

# FCC TEST REPORT (15.247)

**REPORT NO.:** RF121023C07-3

MODEL NO.: P530A

FCC ID: UZI-P530A

**RECEIVED:** Oct. 23, 2012

**TESTED:** Oct. 29 ~ Nov. 15, 2012

**ISSUED:** Nov. 26, 2012

**APPLICANT:** BandRich Inc.

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**ISSUED BY:** Bureau Veritas Consumer Products Services

(H.K.) Ltd., Taoyuan Branch

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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei

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## **RELEASE CONTROL RECORD**

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF121023C07-3	Original release	Nov. 26, 2012

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### 1. CERTIFICATION

PRODUCT: LTE/HSPA+ Mobile Router

MODEL NO.: P530A

**BRAND:** BandLuxe

**APPLICANT:** BandRich Inc.

**TESTED:** Oct. 29 ~ Nov. 15, 2012

**TEST SAMPLE:** ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart C (Section 15.247)

ANSI C63.10-2009

The above equipment (model: P530A) 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 : Nov. 26, 2012

Pettie Chen / Senior Specialist

APPROVED BY : Ken Lin , DATE: Nov. 26, 2012

Ken Liu / 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 -21.07dB at 1.27689MHz.			
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.3dB at 2390.00MHz.			
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.			
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.			
15.247(b)	Conducted power	PASS	Meet the requirement of limit.			
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.			
15.203	Antenna Requirement	PASS	No antenna connector is used.			

#### 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:

MEASUREMENT	FREQUENCY	UNCERTAINTY	
Conducted emissions	9kHz~30MHz	2.44 dB	
	30MHz ~ 200MHz	3.19 dB	
Dadiated emissions	200MHz ~1000MHz	3.21 dB	
Radiated emissions	1GHz ~ 18GHz	2.26 dB	
	18GHz ~ 40GHz	1.94 dB	

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



## 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

EUT	LTE/HSPA+ Mobile Router
MODEL NO.	P530A
POWER SUPPLY	3.7Vdc (Battery)
FOWER SOFFEI	5Vdc (Adapter & host equipment)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS
MODOLATION TITL	64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps
TRANSFER RATE	802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps
	802.11n: up to 72.2Mbps
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz)
OUTPUT POWER	94.624mW
ANTENNA TYPE	Chip antenna with 1dBi gain
ANTENNA CONNECTOR	N/A
DATA CABLE	1.0m non-shielded USB cable without core
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

## NOTE:

1. The EUT provides one completed transmitter and one receiver.

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	1TX
802.11n (20MHz)	1TX

2. The EUT consumes power from the following battery and adapter.

Battery	
MODEL:	GT-2200
RATING:	3.7Vdc, 8.14WH

ADAPTER	
BRAND:	PHIHONG
MODEL:	PSA05A-050Q
INPUT:	100-240Vac ~ 0.2A, 50-60Hz
OUTPUT:	5Vdc, 1A

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



## 3.2 DESCRIPTION OF TEST MODES

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

CHANNEL	HANNEL FREQUENCY		FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		



#### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE		APPLICA	ABLE TO		DESCRIPTION
MODE	RE≥1G	RE<1G	PLC	APCM	BESONII NON
Α	√	$\checkmark$	<b>V</b>	√	Power from host equipment
В	-	<b>V</b>	<b>V</b>	-	Power from adapter

Where

**RE≥1G:** Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE:

The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

NOTE: "-"means no effect.

#### **RADIATED EMISSION TEST (ABOVE 1GHz):**

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.

CON	EUT FIGURE IODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
	Α	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
	Α	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
	Α	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2

#### RADIATED EMISSION TEST (BELOW 1GHz):

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A. B	802.11g	1 to 11	11	OFDM	BPSK	6.0

#### **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.

EUT CONFIGURE MODE MODE		AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B	802.11g	1 to 11	11	OFDM	BPSK	6.0

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#### **BANDEDGE 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
Α	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
Α	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
А	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	7.2

#### **ANTENNA PORT CONDUCTED MEASUREMENT:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
А	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
А	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
Α	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2

#### **TEST CONDITION:**

APPLICABLE TO	APPLICABLE TO ENVIRONMENTAL CONDITIONS		TESTED BY
RE≥1G	26deg. C, 70%RH	120Vac, 60Hz	Alan Wu
RE<1G	26deg. C, 70%RH	120Vac, 60Hz	Cedric Wu
PLC	26deg. C, 67%RH	120Vac, 60Hz	Cedric Wu
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui



## 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.

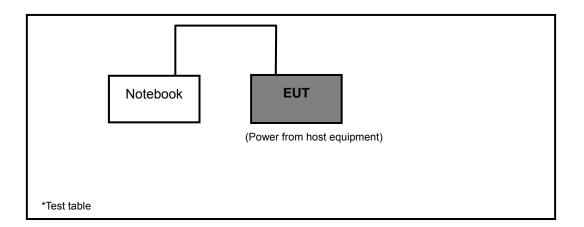
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5420	BPQ8MQ1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

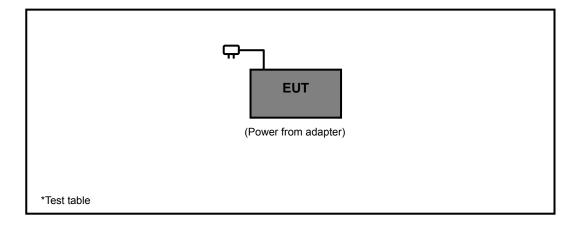
**NOTE:** All power cords of the above support units are non shielded (1.8m).

#### 3.3.1 CONFIGURATION OF SYSTEM UNDER TEST

#### **Test Mode A**



#### **Test Mode B**



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#### 3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247) 558074 D01 DTS Meas Guidance v02

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



#### 4. TEST TYPES AND RESULTS

#### 4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE 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.



#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Jan. 03, 2012	Jan. 02, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP 40	100039	Feb. 03, 2012	Feb. 02, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 06, 2012	Apr. 05, 2013
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Jan. 05, 2012	Jan. 04, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8447D	2944A10738	Oct. 26, 2012	Oct. 25, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Nov. 03, 2011	Nov. 02, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4	Oct. 26, 2012	Oct. 25, 2013
Software ADT	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT	TT100.	TT93021704	NA	NA
Turn Table Controller ADT	SC100.	SC93021704	NA	NA
High Speed Peak Power Meter	ML2495A	0842014	Apr. 28, 2012	Apr. 27, 2013
Power Sensor	MA2411B	0738404	Apr. 28, 2012	Apr. 27, 2013

**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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
- 3. The test was performed in HwaYa Chamber 4.
- 4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 5. The FCC Site Registration No. is 460141.
- 6. The IC Site Registration No. is IC7450F-4.



#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

#### NOTE

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 100kHz and video bandwidth is 300kHz for Peak detection at frequency above 1GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 1kHz for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation



#### 4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

#### **Test Mode A**

- a. Connected the EUT into Notebook via a USB cable placed on a testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.

#### **Test Mode B**

- a. Placed the EUT on the testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.



#### 4.1.7 TEST RESULTS

#### **ABOVE 1GHz DATA:**

#### 802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

	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	2390.00	58.4 PK	74.0	-15.6	1.35 H	54	26.40	32.00	
2	2390.00	48.1 AV	54.0	-5.9	1.35 H	54	16.10	32.00	
3	*2412.00	104.2 PK			1.35 H	57	72.20	32.00	
4	*2412.00	100.4 AV			1.35 H	57	68.40	32.00	
5	4824.00	49.1 PK	74.0	-24.9	1.95 H	144	10.70	38.40	
6	4824.00	42.9 AV	54.0	-11.1	1.95 H	144	4.50	38.40	
		ANTENNA	POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 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	2390.00	58.4 PK	74.0	-15.6	1.00 V	333	26.40	32.00	
2	2390.00	45.3 AV	54.0	-8.7	1.00 V	333	13.30	32.00	
3	*2412.00	94.2 PK			1.00 V	330	62.20	32.00	
4	*2412.00	91.1 AV			1.00 V	330	59.10	32.00	
5	4824.00	49.0 PK	74.0	-25.0	1.73 V	219	10.60	38.40	
6	4824.00	42.1 AV	54.0	-11.9	1.73 V	219	3.70	38.40	

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*2437.00	105.3 PK			1.37 H	48	73.20	32.10
2	*2437.00	101.5 AV			1.37 H	48	69.40	32.10
3	2483.50	58.2 PK	74.0	-15.8	1.34 H	43	25.90	32.30
4	2483.50	45.0 AV	54.0	-9.0	1.34 H	43	12.70	32.30
5	4874.00	50.1 PK	74.0	-23.9	1.92 H	141	11.70	38.40
6	4874.00	43.6 AV	54.0	-10.4	1.92 H	141	5.20	38.40
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*2437.00	95.0 PK			1.56 V	352	62.90	32.10
2	*2437.00	92.2 AV			1.56 V	352	60.10	32.10
3	2483.50	58.1 PK	74.0	-15.9	1.56 V	340	25.80	32.30
4	2483.50	44.8 AV	54.0	-9.2	1.56 V	340	12.50	32.30
5	4874.00	49.6 PK	74.0	-24.4	1.79 V	212	11.20	38.40
6	4874.00	42.8 AV	54.0	-11.2	1.79 V	212	4.40	38.40

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



<b>EUT TEST CONDITION</b>		MEASUREMENT DETAIL		
CHANNEL Channel 11		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

	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	*2462.00	104.1 PK			1.31 H	61	71.90	32.20	
2	*2462.00	100.4 AV			1.31 H	61	68.20	32.20	
3	2483.50	58.8 PK	74.0	-15.2	1.34 H	62	26.50	32.30	
4	2483.50	48.4 AV	54.0	-5.6	1.34 H	62	16.10	32.30	
5	4924.00	51.1 PK	74.0	-22.9	1.92 H	144	12.70	38.40	
6	4924.00	43.9 AV	54.0	-10.1	1.92 H	144	5.50	38.40	
		ANTENNA	POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 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	*2462.00	94.1 PK			1.00 V	307	61.90	32.20	
2	*2462.00	90.5 AV			1.00 V	307	58.30	32.20	
3	2483.50	57.7 PK	74.0	-16.3	1.00 V	302	25.40	32.30	
4	2483.50	44.9 AV	54.0	-9.1	1.00 V	302	12.60	32.30	
5	4924.00	50.2 PK	74.0	-23.8	1.72 V	219	11.80	38.40	
6	4924.00	43.2 AV	54.0	-10.8	1.72 V	219	4.80	38.40	

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



## 802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Channel 1		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

		ANTENNA	POLARITY	& TEST DIS	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	2390.00	68.3 PK	74.0	-5.7	1.10 H	42	36.30	32.00					
2	2390.00	51.7 AV	54.0	-2.3	1.10 H	42	19.70	32.00					
3	*2412.00	102.8 PK			1.08 H	39	70.80	32.00					
4	*2412.00	93.2 AV			1.08 H	39	61.20	32.00					
5	4824.00	48.0 PK	74.0	-26.0	1.97 H	147	9.60	38.40					
6	4824.00	41.1 AV	54.0	-12.9	1.97 H	147	2.70	38.40					
		ANTENNA	A POLARIT	/ & TEST DI	STANCE: V	ERTICAL A	T 3 M						
NO.	NO. FREQ. (MHz) EMISSION LIMIT (dBuV/m) MARGIN (dB) ANTENNA HEIGHT (m) TABLE RAW VALUE (dBuV) FACTOR												
		(abav/iii)			` ,	(Degree)		(aB/m)					
1	2390.00	61.1 PK	74.0	-12.9	1.74 V	219	29.10	32.00					
1	2390.00 2390.00	,	74.0 54.0	-12.9 -6.5		` ` ,	29.10 15.50	, ,					
		61.1 PK			1.74 V	219		32.00					
2	2390.00	61.1 PK 47.5 AV			1.74 V 1.74 V	219 219	15.50	32.00 32.00					
2	2390.00	61.1 PK 47.5 AV 96.7 PK			1.74 V 1.74 V 1.74 V	219 219 218	15.50 64.70	32.00 32.00 32.00					

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Channel 6		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*2437.00	102.3 PK			1.10 H	166	70.20	32.10
2	*2437.00	92.5 AV			1.10 H	166	60.40	32.10
3	2483.50	57.9 PK	74.0	-16.1	1.06 H	169	25.60	32.30
4	2483.50	44.7 AV	54.0	-9.3	1.06 H	169	12.40	32.30
5	4874.00	48.5 PK	74.0	-25.5	1.79 H	216	10.10	38.40
6	4874.00	41.0 AV	54.0	-13.0	1.79 H	216	2.60	38.40
		ANTENNA	A POLARITY	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*2437.00	97.0 PK			1.66 V	204	64.90	32.10
2	*2437.00	86.1 AV			1.66 V	204	54.00	32.10
3	2483.50	57.6 PK	74.0	-16.4	1.64 V	208	25.30	32.30
4	2483.50	44.1 AV	54.0	-9.9	1.64 V	208	11.80	32.30
5	4874.00	47.3 PK	74.0	-26.7	1.00 V	161	8.90	38.40

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Channel 11		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

	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	*2462.00	102.6 PK			1.32 H	54	70.40	32.20	
2	*2462.00	91.3 AV			1.32 H	54	59.10	32.20	
3	2483.50	66.9 PK	74.0	-7.1	1.28 H	56	34.60	32.30	
4	2483.50	51.1 AV	54.0	-2.9	1.28 H	56	18.80	32.30	
5	4924.00	46.3 PK	74.0	-27.7	1.88 H	149	7.90	38.40	
6	4924.00	32.5 AV	54.0	-21.5	1.88 H	149	-5.90	38.40	
		ANTENNA	POLARIT	/ & TEST DI	STANCE: V	ERTICAL A	T 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	*2462.00	96.3 PK			1.72 V	217	64.10	32.20	
2	*2462.00	84.6 AV			1.72 V	217	52.40	32.20	
3	2483.50	59.5 PK	74.0	-14.5	1.70 V	215	27.20	32.30	
4	2483.50	46.0 AV	54.0	-8.0	1.70 V	215	13.70	32.30	
5	4924.00	46.4 PK	74.0	-27.6	1.00 V	65	8.00	38.40	
6	4924.00	32.0 AV	54.0	-22.0	1.00 V	65	-6.40	38.40	

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



#### 802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Channel 1		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	2390.00	63.2 PK	74.0	-10.8	1.39 H	13	31.20	32.00
2	2390.00	48.0 AV	54.0	-6.0	1.39 H	13	16.00	32.00
3	*2412.00	102.3 PK			1.40 H	17	70.30	32.00
4	*2412.00	89.4 AV			1.40 H	17	57.40	32.00
5	4824.00	45.6 PK	74.0	-28.4	1.82 H	163	7.20	38.40
6	4824.00	31.9 AV	54.0	-22.1	1.82 H	163	-6.50	38.40
		ANTENNA	POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 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	2390.00	56.4 PK	74.0	-17.6	1.76 V	221	24.40	32.00
2	2390.00	45.5 AV	54.0	-8.5	1.76 V	221	13.50	32.00
3	*2412.00	92.3 PK			1.70 V	215	60.30	32.00
4	*2412.00	82.2 AV			1.70 V	215	50.20	32.00
5	4824.00	44.4 PK	74.0	-29.6	1.00 V	58	6.00	38.40
6	4824.00	30.2 AV	54.0	-23.8	1.00 V	58	-8.20	38.40

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL Channel 6		FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

		ANTENNA I	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*2437.00	104.1 PK			1.33 H	56	72.00	32.10
2	*2437.00	92.3 AV			1.33 H	56	60.20	32.10
3	2483.50	57.6 PK	74.0	-16.4	1.30 H	54	25.30	32.30
4	2483.50	45.3 AV	54.0	-8.7	1.30 H	54	13.00	32.30
5	4874.00	45.6 PK	74.0	-28.4	1.60 H	173	7.20	38.40
6	4874.00	32.7 AV	54.0	-21.3	1.60 H	173	-5.70	38.40
		ANTENNA	POLARIT	/ & TEST DI	STANCE: V	ERTICAL A	T 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	*2437.00	93.5 PK			1.44 V	211	61.40	32.10
2	*2437.00	81.6 AV			1.44 V	211	49.50	32.10
3	2483.50	58.0 PK	74.0	-16.0	1.40 V	200	25.70	32.30
4	2483.50	45.1 AV	54.0	-8.9	1.40 V	200	12.80	32.30
5	4874.00	44.9 PK	74.0	-29.1	1.00 V	40	6.50	38.40
6	4874.00	31.9 AV	54.0	-22.1	1.00 V	40	-6.50	38.40

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



<b>EUT TEST CONDITION</b>		MEASUREMENT DETAIL		
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Alan Wu	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*2462.00	100.3 PK			1.34 H	20	68.10	32.20
2	*2462.00	89.4 AV			1.34 H	20	57.20	32.20
3	2483.50	60.1 PK	74.0	-13.9	1.30 H	21	27.80	32.30
4	2483.50	47.1 AV	54.0	-6.9	1.30 H	21	14.80	32.30
5	4924.00	46.7 PK	74.0	-27.3	1.80 H	135	8.30	38.40
6	4924.00	32.7 AV	54.0	-21.3	1.80 H	135	-5.70	38.40
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*2462.00	90.5 PK			1.68 V	233	58.30	32.20
2	*2462.00	81.4 AV			1.68 V	233	49.20	32.20
3	2483.50	59.4 PK	74.0	-14.6	1.60 V	230	27.10	32.30
4	2483.50	46.3 AV	54.0	-7.7	1.60 V	230	14.00	32.30
5	4904.00	46.1 PK	74.0	-27.9	1.00 V	47	7.60	38.50
6	4904.00	32.3 AV	54.0	-21.7	1.00 V	47	-6.20	38.50

- 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
- 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. " \* ": Fundamental frequency.



#### **BELOW 1GHz WORST-CASE DATA: 802.11g**

<b>EUT TEST CONDITION</b>		MEASUREMENT DETAIL		
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Cedric Wu	
TEST MODE	Α			

	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	69.99	30.5 QP	40.0	-9.5	1.75 H	8	18.30	12.20	
2	214.24	39.8 QP	43.5	-3.7	1.50 H	232	28.40	11.40	
3	231.70	42.7 QP	46.0	-3.3	1.25 H	202	30.60	12.10	
4	313.20	40.0 QP	46.0	-6.0	1.25 H	5	24.90	15.10	
5	480.07	42.1 QP	46.0	-3.9	1.50 H	219	23.10	19.00	
6	666.35	35.3 QP	46.0	-10.7	1.25 H	244	13.30	22.00	
		ANTENNA	A POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 3 M		
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)			
1	70.66								
	70.00	36.9 QP	40.0	-3.1	1.50 V	242	24.80	12.10	
2	202.60	36.9 QP 29.1 QP	40.0 43.5	-3.1 -14.4	1.50 V 1.74 V	242 331	24.80 18.20	12.10 10.90	
3				***				_	
-	202.60	29.1 QP	43.5	-14.4	1.74 V	331	18.20	10.90	
3	202.60 233.64	29.1 QP 33.1 QP	43.5 46.0	-14.4 -12.9	1.74 V 1.74 V	331 265	18.20 20.90	10.90 12.20	

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



<b>EUT TEST CONDITION</b>		MEASUREMENT DETAIL		
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak	
ENVIRONMENTAL CONDITIONS	26deg. C, 70%RH	TESTED BY	Cedric Wu	
TEST MODE	В			

	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	101.69	22.7 QP	43.5	-20.8	1.75 H	5	13.10	9.60		
2	286.03	18.1 QP	46.0	-27.9	1.25 H	224	3.90	14.20		
3	464.55	18.5 QP	46.0	-27.5	1.75 H	77	-0.20	18.70		
4	623.66	21.2 QP	46.0	-24.8	1.50 H	138	-0.50	21.70		
5	775.01	23.4 QP	46.0	-22.6	1.50 H	170	-0.60	24.00		
6	916.66	25.9 QP	46.0	-20.1	1.75 H	292	0.00	25.90		
		ANTENNA	A POLARITY	/ & TEST DI	STANCE: V	ERTICAL A	T 3 M			
	(dBuV/m) HEIGHT (m) (dBuV)									
NO.	FREQ. (MHz)			MARGIN (dB)	7			FACTOR (dB/m)		
<b>NO</b> .	FREQ. (MHz) 45.42	LEVEL		MARGIN (dB) -14.7	7	ANGLE		FACTOR		
	` ,	LEVEL (dBuV/m)	(dBuV/m)	` ′	HEIGHT (m)	ANGLE (Degree)	(dBuV)	FACTOR (dB/m)		
1	45.42	LEVEL (dBuV/m) 25.3 QP	(dBuV/m) 40.0	-14.7	<b>HEIGHT (m)</b>	ANGLE (Degree)	(dBuV)	FACTOR (dB/m) 14.00		
1 2	45.42 66.77	LEVEL (dBuV/m) 25.3 QP 23.2 QP	(dBuV/m) 40.0 40.0	-14.7 -16.8	1.00 V 1.00 V	ANGLE (Degree) 121 107	(dBuV) 11.30 10.60	FACTOR (dB/m) 14.00 12.60		
1 2 3	45.42 66.77 144.38	LEVEL (dBuV/m) 25.3 QP 23.2 QP 15.4 QP	(dBuV/m) 40.0 40.0 43.5	-14.7 -16.8 -28.1	1.00 V 1.00 V 1.24 V	ANGLE (Degree) 121 107 38	(dBuV)  11.30  10.60  1.70	FACTOR (dB/m)  14.00  12.60  13.70		

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



#### 4.2 CONDUCTED EMISSION MEASUREMENT

#### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED	D 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 0.50MHz.
- 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Nov. 23, 2011	Nov. 22, 2012
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 29, 2011	Dec. 28, 2012
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 02, 2012	Jul. 01, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 07, 2012	Feb. 06, 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 HwaYa Shielded Room 1.
- 3. The VCCI Site Registration No. is C-2040.



#### 4.2.3 TEST PROCEDURES

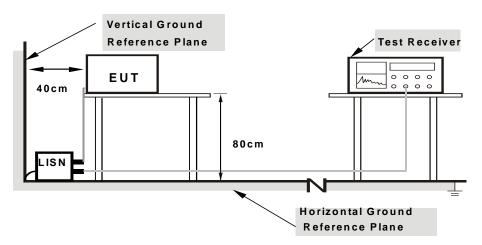
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

NOTE: 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



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

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.



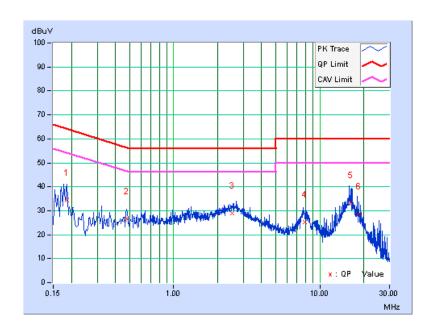
#### 4.2.7 TEST RESULTS

## **CONDUCTED WORST-CASE DATA: 802.11g**

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

Na	Freq.	Corr. Factor	Readin	g Value	_	ssion vel	Lir	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18508	0.22	34.16	17.44	34.38	17.66	64.25	54.25	-29.88	-36.60
2	0.47412	0.25	26.48	19.03	26.73	19.28	56.44	46.44	-29.71	-27.16
3	2.50773	0.37	28.62	23.90	28.99	24.27	56.00	46.00	-27.01	-21.73
4	7.85661	0.49	24.79	18.64	25.28	19.13	60.00	50.00	-34.72	-30.87
5	16.27673	0.69	32.53	26.82	33.22	27.51	60.00	50.00	-26.78	-22.49
6	18.41752	0.75	27.90	19.38	28.65	20.13	60.00	50.00	-31.35	-29.87

- 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.

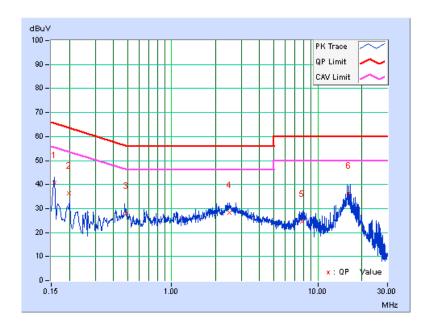




PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

Na	Freq. Corr.		Freq. Corr. Reading Value			Emission Level		Limit		Margin	
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(dl	B)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15719	0.20	40.45	27.14	40.65	27.34	65.61	55.61	-24.96	-28.27	
2	0.19769	0.20	36.01	20.01	36.21	20.21	63.71	53.71	-27.50	-33.50	
3	0.48678	0.23	27.83	20.45	28.06	20.68	56.22	46.22	-28.17	-25.55	
4	2.47254	0.34	28.02	22.83	28.36	23.17	56.00	46.00	-27.64	-22.83	
5	7.78320	0.54	24.11	18.31	24.65	18.85	60.00	50.00	-35.35	-31.15	
6	16.20055	0.78	35.48	26.58	36.26	27.36	60.00	50.00	-23.74	-22.64	

- 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.

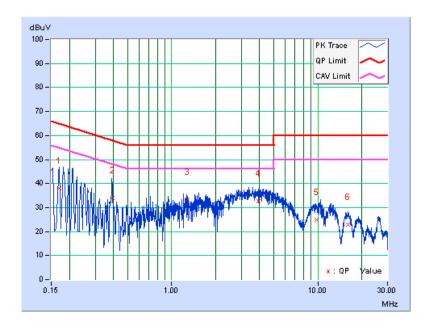




PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	В		

Na	No Freq. Corr. Factor		Readin	g Value	Emis Le	ssion vel	Lir	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(dl	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16967	0.21	37.97	23.76	38.18	23.97	64.98	54.98	-26.80	-31.01
2	0.39242	0.24	33.71	23.68	33.95	23.92	58.01	48.01	-24.06	-24.09
3	1.27689	0.32	33.14	24.61	33.46	24.93	56.00	46.00	-22.54	-21.07
4	3.90751	0.44	32.26	23.63	32.70	24.07	56.00	46.00	-23.30	-21.93
5	9.75687	0.52	24.41	16.53	24.93	17.05	60.00	50.00	-35.07	-32.95
6	15.99723	0.68	22.25	13.22	22.93	13.90	60.00	50.00	-37.07	-36.10

- 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.

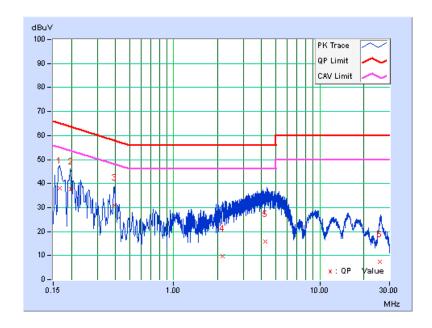




PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	В		

Na	No Freq. Corr. Factor		Readin	g Value	Emis Le	ssion vel	Lir	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(dl	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16526	0.20	37.81	24.11	38.01	24.31	65.20	55.20	-27.18	-30.88
2	0.19717	0.20	37.51	25.66	37.71	25.86	63.73	53.73	-26.02	-27.87
3	0.39426	0.22	30.61	22.79	30.83	23.01	57.97	47.97	-27.14	-24.96
4	2.16281	0.32	9.52	2.23	9.84	2.55	56.00	46.00	-46.16	-43.45
5	4.22353	0.44	15.51	2.27	15.95	2.71	56.00	46.00	-40.05	-43.29
6	25.60410	0.84	6.44	-2.65	7.28	-1.81	60.00	50.00	-52.72	-51.81

- 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.



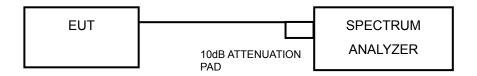


#### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST SETUP



#### 4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 TEST PROCEDURE

- a. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
- b. Set the video bandwidth (VBW)  $\geq$  3 x RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



## 4.3.7 TEST RESULTS

## 802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.33	0.5	PASS
6	2437	10.29	0.5	PASS
11	2462	10.29	0.5	PASS

## 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.45	0.5	PASS
6	2437	16.51	0.5	PASS
11	2462	16.51	0.5	PASS

## 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.69	0.5	PASS
6	2437	17.66	0.5	PASS
11	2462	17.79	0.5	PASS



#### 4.4 CONDUCTED OUTPUT POWER

#### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

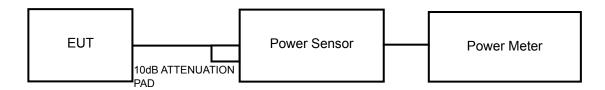
Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

#### 4.4.2 TEST SETUP



#### 4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

#### 4.4.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the peak power level.

#### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



## 4.4.7 TEST RESULTS

## 802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	40.738	16.10	30	PASS
6	2437	40.179	16.04	30	PASS
11	2462	41.783	16.21	30	PASS

## 802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	84.918	19.29	30	PASS
6	2437	88.716	19.48	30	PASS
11	2462	94.624	19.76	30	PASS

## 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	65.013	18.13	30	PASS
6	2437	75.336	18.77	30	PASS
11	2462	70.795	18.50	30	PASS

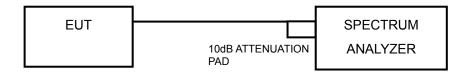


#### 4.5 POWER SPECTRAL DENSITY MEASUREMENT

#### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

#### 4.5.2 TEST SETUP



#### 4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

#### 4.5.4 TEST PROCEDURE

- a. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
- b. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- c. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



## 4.5.7 TEST RESULTS

## 802.11b

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-13.09	8	PASS
6	2437	-12.67	8	PASS
11	2462	-11.75	8	PASS

## 802.11g

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-17.19	8	PASS
6	2437	-15.62	8	PASS
11	2462	-15.65	8	PASS

## 802.11n (20MHz)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-18.62	8	PASS
6	2437	-17.58	8	PASS
11	2462	-17.89	8	PASS



#### 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

#### 4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

#### 4.6.2 TEST SETUP



#### 4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

#### 4.6.4 TEST PROCEDURE

#### **MEASUREMENT PROCEDURE REF**

- 1. Set the RBW = 100 kHz.
- 2. Set the VBW ≥ 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 OOBE**

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

#### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

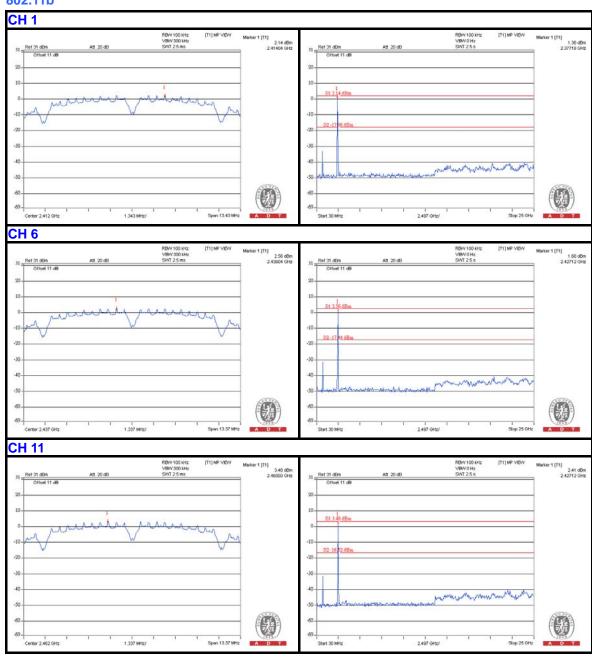
#### 4.6.7 TEST RESULTS

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.



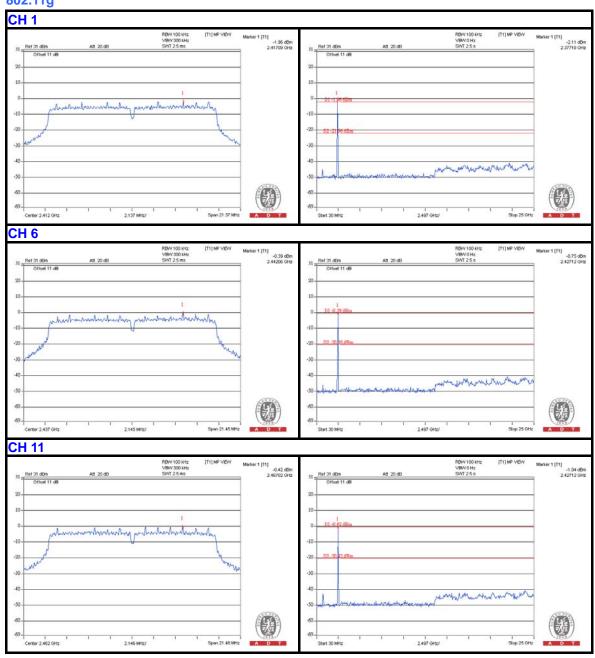
#### 4.6.8 TEST RESULTS

## 802.11b



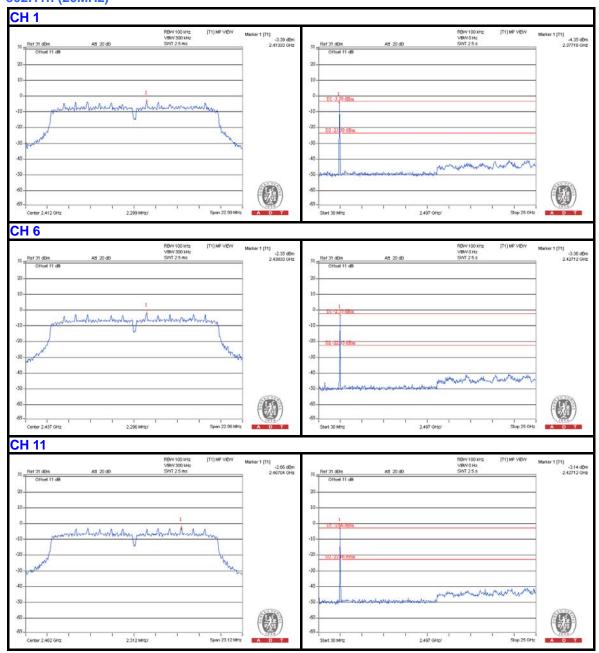


#### 802.11g





## 802.11n (20MHz)





	A D T					
5. PHOTOGRAPHS OF THE TEST CONFIGURATION						
Please refer to the attached file (Test Setup Photo).						



#### 6. 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.

Hsin Chu EMC/RF Lab

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

Linko EMC/RF Lab

Tel: 886-2-26052180 Tel: 886-3-5935343 Fax: 886-2-26051924 Fax: 886-3-5935342

## Hwa Ya EMC/RF/Safety/Telecom Lab

Tel: 886-3-3183232 Fax: 886-3-3270892

**Email:** <u>service.adt@tw.bureauveritas.com</u> **Web Site:** <u>www.bureauveritas-adt.com</u>

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



# 7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---