SUPPLY	DC 12V from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
OPERATING FREQUENCY	For 15.407 5.18 ~ 5.24GHz For 15.247 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	For 15.407 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 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), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
MAXIMUM OUTPUT POWER	Please see NOTE
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x1

NOTE:

1. The EUT is a 2.4GHz & 5GHz WLAN device.
2. The maximum output power table as below table:

MAXIMUM OUTPUT POWER (mW)					
Legacy/MIMO (CDD) with beam forming mode					
15.247 (2.4GHz)		15.247 (5GHz)		15.407	
802.11b	267.301	802.11a	348.337	802.11a	41.305
802.11g	232.274	802.11n (HT20)	587.241	802.11n (HT20)	24.237
802.11n (HT20)	606.625	802.11n (HT40)	586.756	802.11n (HT40)	27.815
802.11n (HT40)	256.930	802.11ac (VHT80)	368.485	802.11ac (VHT80)	26.934
Legacy/MIMO (CDD) without beam forming mode					
15.247 (2.4GHz)		15.247 (5GHz)		15.407	
802.11b	267.301	802.11a	348.337	802.11a	41.305
802.11g	232.274	802.11n (HT20)	988.352	802.11n (HT20)	24.237
802.11n (HT20)	741.986	802.11n (HT40)	944.845	802.11n (HT40)	48.970
802.11n (HT40)	256.930	802.11ac (VHT80)	368.485	802.11ac (VHT80)	47.214
Legacy/MIMO (STBC) without beam forming mode					
15.247 (2.4GHz)		15.247 (5GHz)		15.407	
802.11b	267.301	802.11a	348.337	802.11a	41.305
802.11g	232.274	802.11n (HT20)	988.352	802.11n (HT20)	40.736
802.11n (HT20)	716.360	802.11n (HT40)	944.845	802.11n (HT40)	48.970
802.11n (HT40)	312.116	802.11ac (VHT80)	368.485	802.11ac (VHT80)	47.214

3. The EUT has two different RJ45 XFRM Transformer types could be chosen and please refer the below table:

Type 1(Vendor: MINGTEK)			
Vendor P/N	Different	Vendor	Location
HN1878CG	TRANSFORMER VARIABLE COILS,DIP,350UH,HN1878CG	MINGTEK	T1
HN3678CG	TRANSFORMER VARIABLE COILS,DIP,350UH,HN3678CG	MINGTEK	T2, T3
Type 2(Vendor: MYJWD)			
Vendor P/N	Different	Vendor	Location
DG18107-1 G	TRANSFORMER,DIP,350UH,16.8*8.5*1 1.85MM,18PIN,DG18107-1 G	MYJWD	T1
DG36005-1 G	TRANSFORMER,DIP,350UH,32.7*8.5*1 1.85MM,36PIN	MYJWD	T2, T3

From the above types, the worst case was found in **Type 2(Vendor: MYJWD)**. Therefore only the test data of the type were recorded in this report.

4. The EUT must be supplied with a power adapter and following two different models could be chosen as following table:

No	Brand	Model No.	Spec.
1	Ktec	KSAS0451200350HU	Input: 100-240V, 1.2A, 50-60Hz Output: 12V, 3.5A DC power cable: 1.5m, unshielded
2	LEI	MU42-1120350-A1	Input: 100-240V, 1.5A, 50-60Hz Output: 12V, 3.5A DC power cable: 1.5m, unshielded

From the above adapters, the worst radiated emission was found in **Adapter 2**. Therefore only the test data of the modes were recorded in this report.

5. The antenna provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Antenna Type	Peak Gain(dBi) (Include cable loss)		Connector Type	Cable Loss (dB)	Cable Length (mm)
			For 2.4GHz (2.4GHz to 2.4835GHz)	For 5GHz (Band 1: 5.15 to 5.25GHz Band 4: 5.725 to 5.85GHz)			
Right Side Chain (0)	Galtronics	Dipole	2.60	5G Band1: 3.70 5G Band4: 2.81	R-SMA	NA	168
In center Chain (1)	Galtronics	Dipole	4.18	5G Band1: 3.35 5G Band4: 2.97	R-SMA	NA	255
Left Side Chain (2)	Galtronics	Dipole	2.99	5G Band1: 3.89 5G Band4: 3.58	R-SMA	NA	260

6. The EUT incorporates MIMO CDD/STBC function with beam forming.

MODULATION MODE	Tx/Rx FUNCTION
802.11a	1TX (Diversity)/3Rx
802.11b	1TX(Diversity)/3RX
802.11g	1TX(Diversity)/3RX
802.11n (HT20)	3TX/3RX
802.11n (HT40)	3TX/3RX
802.11ac (VHT20)	3TX/3RX
802.11ac (VHT40)	3TX/3RX
802.11ac (VHT80)	3TX/3RX

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report.

7. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 23.

8. When the EUT operating in 802.11ac, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 9.

9. 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 ≥ 1G	OB	
1	√	-	-	-	Legacy/MIMO (CDD) + adapter 1
2	-	-	√	√	Legacy/MIMO (CDD) with beam forming + adapter 2
3	√	√	√	√	Legacy/MIMO (CDD) + adapter 2
4	-	-	√	√	Legacy/MIMO (STBC) + adapter 2

Where **PLC:** Power Line Conducted Emission

RE < 1G: Radiated Emission below 1GHz

RE ≥ 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 **X-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)	CONFIGURE MODE
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	1
	149 to 165	165	OFDM	BPSK	6.5	
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	3
	149 to 165	165	OFDM	BPSK	6.5	



RADIATED EMISSION (BELOW 1GHz) 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)	CONFIGURE MODE
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	2
	149 to 165	165	OFDM	BPSK	6.5	

RADIATED EMISSION (ABOVE 1GHz) 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)	CONFIGURE MODE
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	2
	149 to 165	165	OFDM	BPSK	6.5	
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	3
	149 to 165	165	OFDM	BPSK	6.5	
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	4
	149 to 165	157	OFDM	BPSK	6.5	



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)	CONFIGURE MODE
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	2
	149 to 165	165	OFDM	BPSK	6.5	
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	3
	149 to 165	165	OFDM	BPSK	6.5	
2.4 GHz 802.11n (HT20) + 5 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	4
	149 to 165	157	OFDM	BPSK	6.5	

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	26deg. C, 66%RH	120Vac, 60Hz	JyunChun Lin
RE<1G	22deg. C, 71%RH	120Vac, 60Hz	Tim Ho
RE≥1G	22deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
OB	22deg. C, 63%RH	120Vac, 60Hz	Robert Cheng



3.3 DESCRIPTION OF SUPPORT UNITS

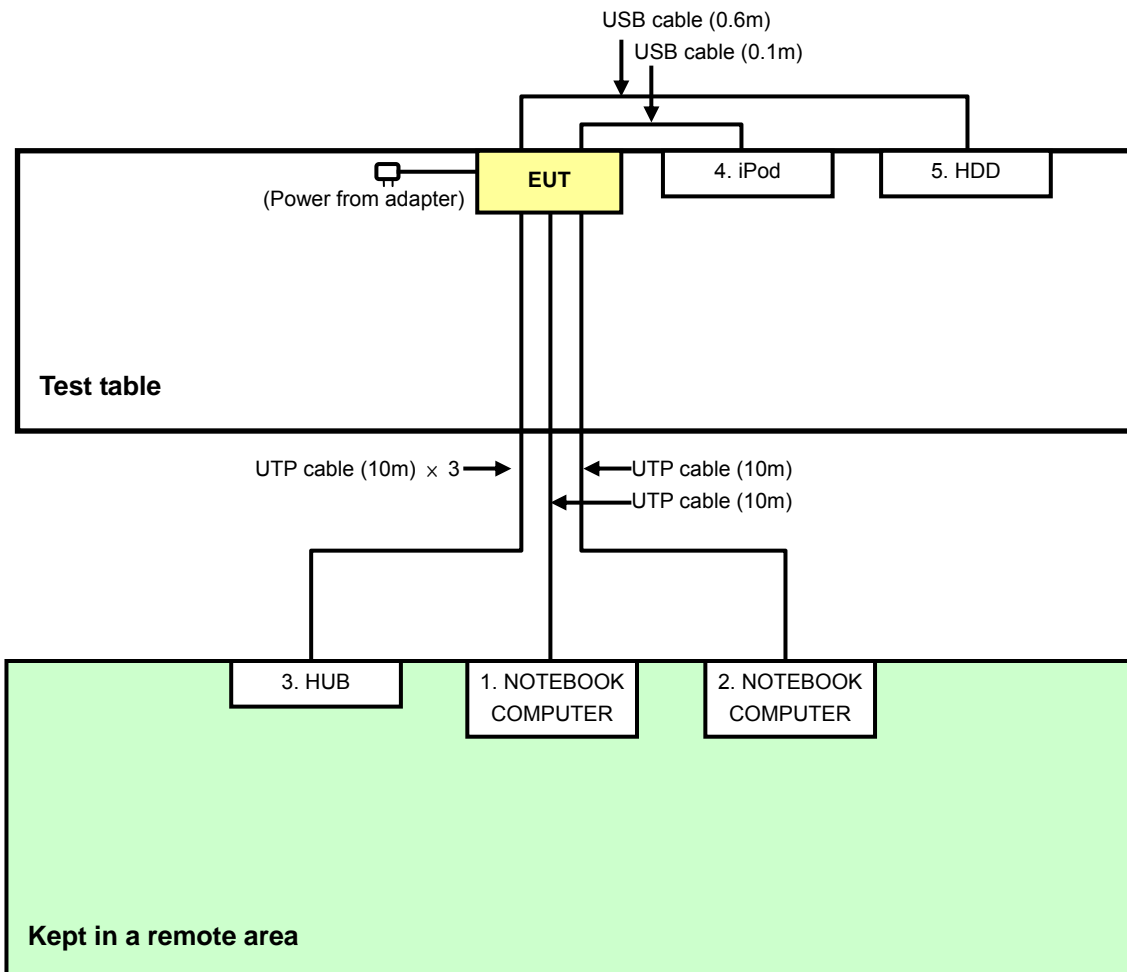
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

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
3	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
4	iPod	Apple	MC749TA/A	CC4DMFJUDFDM	NA
5	HDD	WD	WDBACW0010H BK-SESN	WXK1A51E5819	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable, 10m
2	UTP cable, 10m
3	UTP cable, 10m
4	USB cable, 0.1m
5	USB cable, 0.6m

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 (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

- 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: July 26, 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.

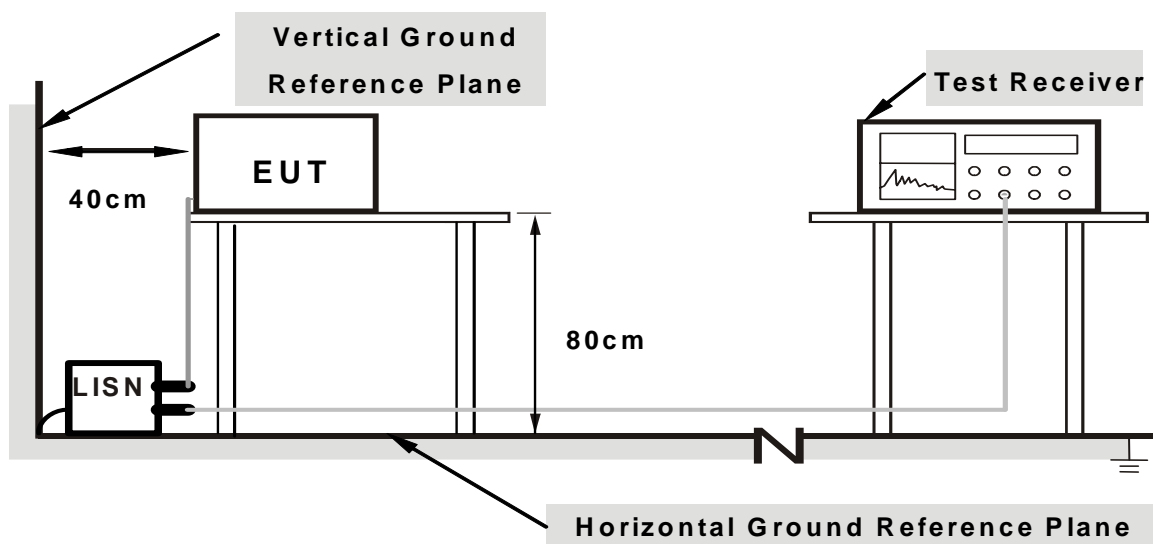
NOTE:

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 “MTool.exe[2.0.0.8]” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

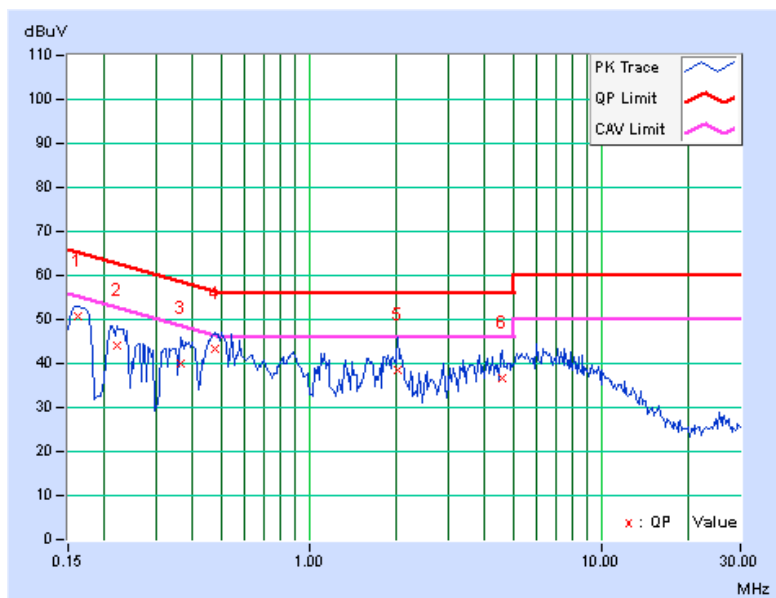
4.1.7 TEST RESULTS (MODE 1)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	----------	--------------------------	--------------------------------

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	0.16172	0.13	50.68	39.24	50.81	39.37	65.38	55.38	-14.56	-16.00
2	0.22031	0.16	44.01	32.09	44.17	32.25	62.81	52.81	-18.64	-20.56
3	0.36484	0.19	39.77	27.35	39.96	27.54	58.62	48.62	-18.66	-21.08
4	0.47422	0.21	43.26	32.78	43.47	32.99	56.44	46.44	-12.97	-13.45
5	2.01953	0.34	38.21	30.53	38.55	30.87	56.00	46.00	-17.45	-15.13
6	4.60938	0.51	36.15	28.51	36.66	29.02	56.00	46.00	-19.34	-16.98

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

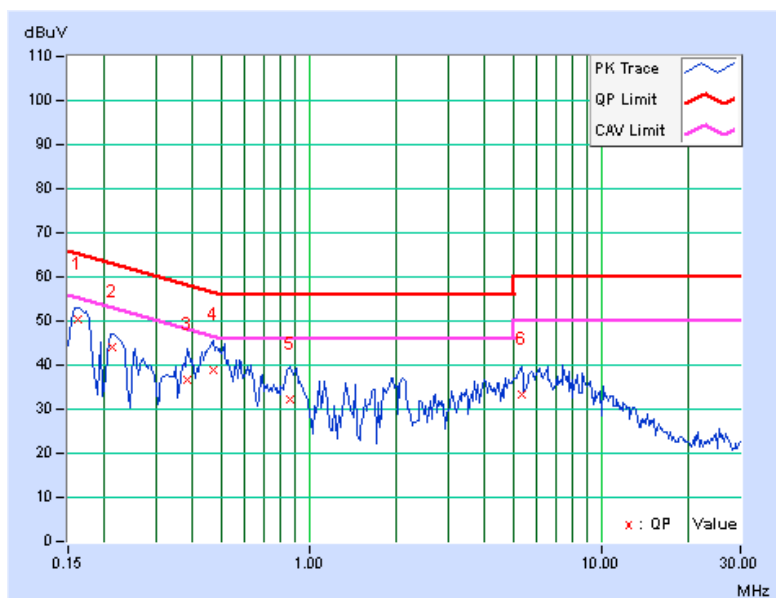


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

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	0.16172	0.11	50.09	38.07	50.20	38.18	65.38	55.38	-15.17	-17.19
2	0.21250	0.13	44.07	31.72	44.20	31.85	63.11	53.11	-18.90	-21.25
3	0.38438	0.19	36.32	25.02	36.51	25.21	58.18	48.18	-21.68	-22.98
4	0.47031	0.19	38.84	27.23	39.03	27.42	56.51	46.51	-17.47	-19.08
5	0.85703	0.21	32.08	22.03	32.29	22.24	56.00	46.00	-23.71	-23.76
6	5.33203	0.50	32.95	25.69	33.45	26.19	60.00	50.00	-26.55	-23.81

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



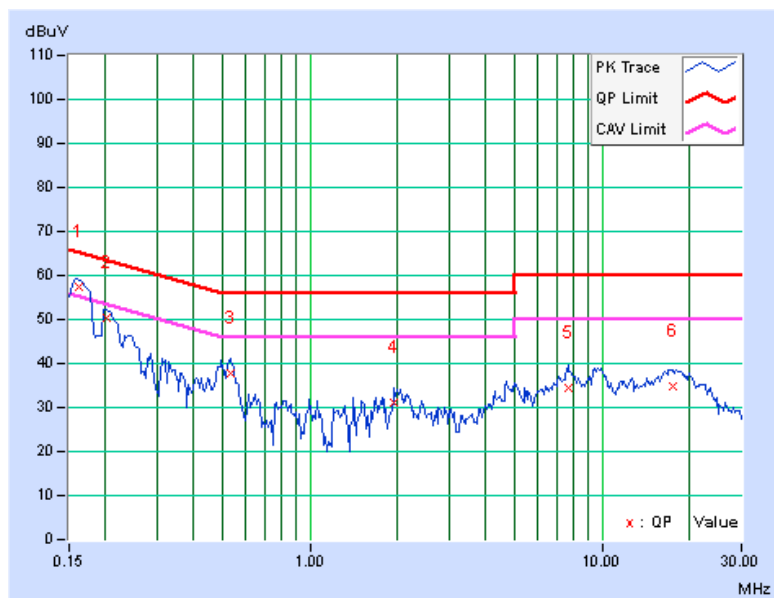
4.1.8 TEST RESULTS (MODE 3)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	----------	--------------------------	--------------------------------

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	0.16172	0.13	57.32	47.74	57.45	47.87	65.38	55.38	-7.92	-7.50
2	0.20078	0.15	50.25	40.21	50.40	40.36	63.58	53.58	-13.18	-13.22
3	0.53281	0.21	37.51	32.07	37.72	32.28	56.00	46.00	-18.28	-13.72
4	1.94922	0.34	30.91	25.30	31.25	25.64	56.00	46.00	-24.75	-20.36
5	7.62891	0.73	33.62	28.81	34.35	29.54	60.00	50.00	-25.65	-20.46
6	17.43359	1.32	33.53	28.54	34.85	29.86	60.00	50.00	-25.15	-20.14

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

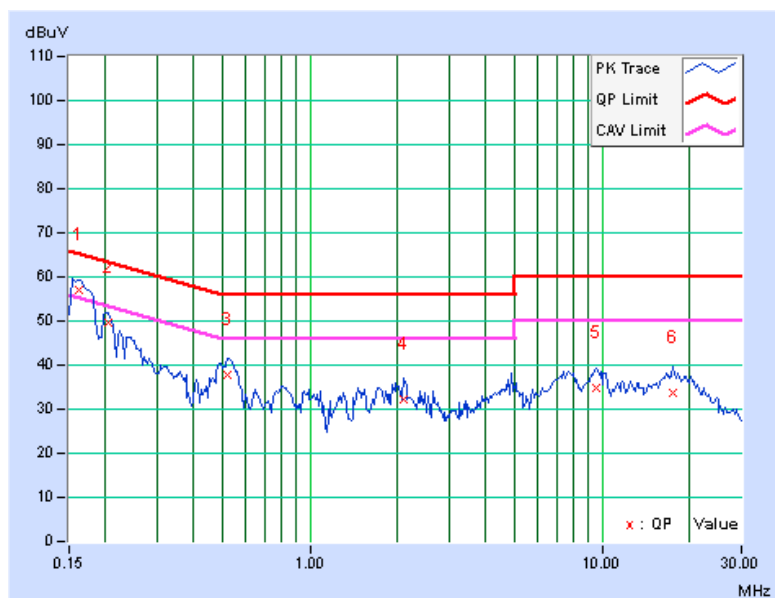


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	-------------	--------------------------	--------------------------------

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	0.16172	0.11	57.01	45.99	57.12	46.10	65.38	55.38	-8.25	-9.27
2	0.20469	0.13	49.64	38.21	49.77	38.34	63.42	53.42	-13.65	-15.08
3	0.52500	0.20	37.57	30.91	37.77	31.11	56.00	46.00	-18.23	-14.89
4	2.09766	0.31	31.94	24.96	32.25	25.27	56.00	46.00	-23.75	-20.73
5	9.52344	0.72	34.14	29.53	34.86	30.25	60.00	50.00	-25.14	-19.75
6	17.48828	1.04	32.67	27.77	33.71	28.81	60.00	50.00	-26.29	-21.19

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.



4.2.2 TEST INSTRUMENTS

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	SLKKa-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: July 29 to Aug. 06, 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.

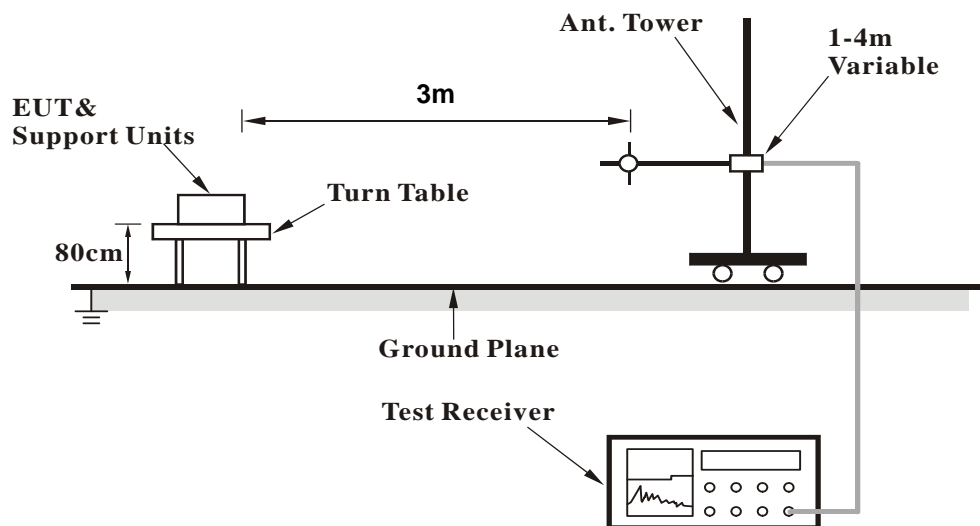
NOTE:

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 (HT20) / ch165	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	107.19	34.9 QP	43.5	-8.6	2.00 H	291	51.67	-16.80
2	250.00	32.6 QP	46.0	-13.4	1.00 H	224	47.07	-14.44
3	293.91	34.1 QP	46.0	-11.9	1.00 H	270	47.09	-12.95
4	533.33	38.8 QP	46.0	-7.2	2.00 H	20	46.07	-7.28
5	786.17	32.3 QP	46.0	-13.7	1.00 H	120	34.31	-2.02
6	875.02	31.0 QP	46.0	-15.0	1.00 H	273	31.92	-0.94
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	37.50	36.2 QP	40.0	-3.8	1.00 V	218	50.20	-13.99
2	63.50	35.6 QP	40.0	-4.5	1.50 V	60	49.73	-14.18
3	212.75	32.2 QP	43.5	-11.3	1.50 V	44	48.61	-16.44
4	500.01	32.2 QP	46.0	-13.8	2.00 V	281	39.97	-7.76
5	533.33	34.2 QP	46.0	-11.8	1.00 V	93	41.45	-7.28
6	675.00	29.2 QP	46.0	-16.8	1.50 V	11	33.56	-4.35

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



A D T

ABOVE 1GHz DATA

Legacy / MIMO (CDD) with beam forming mode

CHANNEL	2.4 GHz 802.11n (HT20) / ch6 + 5 GHz 802.11n (HT20) / ch165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	46.5 PK	74.0	-27.5	1.00 H	317	38.60	7.90
2	4874.00	34.5 AV	54.0	-19.5	1.00 H	317	26.60	7.90
3	7311.00	55.8 PK	74.0	-18.2	1.22 H	280	42.81	12.99
4	7311.00	43.1 AV	54.0	-10.9	1.22 H	280	30.11	12.99
5	11570.00	51.1 PK	74.0	-22.9	1.26 H	206	34.29	16.81
6	11570.00	43.0 AV	54.0	-11.0	1.26 H	206	26.19	16.81

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	51.9 PK	74.0	-22.1	1.17 V	226	44.00	7.90
2	4874.00	43.4 AV	54.0	-10.6	1.17 V	226	35.50	7.90
3	7311.00	55.4 PK	74.0	-18.6	1.28 V	285	42.41	12.99
4	7311.00	43.3 AV	54.0	-10.7	1.28 V	285	30.31	12.99
5	11570.00	51.6 PK	74.0	-22.4	1.26 V	217	34.79	16.81
6	11570.00	43.1 AV	54.0	-10.9	1.26 V	217	26.29	16.81

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



A D T

Legacy / MIMO (CDD) mode

CHANNEL	2.4 GHz 802.11n (HT20) / ch6 + 5 GHz 802.11n (HT20) / ch165	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	46.5 PK	74.0	-27.5	1.00 H	317	38.60	7.90
2	4874.00	34.5 AV	54.0	-19.5	1.00 H	317	26.60	7.90
3	7311.00	55.8 PK	74.0	-18.2	1.22 H	280	42.81	12.99
4	7311.00	43.1 AV	54.0	-10.9	1.22 H	280	30.11	12.99
5	11570.00	51.1 PK	74.0	-22.9	1.26 H	206	34.29	16.81
6	11570.00	43.0 AV	54.0	-11.0	1.26 H	206	26.19	16.81

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	51.9 PK	74.0	-22.1	1.17 V	226	44.00	7.90
2	4874.00	43.4 AV	54.0	-10.6	1.17 V	226	35.50	7.90
3	7311.00	55.4 PK	74.0	-18.6	1.28 V	285	42.41	12.99
4	7311.00	43.3 AV	54.0	-10.7	1.28 V	285	30.31	12.99
5	11570.00	51.6 PK	74.0	-22.4	1.26 V	217	34.79	16.81
6	11570.00	43.1 AV	54.0	-10.9	1.26 V	217	26.29	16.81

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



A D T

Legacy / MIMO (STBC) mode

CHANNEL	2.4 GHz 802.11n (HT20) / ch6 + 5 GHz 802.11n (HT20) / ch157	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	47.1 PK	74.0	-26.9	1.00 H	326	39.20	7.90
2	4874.00	34.9 AV	54.0	-19.1	1.00 H	326	27.00	7.90
3	7311.00	56.3 PK	74.0	-17.7	1.23 H	287	43.31	12.99
4	7311.00	43.5 AV	54.0	-10.5	1.23 H	287	30.51	12.99
5	11650.00	50.7 PK	74.0	-23.3	1.24 H	206	34.08	16.62
6	11650.00	42.8 AV	54.0	-11.2	1.24 H	206	26.18	16.62

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	51.7 PK	74.0	-22.3	1.13 V	232	43.80	7.90
2	4874.00	43.2 AV	54.0	-10.8	1.13 V	232	35.30	7.90
3	7311.00	55.2 PK	74.0	-18.8	1.26 V	285	42.21	12.99
4	7311.00	43.4 AV	54.0	-10.6	1.26 V	285	30.41	12.99
5	11650.00	51.8 PK	74.0	-22.2	1.18 V	219	35.18	16.62
6	11650.00	43.0 AV	54.0	-11.0	1.18 V	219	26.38	16.62

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 30dB 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
Spectrum Analyzer R&S	FSP 40	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. 09, 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.

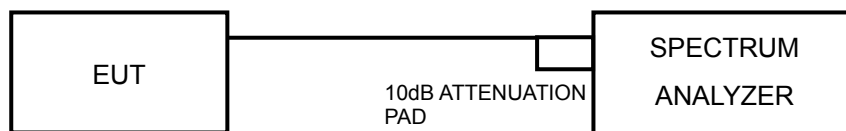
Measurement Procedure –Unwanted Emission Level

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

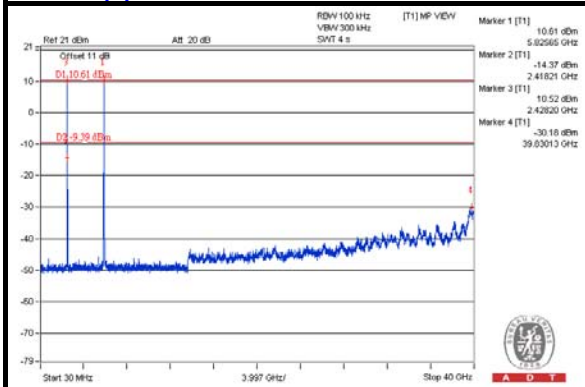
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.



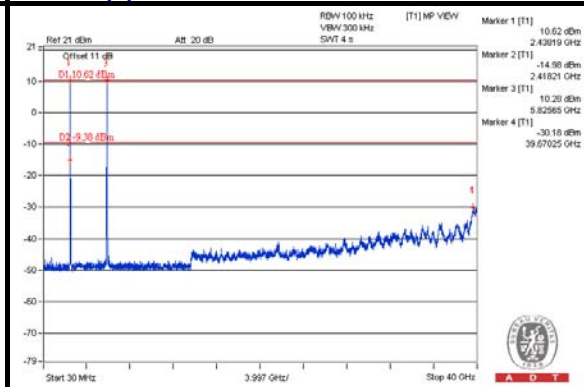
A D T

Legacy/MIMO (CDD) with beam forming 802.11n (HT20)

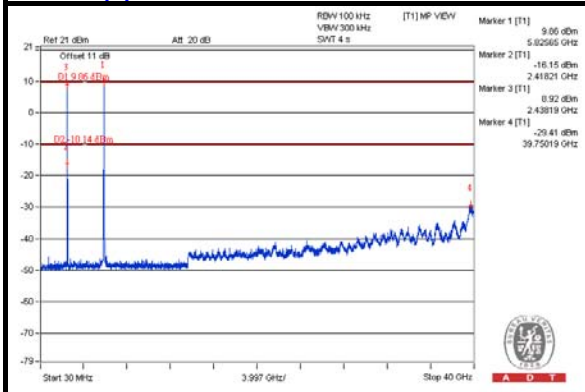
CHAIN (0)



CHAIN (1)



CHAIN (2)

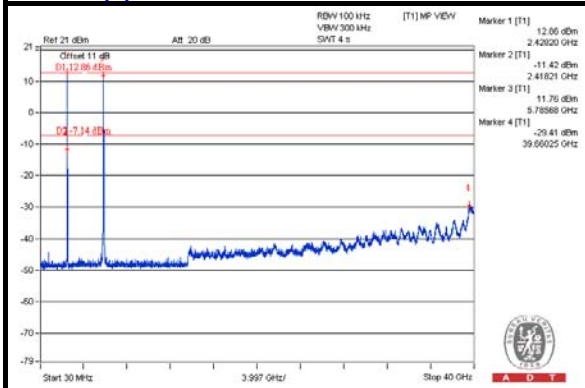




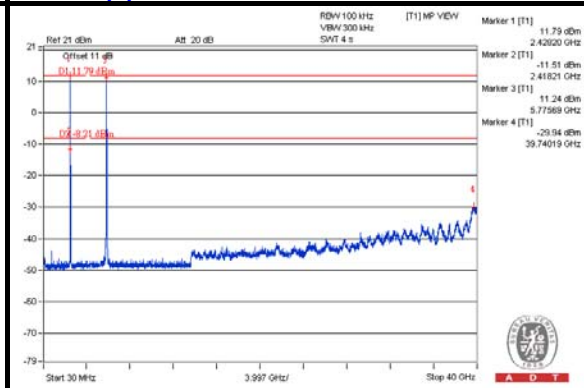
A D T

Legacy/MIMO (CDD) 802.11n (HT20)

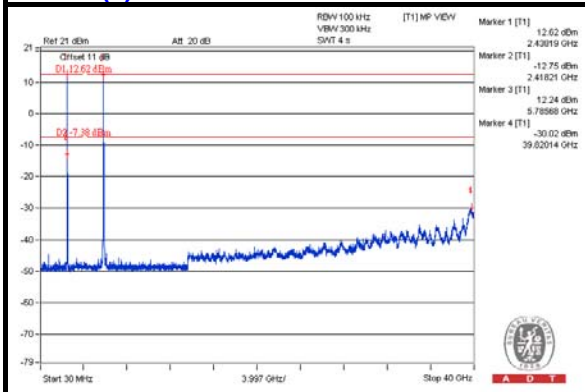
CHAIN (0)



CHAIN (1)



CHAIN (2)

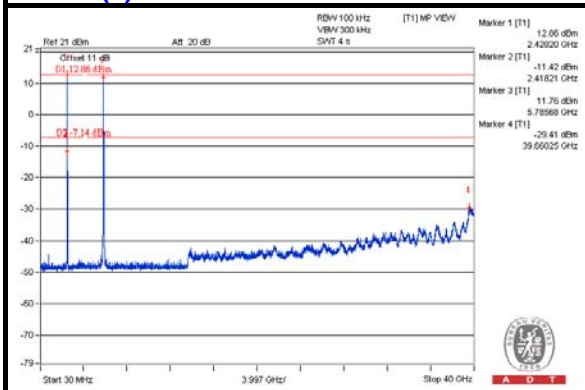




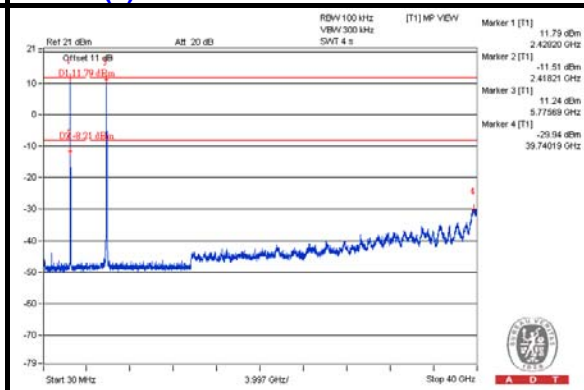
A D T

Legacy/MIMO (STBC) 802.11n (HT20)

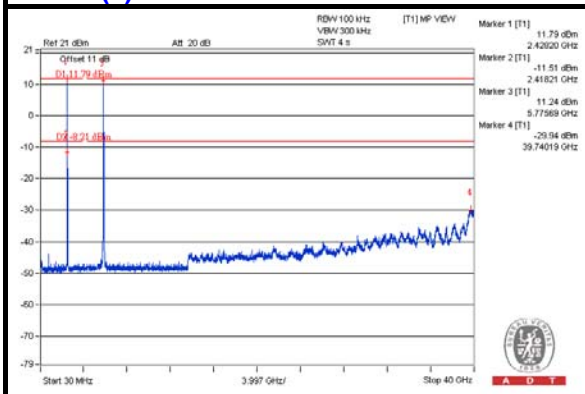
CHAIN (0)



CHAIN (1)



CHAIN (2)



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:

Tel: 886-2-26052180

Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

---END---