



# FCC TEST REPORT

**REPORT NO.:** RF120622C07-1  
**MODEL NO.:** TL-WA830RE  
**FCC ID:** TE7WA830REV2  
**RECEIVED:** Jun. 22, 2012  
**TESTED:** Jul. 21 ~ Aug. 28, 2012  
**ISSUED:** Sep. 10, 2012

**APPLICANT:** TP-LINK TECHNOLOGIES CO., LTD.

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

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120622C07-1	Original release	Sep. 10, 2012



A D T

## 1. CERTIFICATION

**PRODUCT:** 300Mbps Wireless N Range Extender  
**MODEL NO.:** TL-WA830RE  
**BRAND:** TP-LINK  
**APPLICANT:** TP-LINK TECHNOLOGIES CO., LTD.  
**TESTED:** Jul. 21 ~ Aug. 28, 2012  
**TEST SAMPLE:** PROTOTYPE  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
**Canada RSS-210 Issue 8 (2010-12)**  
**Canada RSS-Gen Issue 3 (2010-12)**  
ANSI C63.10-2009

The above equipment (model: TL-WA830RE) 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 : Jemma Yang , DATE : Sep. 10, 2012  
Jemma Yang / Specialist

APPROVED BY : Gary Chang , DATE : Sep. 10, 2012  
Gary Chang / Technical 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); RSS-210; RSS-Gen				
Standard Section		Test Type and Limit	Result	Remark
FCC Part 15	CANADA STANDARD			
15.207	RSS-Gen 7.2.4	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.37dB at 0.15000MHz.
-	RSS-Gen 4.6	Occupied Bandwidth Measurement	PASS	Meet the requirement of limit.
15.247(d) 15.209	RSS-210 A8.5	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2364.00MHz.
15.247(d)	RSS-210 A8.5	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	RSS-210 A8.2 (a)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	RSS-210 A8.4 (4)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	RSS-210 A8.2 (b)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	-	Antenna Requirement	PASS	Antenna connector is SMA Male Reverse not a standard connector.

### 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	150kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	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

<b>EUT</b>	300Mbps Wireless N Range Extender
<b>MODEL NO.</b>	TL-WA830RE
<b>POWER SUPPLY</b>	9Vdc (adapter)
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>TRANSFER RATE</b>	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
<b>OPERATING FREQUENCY</b>	2412 ~ 2462MHz
<b>NUMBER OF CHANNEL</b>	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
<b>OUTPUT POWER</b>	539.24mW
<b>ANTENNA TYPE</b>	Dipole antenna with 5dBi gain
<b>ANTENNA CONNECTOR</b>	SMA Male Reverse
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	Adapter

**NOTE:**

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX FUNCTION
802.11b	2TX
802.11g	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

2. The EUT consumes power from the following adapter.

ADAPTER	
<b>BRAND:</b>	TP-LINK
<b>MODEL:</b>	T090060-2B1
<b>INPUT:</b>	100-240Vac, 50/60Hz, 0.3A
<b>OUTPUT:</b>	9Vdc, 0.6
<b>POWER LINE:</b>	1.5m non-shielded cable w/o core

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

7 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		



### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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 **Z-plane**.

#### **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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

#### **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)
-	802.11g	1 to 11	6	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)
-	802.11g	1 to 11	6	OFDM	BPSK	6.0



**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)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 9	OFDM	BPSK	15.0

**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)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 68%RH	120Vac, 60Hz	Sun Lin
	24deg. C, 65%RH	120Vac, 60Hz	Alan Wu
RE<1G	24deg. C, 65%RH	120Vac, 60Hz	Alan Wu
PLC	23deg. C, 65%RH	120Vac, 60Hz	Jones Chang
APCM	24deg. C, 64%RH	120Vac, 60Hz	Felix Soong



### 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.

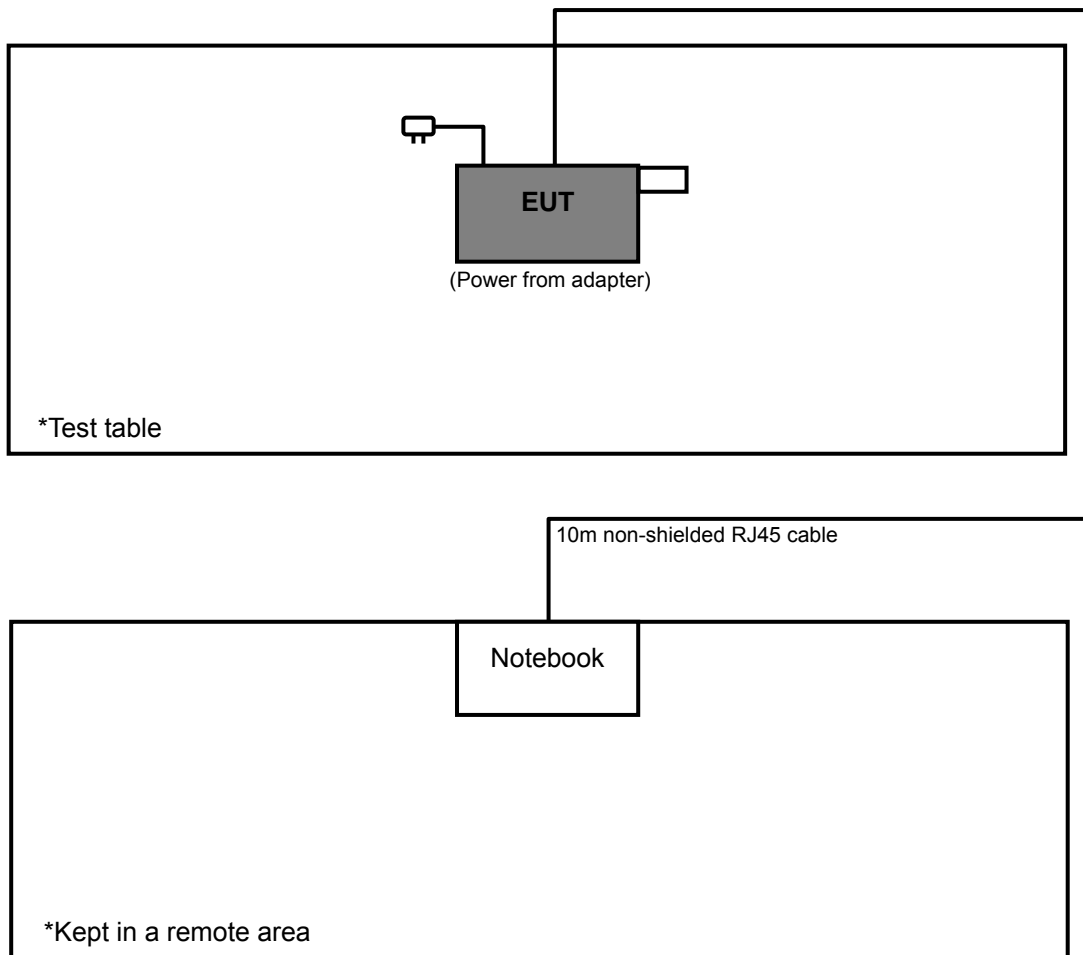
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	D531	CN-0XM006-48643-81U-2610	QDS-BRCM1020

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m non-shielded RJ45 cable.

**NOTE:**

- 1. All power cords of the above support units are non shielded (1.8m).
- 2. Item 1 acted as communication partner to transfer data.

### 3.3.1 CONFIGURATION OF SYSTEM UNDER TEST





### 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 v01**

**Canada RSS-210 Issue 8 (2010-12)**

**Canada RSS-Gen Issue 3 (2010-12)**

**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	ESCI	100744	Apr. 19, 2012	Apr. 18, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jan. 30, 2012	Jan. 29, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 03, 2012	Apr. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Dec. 21, 2011	Dec. 20, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Preamplifier Agilent	8449B	3008A01911	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10638	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 11, 2012	Aug. 10, 2013
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	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 test was performed in HwaYa Chamber 9.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 460141.
  5. The IC Site Registration No. is IC 7450F-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. Height of receiving 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 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:**

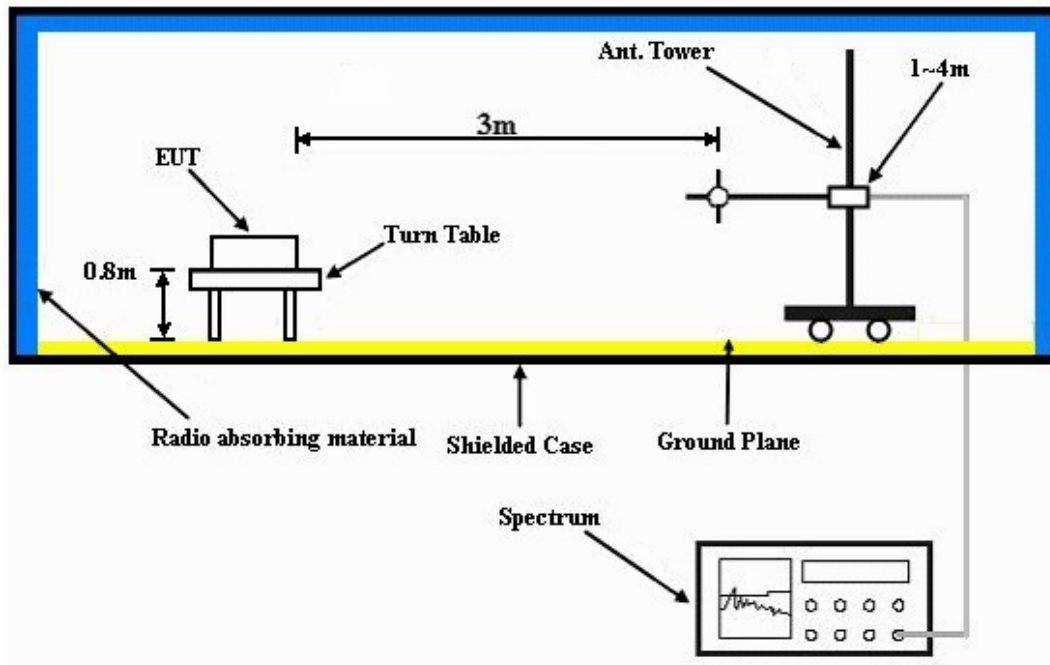
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz 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

- Placed the EUT on the testing table.
- Prepared notebook to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".
- The necessary accessories enable the system in full functions.

## 4.1.7 TEST RESULTS

### ABOVE 1GHz

#### 802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	2364.00	58.5 PK	74.0	-15.5	1.27 H	159	27.20	31.30
2	2364.00	50.1 AV	54.0	-3.9	1.27 H	159	18.80	31.30
3	*2412.00	101.2 PK			1.27 H	158	69.80	31.40
4	*2412.00	97.6 AV			1.27 H	158	66.20	31.40
5	4824.00	50.1 PK	74.0	-23.9	1.39 H	221	12.60	37.50
6	4824.00	46.8 AV	54.0	-7.2	1.39 H	221	9.30	37.50
7	#7236.00	51.7 PK	81.2	-29.5	1.04 H	322	8.10	43.60
8	#7236.00	39.6 AV	77.6	-38.0	1.04 H	322	-4.00	43.60

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	2364.00	62.6 PK	74.0	-11.4	1.00 V	44	31.30	31.30
2	<b>2364.00</b>	<b>53.0 AV</b>	<b>54.0</b>	<b>-1.0</b>	<b>1.00 V</b>	<b>44</b>	<b>21.70</b>	<b>31.30</b>
3	*2412.00	112.4 PK			1.00 V	44	81.00	31.40
4	*2412.00	108.7 AV			1.00 V	44	77.30	31.40
5	4824.00	53.9 PK	74.0	-20.1	1.00 V	237	16.40	37.50
6	4824.00	51.1 AV	54.0	-2.9	1.00 V	237	13.60	37.50
7	#7236.00	52.8 PK	92.4	-39.6	1.17 V	221	9.20	43.60
8	#7236.00	43.8 AV	88.7	-44.9	1.17 V	221	0.20	43.60

#### 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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. "#": The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	2385.00	58.4 PK	74.0	-15.6	1.21 H	189	27.10	31.30
2	2385.00	50.3 AV	54.0	-3.7	1.21 H	189	19.00	31.30
3	*2437.00	100.0 PK			1.22 H	169	68.50	31.50
4	*2437.00	95.9 AV			1.22 H	169	64.40	31.50
5	4874.00	49.7 PK	74.0	-24.3	1.43 H	217	12.10	37.60
6	4874.00	46.5 AV	54.0	-7.5	1.43 H	217	8.90	37.60
7	7311.00	51.2 PK	74.0	-22.8	1.08 H	325	7.50	43.70
8	7311.00	39.1 AV	54.0	-14.9	1.08 H	325	-4.60	43.70

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	2385.00	60.5 PK	74.0	-13.5	1.00 V	30	29.20	31.30
2	2385.00	52.3 AV	54.0	-1.7	1.00 V	30	21.00	31.30
3	*2437.00	110.6 PK			1.00 V	30	79.10	31.50
4	*2437.00	106.9 AV			1.00 V	30	75.40	31.50
5	4874.00	52.2 PK	74.0	-21.8	1.00 V	240	14.60	37.60
6	4874.00	48.4 AV	54.0	-5.6	1.00 V	240	10.80	37.60
7	7311.00	52.5 PK	74.0	-21.5	1.04 V	199	8.80	43.70
8	7311.00	40.3 AV	54.0	-13.7	1.04 V	199	-3.40	43.70

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	100.8 PK			1.21 H	142	69.20	31.60
2	*2462.00	97.3 AV			1.21 H	142	65.70	31.60
3	2483.50	57.3 PK	74.0	-16.7	1.15 H	247	25.60	31.70
4	2483.50	44.7 AV	54.0	-9.3	1.15 H	247	13.00	31.70
5	4924.00	50.7 PK	74.0	-23.3	1.35 H	217	13.00	37.70
6	4924.00	47.3 AV	54.0	-6.7	1.35 H	217	9.60	37.70
7	7386.00	51.5 PK	74.0	-22.5	1.08 H	327	7.60	43.90
8	7386.00	40.1 AV	54.0	-13.9	1.08 H	327	-3.80	43.90
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	*2462.00	111.6 PK			1.00 V	41	80.00	31.60
2	*2462.00	108.0 AV			1.00 V	41	76.40	31.60
3	2483.50	59.2 PK	74.0	-14.8	1.00 V	41	27.50	31.70
4	2483.50	49.1 AV	54.0	-4.9	1.00 V	41	17.40	31.70
5	4924.00	51.5 PK	74.0	-22.5	1.00 V	231	13.80	37.70
6	4924.00	47.8 AV	54.0	-6.2	1.00 V	231	10.10	37.70
7	7386.00	53.3 PK	74.0	-20.7	1.24 V	217	9.40	43.90
8	7386.00	41.9 AV	54.0	-12.1	1.24 V	217	-2.00	43.90

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



A D T

802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	1.26 H	143	27.00	31.40
2	2390.00	44.5 AV	54.0	-9.5	1.26 H	143	13.10	31.40
3	*2412.00	100.2 PK			1.26 H	143	68.80	31.40
4	*2412.00	90.3 AV			1.26 H	143	58.90	31.40
5	4824.00	43.8 PK	74.0	-30.2	1.37 H	213	6.30	37.50
6	4824.00	31.9 AV	54.0	-22.1	1.37 H	213	-5.60	37.50

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	2390.00	61.6 PK	74.0	-12.4	1.00 V	337	30.20	31.40
2	2390.00	48.5 AV	54.0	-5.5	1.00 V	337	17.10	31.40
3	*2412.00	109.2 PK			1.00 V	348	77.80	31.40
4	*2412.00	100.4 AV			1.00 V	348	69.00	31.40
5	4824.00	46.4 PK	74.0	-27.6	1.00 V	244	8.90	37.50
6	4824.00	33.5 AV	54.0	-20.5	1.00 V	244	-4.00	37.50

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Sun Lin

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	2385.00	56.4 PK	74.0	-17.6	1.00 H	33	25.10	31.30
2	2385.00	44.8 AV	54.0	-9.2	1.00 H	33	13.50	31.30
3	*2437.00	102.7 PK			1.00 H	33	71.20	31.50
4	*2437.00	92.3 AV			1.00 H	33	60.80	31.50
5	2483.50	57.0 PK	74.0	-17.0	1.00 H	33	25.30	31.70
6	2483.50	45.1 AV	54.0	-8.9	1.00 H	33	13.40	31.70
7	4874.00	61.9 PK	74.0	-12.1	1.18 H	341	24.30	37.60
8	4874.00	43.8 AV	54.0	-10.2	1.18 H	341	6.20	37.60
9	7311.00	59.4 PK	74.0	-14.6	1.29 H	241	15.70	43.70
10	7311.00	45.3 AV	54.0	-8.7	1.29 H	241	1.60	43.70

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.
6. “ # “: The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Sun Lin

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	2385.00	62.5 PK	74.0	-11.5	1.00 V	206	31.20	31.30
2	2385.00	51.3 AV	54.0	-2.7	1.00 V	206	20.00	31.30
3	*2437.00	115.8 PK			1.00 V	154	84.30	31.50
4	*2437.00	105.7 AV			1.00 V	154	74.20	31.50
5	2483.50	62.2 PK	74.0	-11.8	1.00 V	154	30.50	31.70
6	2483.50	51.0 AV	54.0	-3.0	1.00 V	154	19.30	31.70
7	4874.00	65.8 PK	74.0	-8.2	1.00 V	239	28.20	37.60
8	4874.00	47.1 AV	54.0	-6.9	1.00 V	239	9.50	37.60
9	7311.00	58.7 PK	74.0	-15.3	1.09 V	219	15.00	43.70
10	7311.00	45.4 AV	54.0	-8.6	1.09 V	219	1.70	43.70

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	100.4 PK			1.22 H	147	68.80	31.60
2	*2462.00	90.5 AV			1.22 H	147	58.90	31.60
3	2483.50	59.2 PK	74.0	-14.8	1.22 H	147	27.50	31.70
4	2483.50	45.2 AV	54.0	-8.8	1.22 H	147	13.50	31.70
5	4924.00	43.9 PK	74.0	-30.1	1.42 H	221	6.20	37.70
6	4924.00	32.2 AV	54.0	-21.8	1.42 H	221	-5.50	37.70
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	*2462.00	109.2 PK			1.00 V	217	77.60	31.60
2	*2462.00	100.0 AV			1.00 V	217	68.40	31.60
3	2483.50	61.5 PK	74.0	-12.5	1.00 V	217	29.80	31.70
4	2483.50	49.3 AV	54.0	-4.7	1.00 V	217	17.60	31.70
5	4924.00	46.7 PK	74.0	-27.3	1.02 V	241	9.00	37.70
6	4924.00	33.2 AV	54.0	-20.8	1.02 V	241	-4.50	37.70

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.





A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	58.9 PK	74.0	-15.1	1.28 H	157	27.50	31.40
2	2390.00	44.8 AV	54.0	-9.2	1.28 H	157	13.40	31.40
3	*2412.00	99.5 PK			1.28 H	157	68.10	31.40
4	*2412.00	89.1 AV			1.28 H	157	57.70	31.40
5	4824.00	44.2 PK	74.0	-29.8	1.24 H	217	6.70	37.50
6	4824.00	32.7 AV	54.0	-21.3	1.24 H	217	-4.80	37.50

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	2390.00	60.0 PK	74.0	-14.0	1.00 V	190	28.60	31.40
2	2390.00	47.9 AV	54.0	-6.1	1.00 V	190	16.50	31.40
3	*2412.00	108.2 PK			1.00 V	164	76.80	31.40
4	*2412.00	98.9 AV			1.00 V	164	67.50	31.40
5	4824.00	46.8 PK	74.0	-27.2	1.04 V	258	9.30	37.50
6	4824.00	34.1 AV	54.0	-19.9	1.04 V	258	-3.40	37.50

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Sun Lin

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	55.4 PK	74.0	-18.6	1.00 H	34	24.00	31.40
2	2390.00	44.0 AV	54.0	-10.0	1.00 H	34	12.60	31.40
3	*2437.00	100.9 PK			1.00 H	34	69.40	31.50
4	*2437.00	91.2 AV			1.00 H	34	59.70	31.50
5	2483.50	55.1 PK	74.0	-18.9	1.00 H	34	23.40	31.70
6	2483.50	44.6 AV	54.0	-9.4	1.00 H	34	12.90	31.70
7	4874.00	58.1 PK	74.0	-15.9	1.17 H	341	20.50	37.60
8	4874.00	39.1 AV	54.0	-14.9	1.17 H	341	1.50	37.60
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	2390.00	62.8 PK	74.0	-11.2	1.00 V	25	31.40	31.40
2	2390.00	51.2 AV	54.0	-2.8	1.00 V	25	19.80	31.40
3	*2437.00	114.9 PK			1.00 V	34	83.40	31.50
4	*2437.00	104.5 AV			1.00 V	34	73.00	31.50
5	2483.50	61.5 PK	74.0	-12.5	1.00 V	35	29.80	31.70
6	2483.50	50.0 AV	54.0	-4.0	1.00 V	35	18.30	31.70
7	4874.00	62.9 PK	74.0	-11.1	1.00 V	240	25.30	37.60
8	4874.00	42.1 AV	54.0	-11.9	1.00 V	240	4.50	37.60

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	99.0 PK			1.24 H	162	67.40	31.60
2	*2462.00	88.5 AV			1.24 H	162	56.90	31.60
3	2483.50	57.6 PK	74.0	-16.4	1.24 H	162	25.90	31.70
4	2483.50	43.2 AV	54.0	-10.8	1.24 H	162	11.50	31.70
5	4924.00	44.9 PK	74.0	-29.1	1.35 H	228	7.20	37.70
6	4924.00	33.4 AV	54.0	-20.6	1.35 H	228	-4.30	37.70
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	*2462.00	107.8 PK			1.18 V	227	76.20	31.60
2	*2462.00	98.5 AV			1.18 V	227	66.90	31.60
3	2483.50	58.2 PK	74.0	-15.8	1.18 V	227	26.50	31.70
4	2483.50	48.2 AV	54.0	-5.8	1.18 V	227	16.50	31.70
5	4924.00	47.2 PK	74.0	-26.8	1.08 V	247	9.50	37.70
6	4924.00	34.5 AV	54.0	-19.5	1.08 V	247	-3.20	37.70

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

**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	60.4 PK	74.0	-13.6	1.21 H	169	29.00	31.40
2	2390.00	47.8 AV	54.0	-6.2	1.21 H	169	16.40	31.40
3	*2422.00	95.7 PK			1.21 H	169	64.20	31.50
4	*2422.00	85.4 AV			1.21 H	169	53.90	31.50
5	4844.00	44.7 PK	74.0	-29.3	1.22 H	227	7.20	37.50
6	4844.00	33.2 AV	54.0	-20.8	1.22 H	227	-4.30	37.50

**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	2390.00	62.2 PK	74.0	-11.8	1.41 V	93	30.80	31.40
2	2390.00	49.5 AV	54.0	-4.5	1.41 V	93	18.10	31.40
3	*2422.00	105.9 PK			1.38 V	251	74.40	31.50
4	*2422.00	96.4 AV			1.38 V	251	64.90	31.50
5	4844.00	45.2 PK	74.0	-28.8	1.08 V	264	7.70	37.50
6	4844.00	33.4 AV	54.0	-20.6	1.08 V	264	-4.10	37.50

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Sun Lin

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	57.4 PK	74.0	-16.6	1.00 H	67	26.00	31.40
2	2390.00	44.8 AV	54.0	-9.2	1.00 H	67	13.40	31.40
3	*2437.00	98.0 PK			1.00 H	67	66.50	31.50
4	*2437.00	88.0 AV			1.00 H	67	56.50	31.50
5	2483.50	55.7 PK	74.0	-18.3	1.00 H	67	24.00	31.70
6	2483.50	44.7 AV	54.0	-9.3	1.00 H	67	13.00	31.70
7	4874.00	49.7 PK	74.0	-24.3	1.06 H	342	12.10	37.60
8	4874.00	34.1 AV	54.0	-19.9	1.06 H	342	-3.50	37.60

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	2390.00	67.2 PK	74.0	-6.8	1.00 V	255	35.80	31.40
2	2390.00	52.6 AV	54.0	-1.4	1.00 V	255	21.20	31.40
3	*2437.00	111.6 PK			1.00 V	221	80.10	31.50
4	*2437.00	101.2 AV			1.00 V	221	69.70	31.50
5	2483.50	64.9 PK	74.0	-9.1	1.10 V	321	33.20	31.70
6	2483.50	51.2 AV	54.0	-2.8	1.10 V	321	19.50	31.70
7	4874.00	51.9 PK	74.0	-22.1	1.10 V	241	14.30	37.60
8	4874.00	35.6 AV	54.0	-18.4	1.10 V	241	-2.00	37.60

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	*2452.00	95.6 PK			1.18 H	158	64.00	31.60
2	*2452.00	85.2 AV			1.18 H	158	53.60	31.60
3	2483.50	55.2 PK	74.0	-18.8	1.18 H	158	23.50	31.70
4	2483.50	44.8 AV	54.0	-9.2	1.18 H	158	13.10	31.70
5	4904.00	44.2 PK	74.0	-29.8	1.27 H	234	6.60	37.60
6	4904.00	32.8 AV	54.0	-21.2	1.27 H	234	-4.80	37.60
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	*2452.00	105.8 PK			1.20 V	208	74.20	31.60
2	*2452.00	96.3 AV			1.20 V	208	64.70	31.60
3	2483.50	60.1 PK	74.0	-13.9	1.21 V	217	28.40	31.70
4	2483.50	49.3 AV	54.0	-4.7	1.21 V	217	17.60	31.70
5	4904.00	44.7 PK	74.0	-29.3	1.12 V	258	7.10	37.60
6	4904.00	33.2 AV	54.0	-20.8	1.12 V	258	-4.40	37.60

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ \* “: Fundamental frequency.



A D T

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 65%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	150.45	35.1 QP	43.5	-8.4	1.99 H	255	20.70	14.40
2	187.39	36.5 QP	43.5	-7.0	1.49 H	189	24.10	12.40
3	374.04	39.1 QP	46.0	-6.9	1.00 H	219	21.40	17.70
4	399.31	42.6 QP	46.0	-3.4	1.00 H	240	24.20	18.40
5	599.58	41.8 QP	46.0	-4.2	1.49 H	181	18.30	23.50
6	751.23	36.9 QP	46.0	-9.1	1.00 H	196	11.10	25.80
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	43.51	37.7 QP	40.0	-2.3	1.49 V	6	23.70	14.00
2	105.73	35.3 QP	43.5	-8.2	1.24 V	82	24.90	10.40
3	374.04	43.5 QP	46.0	-2.5	1.24 V	187	25.80	17.70
4	399.31	43.8 QP	46.0	-2.2	1.24 V	128	25.40	18.40
5	599.58	39.6 QP	46.0	-6.4	1.00 V	355	16.10	23.50
6	751.23	39.5 QP	46.0	-6.5	1.24 V	120	13.70	25.80

## 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).
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 LIMIT (dB $\mu$ 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 0.50MHz.
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

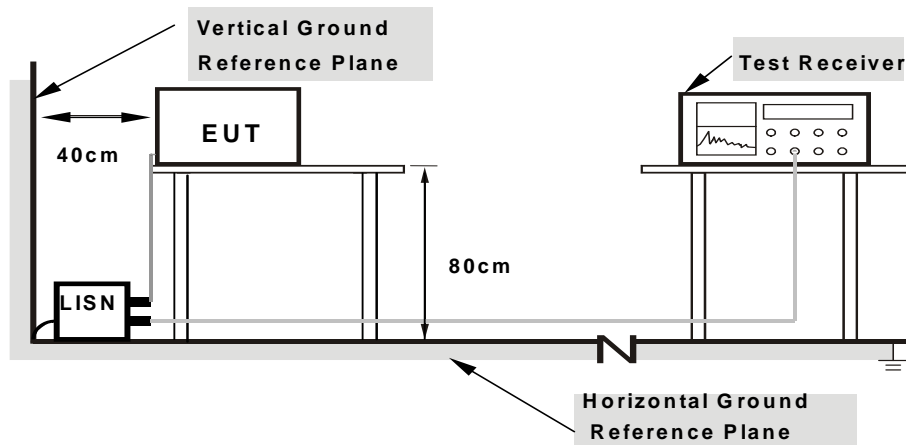
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. 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

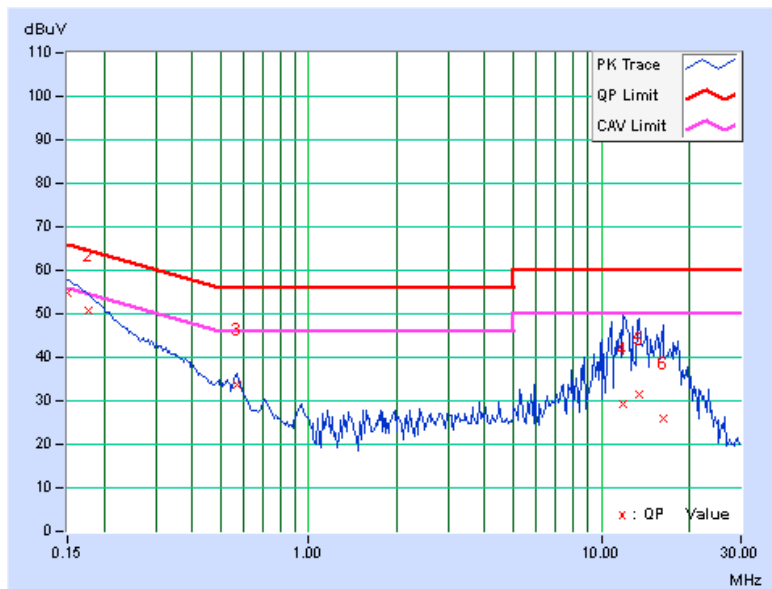
**CONDUCTED WORST-CASE DATA : 802.11g**

<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.14	54.49	42.22	54.63	42.36	66.00	56.00	-11.37	-13.64
2	0.17734	0.19	50.67	38.44	50.86	38.63	64.61	54.61	-13.75	-15.98
3	0.56797	0.17	33.36	27.59	33.53	27.76	56.00	46.00	-22.47	-18.24
4	11.89453	0.63	28.68	17.45	29.31	18.08	60.00	50.00	-30.69	-31.92
5	13.40597	0.68	30.84	18.23	31.52	18.91	60.00	50.00	-28.48	-31.09
6	16.23047	0.76	25.00	17.23	25.76	17.99	60.00	50.00	-34.24	-32.01

**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.

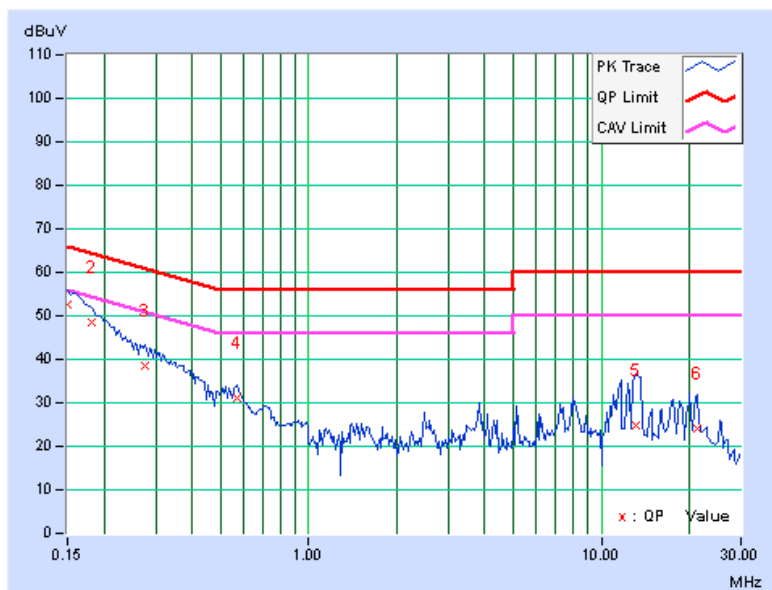


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.23	52.18	40.06	52.41	40.29	66.00	56.00	-13.59	-15.71
2	0.18125	0.28	48.38	35.96	48.66	36.24	64.43	54.43	-15.77	-18.19
3	0.27500	0.29	38.27	26.54	38.56	26.83	60.97	50.97	-22.41	-24.14
4	0.56797	0.26	30.80	20.05	31.06	20.31	56.00	46.00	-24.94	-25.69
5	13.16406	0.76	23.91	12.47	24.67	13.23	60.00	50.00	-35.33	-36.77
6	21.28125	1.03	23.05	11.65	24.08	12.68	60.00	50.00	-35.92	-37.32

**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.

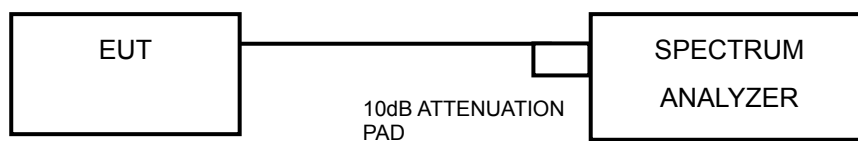


### 4.3 6dB BANDWIDTH MEASUREMENT

#### 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)  $\geq 3 \times$  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
		CHAIN 0	CHAIN 1		
1	2412	10.30	10.29	0.5	PASS
6	2437	10.26	10.30	0.5	PASS
11	2462	10.31	10.29	0.5	PASS

## 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.54	16.56	0.5	PASS
6	2437	16.58	16.62	0.5	PASS
11	2462	16.66	16.60	0.5	PASS

## 802.11n (20MHz)

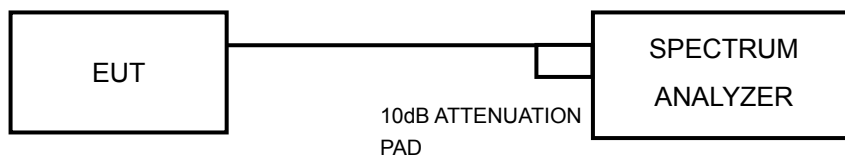
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.81	17.83	0.5	PASS
6	2437	17.81	17.85	0.5	PASS
11	2462	17.83	17.82	0.5	PASS

## 802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	35.63	35.82	0.5	PASS
6	2437	35.44	35.77	0.5	PASS
9	2452	35.88	35.61	0.5	PASS

## 4.4 OCCUPIED BANDWIDTH MEASUREMENT

### 4.4.1 TEST SETUP



### 4.4.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 4.4.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.5 EUT OPERATING CONDITIONS

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



## 4.4.6 TEST RESULTS

## 802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
1	2412	13.98	13.98	PASS
6	2437	13.74	13.98	PASS
11	2462	14.04	13.98	PASS

## 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
1	2412	17.16	16.98	PASS
6	2437	17.34	16.98	PASS
11	2462	17.22	16.86	PASS

## 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
1	2412	18.18	18.06	PASS
6	2437	18.18	18.18	PASS
11	2462	18.12	18.12	PASS

## 802.11n (40MHz)

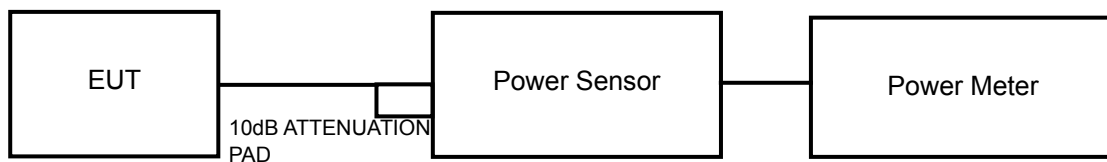
CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
3	2422	36.48	36.32	PASS
6	2437	36.48	36.48	PASS
9	2452	36.32	36.32	PASS

## 4.5 CONDUCTED OUTPUT POWER

### 4.5.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

### 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 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.

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



#### 4.5.7 TEST RESULTS

##### 802.11b

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	17.51	17.78	116.34	20.66	27.99	PASS
6	2437	17.85	17.52	117.45	20.70	27.99	PASS
11	2462	17.71	17.78	119.00	20.76	27.99	PASS

**NOTE:** Directional gain = 5.01dBi + 10log(2) = 8dBi > 6dBi , so the conducted power limit shall be reduced to 30-(8.01-6) = 27.99dBm.

##### 802.11g

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	20.28	20.21	211.61	23.26	27.99	PASS
6	2437	24.68	23.90	539.24	27.32	27.99	PASS
11	2462	20.32	20.41	217.55	23.38	27.99	PASS

**NOTE:** Directional gain = 5.01dBi + 10log(2) = 8dBi > 6dBi , so the conducted power limit shall be reduced to 30-(8.01-6) = 27.99dBm.

##### 802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	18.82	18.91	154.01	21.88	30	PASS
6	2437	24.16	23.69	494.50	26.94	30	PASS
11	2462	18.67	18.72	148.09	21.71	30	PASS

##### 802.11n (40MHz)

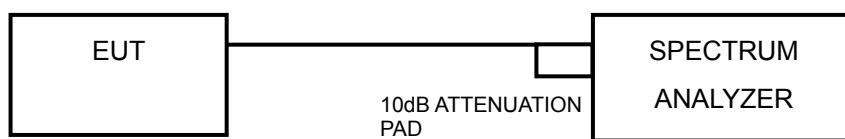
CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	18.12	18.43	134.53	21.29	30	PASS
6	2437	23.15	22.65	390.62	25.92	30	PASS
9	2452	18.38	18.71	143.17	21.56	30	PASS

## 4.6 POWER SPECTRAL DENSITY MEASUREMENT

### 4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 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

- a. Set the RBW = 100 kHz, VBW =300 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.
- d. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

### 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

### 802.11b

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	5.10	-10.13	3.01	-7.12	5.99	PASS
	6	2437	5.99	-9.24	3.01	-6.23	5.99	PASS
	11	2462	5.59	-9.64	3.01	-6.63	5.99	PASS
1	1	2412	5.60	-9.63	3.01	-6.62	5.99	PASS
	6	2437	5.26	-9.97	3.01	-6.96	5.99	PASS
	11	2462	5.67	-9.56	3.01	-6.55	5.99	PASS

**NOTE:** Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 8-(8.01-6) = 5.99dBm.

### 802.11g

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-2.08	-17.31	3.01	-14.30	5.99	PASS
	6	2437	3.48	-11.75	3.01	-8.74	5.99	PASS
	11	2462	-2.24	-17.47	3.01	-14.46	5.99	PASS
1	1	2412	-1.90	-17.13	3.01	-14.12	5.99	PASS
	6	2437	3.93	-11.30	3.01	-8.29	5.99	PASS
	11	2462	-1.49	-16.72	3.01	-13.71	5.99	PASS

**NOTE:** Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 8-(8.01-6) = 5.99dBm.

### 802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-2.99	-18.22	3.01	-15.21	8	PASS
	6	2437	4.14	-11.09	3.01	-8.08	8	PASS
	11	2462	-2.96	-18.19	3.01	-15.18	8	PASS
1	1	2412	-4.45	-19.68	3.01	-16.67	8	PASS
	6	2437	2.48	-12.75	3.01	-9.74	8	PASS
	11	2462	-4.21	-19.44	3.01	-16.43	8	PASS



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### 802.11n (40MHz)

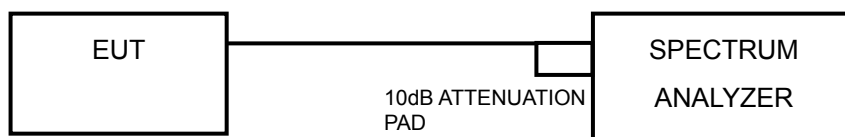
TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-6.45	-21.68	3.01	-18.67	8	PASS
	6	2437	-1.43	-16.66	3.01	-13.65	8	PASS
	9	2452	-6.25	-21.48	3.01	-18.47	8	PASS
1	3	2422	-6.20	-21.43	3.01	-18.42	8	PASS
	6	2437	-1.53	-16.76	3.01	-13.75	8	PASS
	9	2452	-5.74	-20.97	3.01	-17.96	8	PASS

## 4.7 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.7.2 TEST SETUP



### 4.7.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

### 4.7.4 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

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 OOB

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.

### 4.7.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

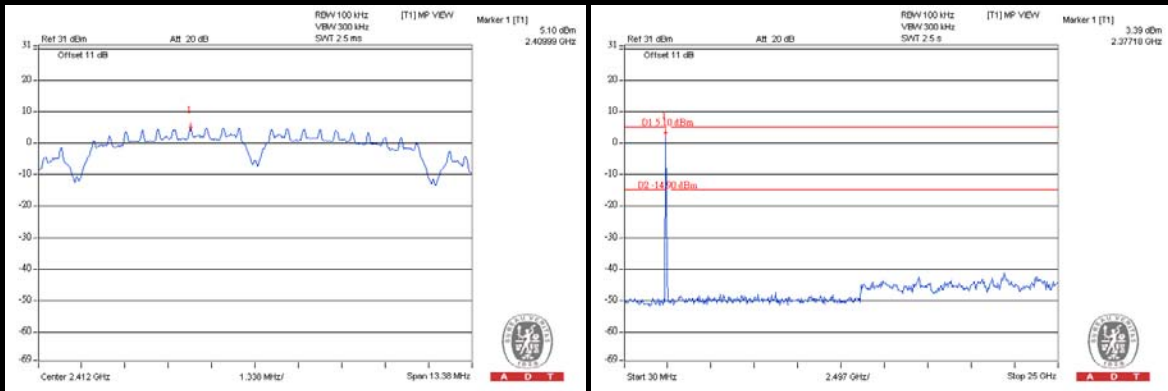
### 4.7.7 TEST RESULTS

The conducted emission test is performed on each TX port of operating mode without summing or adding  $10\log(N)$  since the limit is relative emission limit. Only worst data of each operating mode is presented.

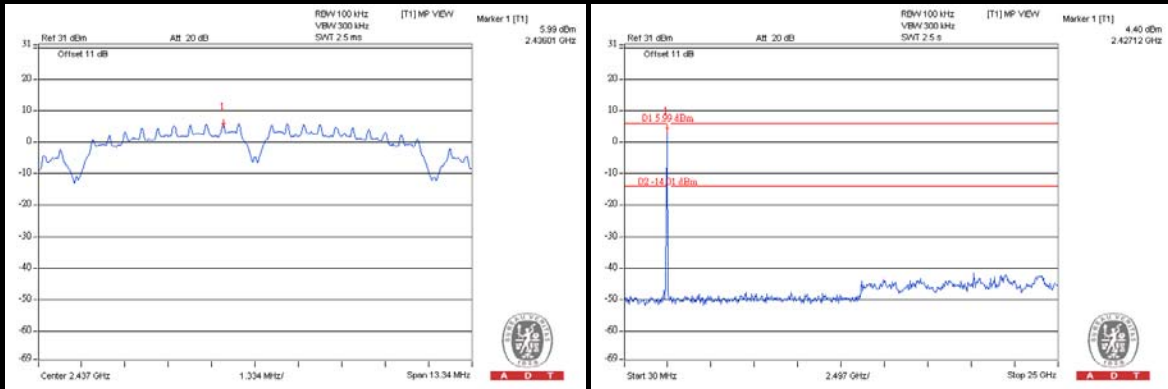
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

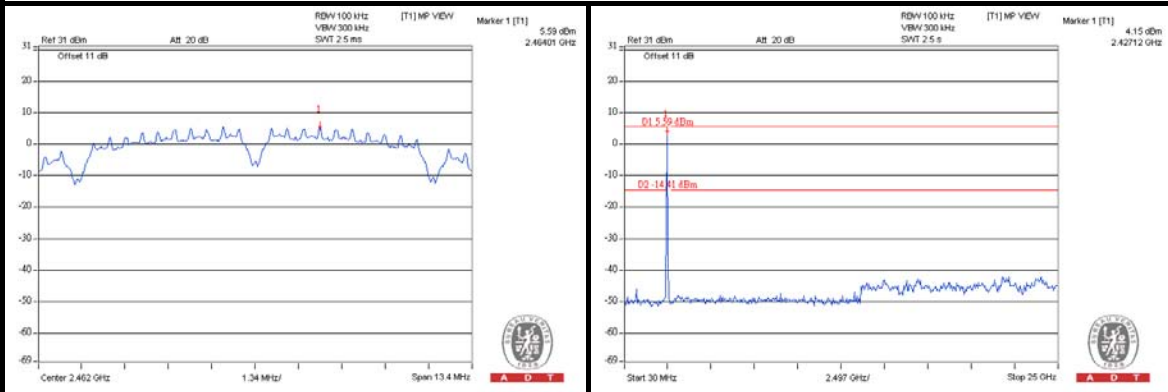
CH 1



CH 6

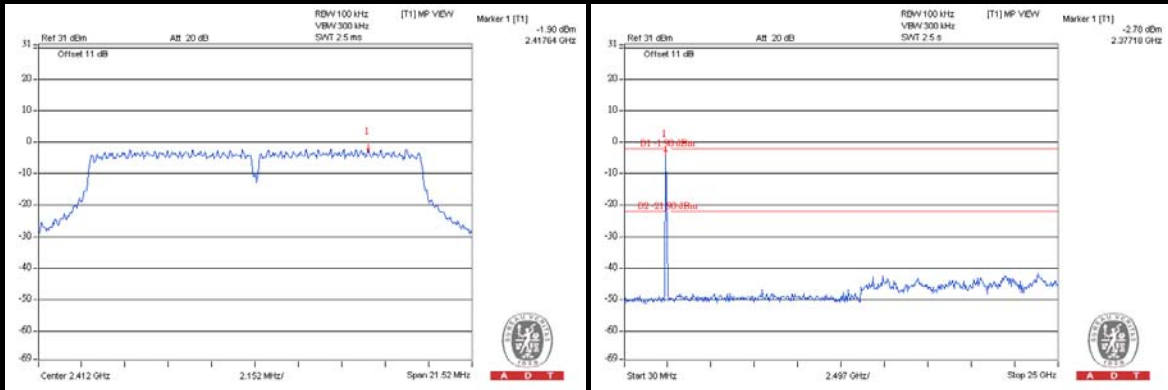


CH 11

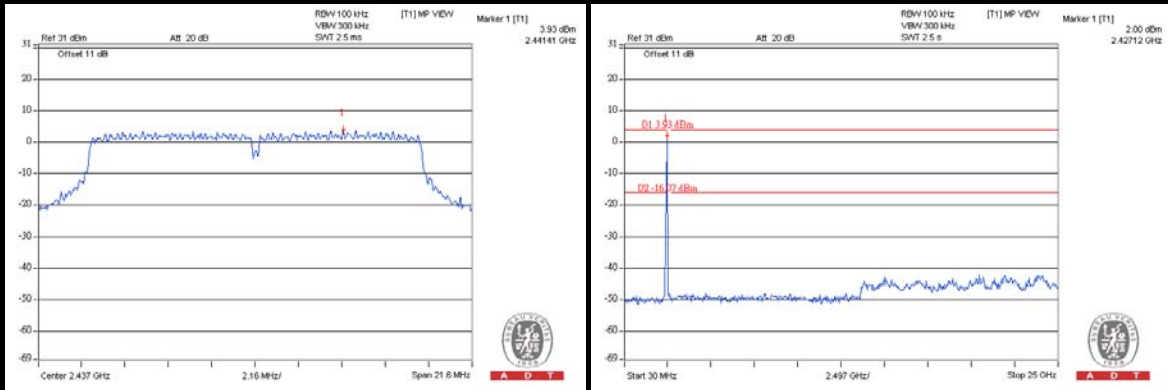


802.11g

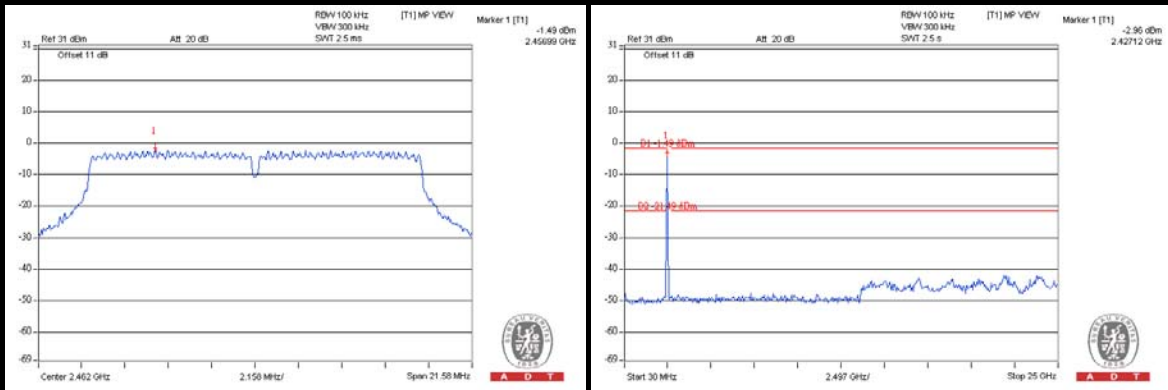
CH 1



CH 6



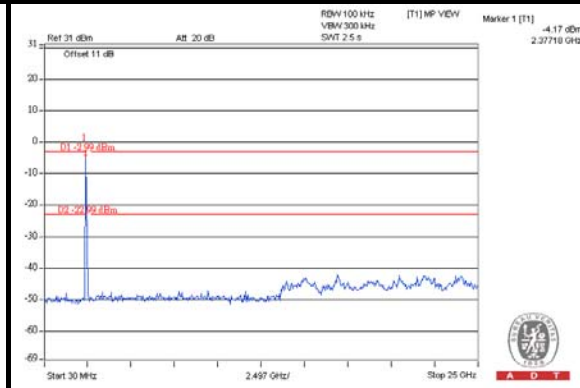
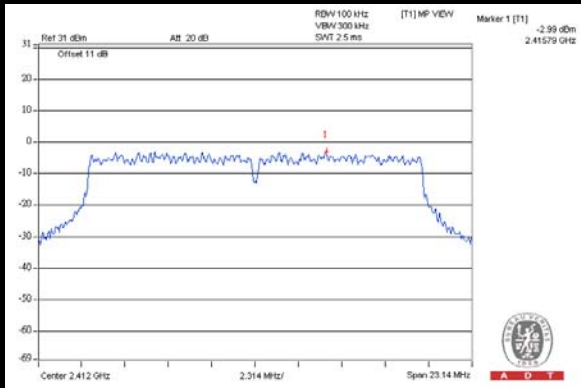
CH 11



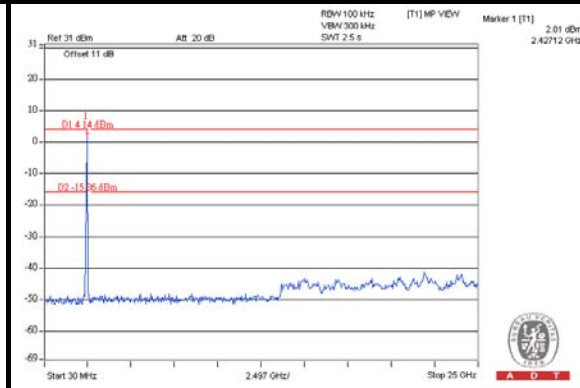
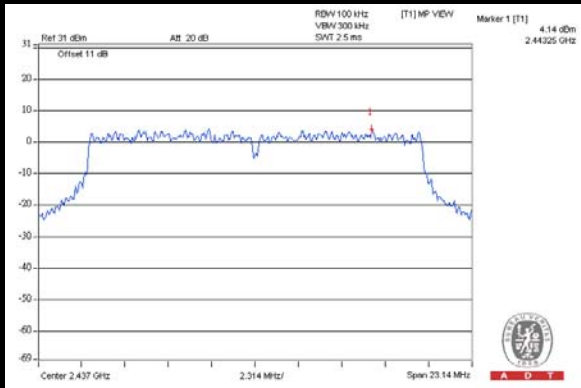


802.11n (20MHz)

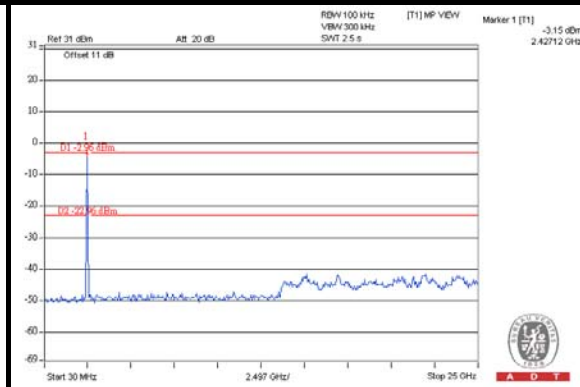
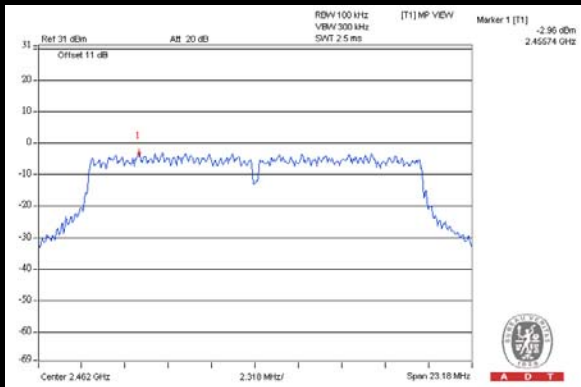
CH 1



CH 6

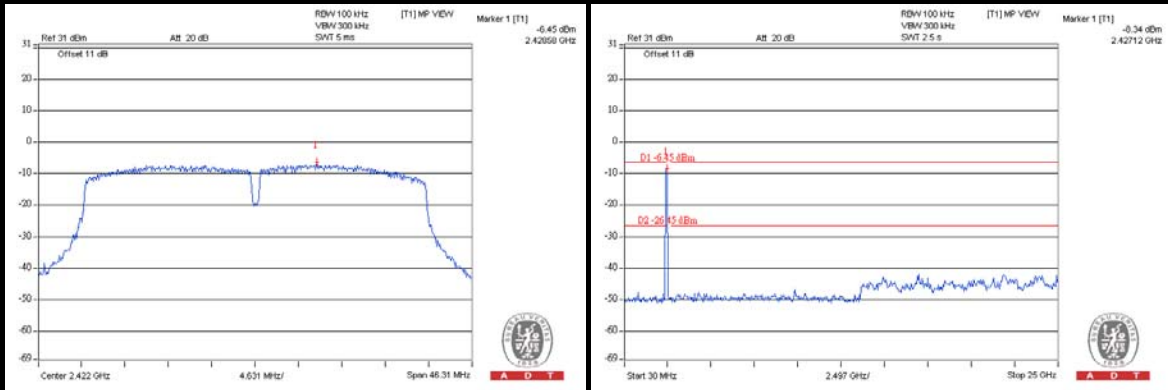


CH 11

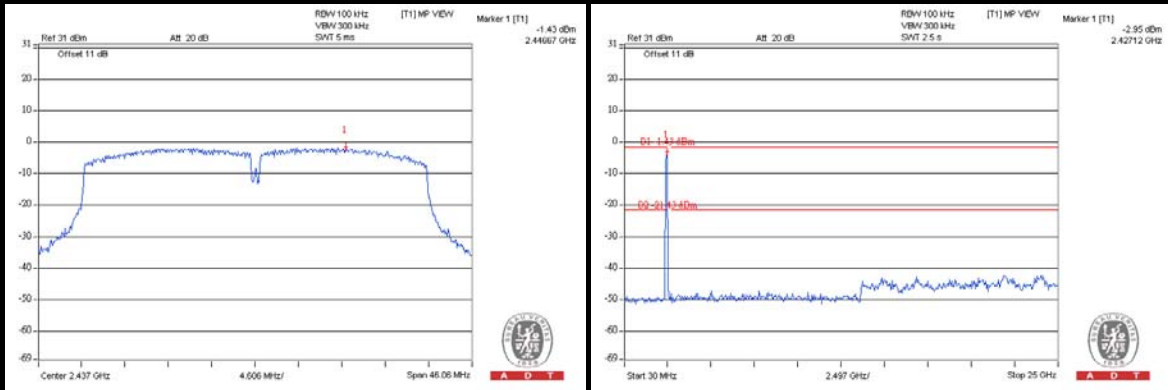


802.11n (40MHz)

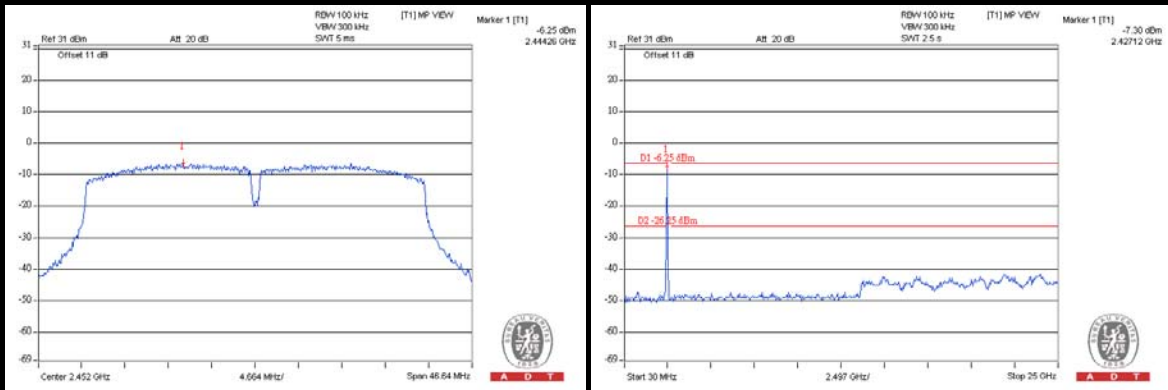
CH 3



CH 6



CH 9



## 4.8 RECEIVER RADIATED EMISSION MEASUREMENT

### 4.8.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in RSS-Gen table 2 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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. As shown in RSS-Gen 7.2.3, 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.

### 4.8.2 TEST INSTRUMENTS

Same as 4.1.2

### 4.8.3 TEST PROCEDURES

Same as 4.1.3

### 4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.8.5 TEST SETUP

Same as 4.1.5

### 4.8.6 EUT OPERATING CONDITIONS

Same as 4.1.6



### 4.8.7 TEST RESULTS

802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 12.5GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%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	1000.00	44.4 PK	74.0	-29.6	1.00 H	252	17.60	26.80
2	1000.00	38.0 AV	54.0	-16.0	1.00 H	252	11.20	26.80
3	1400.00	44.9 PK	74.0	-29.1	1.00 H	284	16.70	28.20
4	1400.00	40.3 AV	54.0	-13.7	1.00 H	284	12.10	28.20
5	2200.00	41.4 PK	74.0	-32.6	1.00 H	281	10.80	30.60
6	2200.00	31.7 AV	54.0	-22.3	1.00 H	281	1.10	30.60

**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	1000.00	45.9 PK	74.0	-28.1	1.00 V	325	19.10	26.80
2	1000.00	39.1 AV	54.0	-14.9	1.00 V	325	12.30	26.80
3	1400.00	45.4 PK	74.0	-28.6	1.16 V	348	17.20	28.20
4	1400.00	41.2 AV	54.0	-12.8	1.16 V	348	13.00	28.20
5	2200.00	42.2 PK	74.0	-31.8	1.00 V	318	11.60	30.60
6	2200.00	32.5 AV	54.0	-21.5	1.00 V	318	1.90	30.60

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 12.5GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%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	1000.00	45.0 PK	74.0	-29.0	1.00 H	222	18.20	26.80
2	1000.00	39.0 AV	54.0	-15.0	1.00 H	222	12.20	26.80
3	1400.00	45.0 PK	74.0	-29.0	1.00 H	234	16.80	28.20
4	1400.00	41.5 AV	54.0	-12.5	1.00 H	234	13.30	28.20
5	2200.00	42.7 PK	74.0	-31.3	1.00 H	202	12.10	30.60
6	2200.00	32.0 AV	54.0	-22.0	1.00 H	202	1.40	30.60

**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	1000.00	46.4 PK	74.0	-27.6	1.00 V	322	19.60	26.80
2	1000.00	40.0 AV	54.0	-14.0	1.00 V	322	13.20	26.80
3	1400.00	46.0 PK	74.0	-28.0	1.10 V	343	17.80	28.20
4	1400.00	42.3 AV	54.0	-11.7	1.10 V	343	14.10	28.20
5	2200.00	43.4 PK	74.0	-30.6	1.00 V	320	12.80	30.60
6	2200.00	33.7 AV	54.0	-20.3	1.00 V	320	3.10	30.60

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 12.5GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%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	1000.00	44.0 PK	74.0	-30.0	1.00 H	233	17.20	26.80
2	1000.00	38.0 AV	54.0	-16.0	1.00 H	233	11.20	26.80
3	1400.00	44.0 PK	74.0	-30.0	1.00 H	245	15.80	28.20
4	1400.00	40.6 AV	54.0	-13.4	1.00 H	245	12.40	28.20
5	2200.00	41.9 PK	74.0	-32.1	1.00 H	250	11.30	30.60
6	2200.00	31.0 AV	54.0	-23.0	1.00 H	250	0.40	30.60
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	1000.00	45.9 PK	74.0	-28.1	1.00 V	333	19.10	26.80
2	1000.00	39.0 AV	54.0	-15.0	1.00 V	333	12.20	26.80
3	1400.00	45.3 PK	74.0	-28.7	1.11 V	354	17.10	28.20
4	1400.00	41.3 AV	54.0	-12.7	1.11 V	354	13.10	28.20
5	2200.00	42.5 PK	74.0	-31.5	1.00 V	305	11.90	30.60
6	2200.00	32.8 AV	54.0	-21.2	1.00 V	305	2.20	30.60

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 65%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	150.45	34.8 QP	43.5	-8.7	1.49 H	266	20.40	14.40
2	187.39	35.6 QP	43.5	-7.9	1.24 H	177	23.20	12.40
3	374.04	38.8 QP	46.0	-7.2	1.00 H	219	21.10	17.70
4	399.31	41.8 QP	46.0	-4.2	1.00 H	243	23.40	18.40
5	599.58	40.9 QP	46.0	-5.1	1.49 H	188	17.40	23.50
6	751.23	36.9 QP	46.0	-9.1	3.00 H	2	11.10	25.80

**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	43.51	36.4 QP	40.0	-3.6	1.00 V	98	22.40	14.00
2	105.73	34.5 QP	43.5	-9.0	1.75 V	244	24.10	10.40
3	374.04	42.8 QP	46.0	-3.2	1.24 V	174	25.10	17.70
4	399.31	44.0 QP	46.0	-2.0	1.24 V	134	25.60	18.40
5	599.58	39.3 QP	46.0	-6.7	1.00 V	349	15.80	23.50
6	799.84	37.3 QP	46.0	-8.7	1.49 V	4	10.20	27.10

**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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

## 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.

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

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

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**Hwa Ya EMC/RF/Safety Telecom Lab:**

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Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

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



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

No any modifications are made to the EUT by the lab during the test.

**---END---**