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# FCC TEST REPORT (15.247)

**REPORT NO.:** RF120328C12  
**MODEL NO.:** WPEA-127NI  
**FCC ID:** RYK-WPEA127NI  
**RECEIVED:** Mar. 28, 2012  
**TESTED:** Apr. 02 ~ Apr. 13, 2012  
**ISSUED:** Apr. 19, 2012

**APPLICANT:** SparkLAN Communications, Inc.

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

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,  
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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120328C12	Original release	Apr. 19, 2012



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## 1. CERTIFICATION

**PRODUCT:** 802.11a/b/g/n 3T3R Mini PCIe Module  
**MODEL NO.:** WPEA-127NI  
**BRAND:** SparkLAN  
**APPLICANT:** SparkLAN Communications, Inc.  
**TESTED:** Apr. 02 ~ Apr. 13, 2012  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
ANSI C63.10-2009

The above equipment (model: WPEA-127NI) 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:** Apr. 19, 2012  
Polly Chien / Specialist

**APPROVED BY** :  , **DATE:** Apr. 19, 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)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -15.03dB at 0.53281MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB at 5725.00MHz.
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	Antenna connector is RP-SMA Plug 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	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 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>	802.11a/b/g/n 3T3R Mini PCIe Module
<b>MODEL NO.</b>	WPEA-127NI
<b>POWER SUPPLY</b>	3.3Vdc (host equipment)
<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 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps
<b>OPERATING FREQUENCY</b>	<b>2.4GHz:</b> 2412 ~ 2462MHz <b>5.0GHz:</b> 5745 ~ 5825MHz
<b>NUMBER OF CHANNEL</b>	<b>2.4GHz:</b> 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) <b>5.0GHz:</b> 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>OUTPUT POWER</b>	92.0mW for 2412 ~ 2462MHz 120.8mW for 5745 ~ 5825MHz
<b>ANTENNA TYPE</b>	<b>2.4GHz:</b> Dipole antenna with 3dBi gain <b>5.0GHz:</b> Dipole antenna with 5dBi gain
<b>ANTENNA CONNECTOR</b>	RP-SMA Plug
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	NA

**NOTE:**

1. The frequency bands used in this EUT are listed as follows:

Frequency Band (MHz)	2412~2462	5180~5320	5500~5700	5745~5825
802.11b	√			
802.11g	√			
802.11a		√	√	√
802.11n (20MHz)	√	√	√	√
802.11n (40MHz)	√	√	√	√

2. The EUT has disabled the 5600-5650MHz band by S/W to avoid 5600-5650MHz band for FCC certification.





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3. The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and three receivers.

<b>MODULATION MODE</b>	<b>TX FUNCTION</b>
<b>802.11b</b>	1TX
<b>802.11g</b>	1TX
<b>802.11a</b>	1TX
<b>802.11n (20MHz)</b>	3TX
<b>802.11n (40MHz)</b>	3TX

4. 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

#### FOR 2.4GHz:

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		

#### FOR 5.0GHz (5745 ~ 5825MHz):

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

#### FOR 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

#### 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	19.5
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	40.5

#### 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)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	19.5

#### 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)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	19.5



**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	19.5
-	802.11n (40MHz)	3 to 9	3, 9	OFDM	BPSK	40.5

**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	19.5
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	40.5

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	24deg. C, 65%RH	120Vac, 60Hz	Alan Wu, Haru Yang
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Alan Wu
PLC	23deg. C, 63%RH	120Vac, 60Hz	Brad Wu
APCM	24deg. C, 65%RH	120Vac, 60Hz	Brad Wu



**FOR 5.0GHz (5745 ~ 5825MHz):**

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

**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)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	19.5
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	40.5

**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)
-	802.11n (20MHz)	149 to 165	149	OFDM	BPSK	19.5

**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)
-	802.11n (20MHz)	149 to 165	149	OFDM	BPSK	19.5



**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)
-	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	19.5
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	40.5

**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)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	19.5
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	40.5

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	24deg. C, 65%RH	120Vac, 60Hz	Alan Wu, Haru Yang
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Alan Wu
PLC	23deg. C, 63%RH	120Vac, 60Hz	Brad Wu
APCM	24deg. C, 65%RH	120Vac, 60Hz	Brad Wu

### 3.3 DESCRIPTION OF SUPPORT UNITS

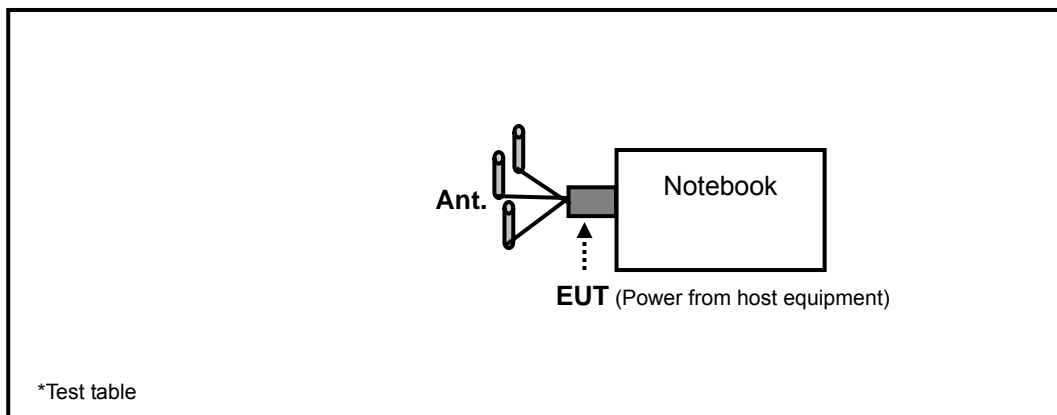
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	DELL	E5410	1HC2XM1	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





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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)**

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 (FOR 2.4GHz BAND)

### 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 30dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

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



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#### 4.1.2 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	FSP40	100269	Jan. 30, 2012	Jan. 29, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 20, 2011	Dec. 19, 2012
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Jan. 05, 2012	Jan. 04, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 20, 2011	Jul. 19, 2012
Preamplifier Agilent	8449B	3008A01961	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10738	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Nov. 03, 2011	Nov. 02, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Nov. 03, 2011	Nov. 02, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Nov. 03, 2011	Nov. 02, 2012
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
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 29, 2011	Oct. 28, 2012
High Speed Peak Power Meter	ML2495A	0842014	Apr. 26, 2011	Apr. 25, 2012
Power Sensor	MA2411B	0738404	Apr. 26, 2011	Apr. 25, 2012

- 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 4.
  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 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.

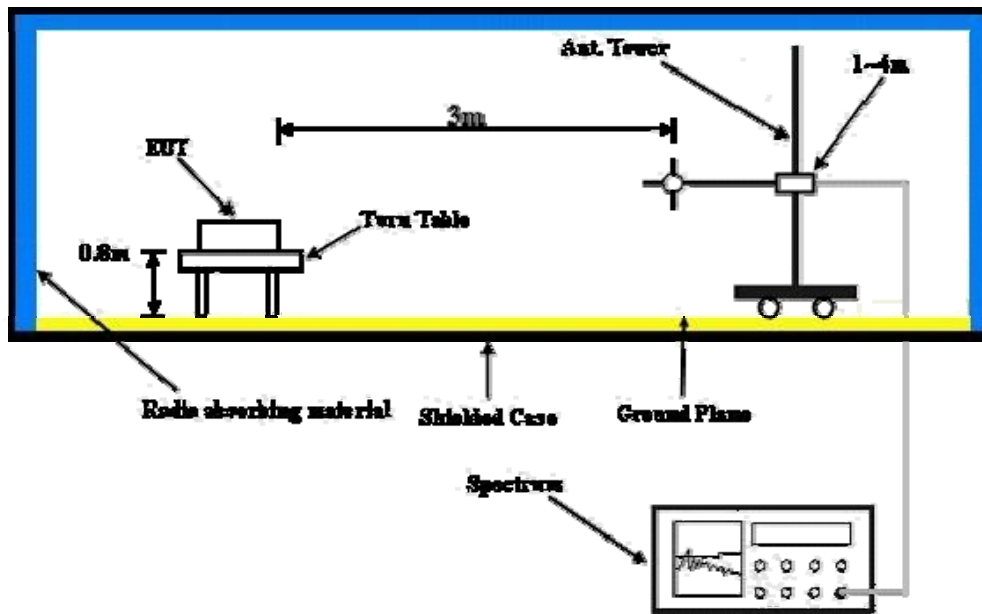
**NOTE:**

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

- a. Connected EUT with a notebook system and placed on a testing table.
- b. The notebook ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- c. The necessary accessories enable the system in full functions.



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### 4.1.7 TEST RESULTS

#### 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	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	2390.00	57.5 PK	74.0	-16.5	1.41 H	48	25.50	32.00
2	2390.00	46.1 AV	54.0	-7.9	1.41 H	48	14.10	32.00
3	*2412.00	105.5 PK			1.41 H	48	73.50	32.00
4	*2412.00	101.6 AV			1.41 H	48	69.60	32.00
5	2500.00	60.6 PK	74.0	-13.4	1.32 H	91	28.20	32.40
6	2500.00	50.6 AV	54.0	-3.4	1.32 H	91	18.20	32.40
7	4824.00	46.4 PK	74.0	-27.6	1.00 H	30	8.00	38.40
8	4824.00	33.1 AV	54.0	-20.9	1.00 H	30	-5.30	38.40
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	59.8 PK	74.0	-14.2	1.06 V	239	27.80	32.00
2	2390.00	47.7 AV	54.0	-6.3	1.06 V	239	15.70	32.00
3	*2412.00	107.2 PK			1.06 V	239	75.20	32.00
4	*2412.00	103.5 AV			1.06 V	239	71.50	32.00
5	2500.00	61.5 PK	74.0	-12.5	1.00 V	241	29.10	32.40
6	2500.00	52.0 AV	54.0	-2.0	1.00 V	241	19.60	32.40
7	4824.00	49.0 PK	74.0	-25.0	1.00 V	139	10.60	38.40
8	4824.00	40.1 AV	54.0	-13.9	1.00 V	139	1.70	38.40

**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 (SYSTEM)	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	*2437.00	105.7 PK			1.38 H	49	73.60	32.10
2	*2437.00	102.0 AV			1.38 H	49	69.90	32.10
3	2483.50	59.9 PK	74.0	-14.1	1.38 H	49	27.60	32.30
4	2483.50	46.0 AV	54.0	-8.0	1.38 H	49	13.70	32.30
5	#2520.00	60.3 PK	75.7	-15.4	1.32 H	88	27.90	32.40
6	#2520.00	49.5 AV	72.0	-22.5	1.32 H	88	17.10	32.40
7	4874.00	46.7 PK	74.0	-27.3	1.00 H	57	8.30	38.40
8	4874.00	33.0 AV	54.0	-21.0	1.00 H	57	-5.40	38.40
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	*2437.00	108.0 PK			1.04 V	238	75.90	32.10
2	*2437.00	104.2 AV			1.04 V	238	72.10	32.10
3	2483.50	59.1 PK	74.0	-14.9	1.04 V	238	26.80	32.30
4	2483.50	46.7 AV	54.0	-7.3	1.04 V	238	14.40	32.30
5	#2520.00	62.1 PK	78.0	-15.9	1.02 V	141	29.70	32.40
6	#2520.00	52.9 AV	74.2	-21.3	1.02 V	141	20.50	32.40
7	4874.00	47.9 PK	74.0	-26.1	1.00 V	148	9.50	38.40
8	4874.00	38.2 AV	54.0	-15.8	1.00 V	148	-0.20	38.40

**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.



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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	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	*2462.00	106.5 PK			1.36 H	51	74.30	32.20
2	*2462.00	102.8 AV			1.36 H	51	70.60	32.20
3	2483.50	61.4 PK	74.0	-12.6	1.36 H	51	29.10	32.30
4	2483.50	44.8 AV	54.0	-9.2	1.36 H	51	12.50	32.30
5	#2550.00	60.3 PK	76.5	-16.2	1.31 H	92	27.80	32.50
6	#2550.00	50.4 AV	72.8	-22.4	1.31 H	92	17.90	32.50
7	4924.00	46.9 PK	74.0	-27.1	1.00 H	102	8.50	38.40
8	4924.00	32.8 AV	54.0	-21.2	1.00 H	102	-5.60	38.40
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	108.7 PK			1.01 V	239	76.50	32.20
2	*2462.00	104.9 AV			1.01 V	239	72.70	32.20
3	2483.50	59.2 PK	74.0	-14.8	1.01 V	239	26.90	32.30
4	2483.50	48.4 AV	54.0	-5.6	1.01 V	239	16.10	32.30
5	#2550.00	62.9 PK	78.7	-15.8	1.03 V	100	30.40	32.50
6	#2550.00	52.4 AV	74.9	-22.5	1.03 V	100	19.90	32.50
7	4924.00	47.7 PK	74.0	-26.3	1.36 V	140	9.30	38.40
8	4924.00	38.8 AV	54.0	-15.2	1.36 V	140	0.40	38.40

**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.



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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	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	2390.00	64.9 PK	74.0	-9.1	1.41 H	45	32.90	32.00
2	2390.00	49.1 AV	54.0	-4.9	1.41 H	45	17.10	32.00
3	*2412.00	108.8 PK			1.41 H	45	76.80	32.00
4	*2412.00	95.4 AV			1.41 H	45	63.40	32.00
5	4824.00	46.3 PK	74.0	-27.7	1.00 H	68	7.90	38.40
6	4824.00	33.0 AV	54.0	-21.0	1.00 H	68	-5.40	38.40

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	68.4 PK	74.0	-5.6	1.05 V	243	36.40	32.00
2	2390.00	51.1 AV	54.0	-2.9	1.05 V	243	19.10	32.00
3	*2412.00	110.3 PK			1.07 V	239	78.30	32.00
4	*2412.00	96.9 AV			1.07 V	239	64.90	32.00
5	4824.00	47.0 PK	74.0	-27.0	1.00 V	133	8.60	38.40
6	4824.00	33.8 AV	54.0	-20.2	1.00 V	133	-4.60	38.40

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 (SYSTEM)	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	*2437.00	108.5 PK			1.37 H	48	76.40	32.10
2	*2437.00	95.3 AV			1.37 H	48	63.20	32.10
3	2483.50	57.6 PK	74.0	-16.4	1.37 H	48	25.30	32.30
4	2483.50	46.8 AV	54.0	-7.2	1.37 H	48	14.50	32.30
5	4874.00	46.7 PK	74.0	-27.3	1.00 H	74	8.30	38.40
6	4874.00	33.4 AV	54.0	-20.6	1.00 H	74	-5.00	38.40
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	*2437.00	109.8 PK			1.05 V	238	77.70	32.10
2	*2437.00	96.4 AV			1.05 V	238	64.30	32.10
3	2483.50	57.0 PK	74.0	-17.0	1.05 V	238	24.70	32.30
4	2483.50	46.6 AV	54.0	-7.4	1.05 V	238	14.30	32.30
5	4874.00	47.3 PK	74.0	-26.7	1.00 V	129	8.90	38.40
6	4874.00	33.9 AV	54.0	-20.1	1.00 V	129	-4.50	38.40

**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 (SYSTEM)	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	*2462.00	109.5 PK			1.35 H	49	77.30	32.20
2	*2462.00	95.9 AV			1.35 H	49	63.70	32.20
3	2483.50	72.0 PK	74.0	-2.0	1.35 H	49	39.70	32.30
4	2483.50	51.0 AV	54.0	-3.0	1.35 H	49	18.70	32.30
5	4924.00	46.9 PK	74.0	-27.1	1.00 H	91	8.50	38.40
6	4924.00	33.8 AV	54.0	-20.2	1.00 H	91	-4.60	38.40
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	112.0 PK			1.03 V	237	79.80	32.20
2	*2462.00	98.0 AV			1.03 V	237	65.80	32.20
3	2483.50	70.8 PK	74.0	-3.2	1.03 V	237	38.50	32.30
4	2483.50	50.5 AV	54.0	-3.5	1.03 V	237	18.20	32.30
5	4924.00	47.7 PK	74.0	-26.3	1.00 V	133	9.30	38.40
6	4924.00	34.1 AV	54.0	-19.9	1.00 V	133	-4.30	38.40

**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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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	24deg. C, 65%RH	TESTED BY	Haru Yang

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	60.9 PK	74.0	-13.1	1.44 H	150	28.90	32.00
2	2390.00	49.9 AV	54.0	-4.1	1.44 H	150	17.90	32.00
3	*2412.00	109.8 PK			1.40 H	48	77.80	32.00
4	*2412.00	98.6 AV			1.40 H	48	66.60	32.00
5	4824.00	45.7 PK	74.0	-28.3	1.00 H	52	7.30	38.40
6	4824.00	33.0 AV	54.0	-21.0	1.00 H	52	-5.40	38.40
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	63.8 PK	74.0	-10.2	1.07 V	246	31.80	32.00
2	2390.00	52.6 AV	54.0	-1.4	1.07 V	246	20.60	32.00
3	*2412.00	111.1 PK			1.08 V	237	79.10	32.00
4	*2412.00	100.1 AV			1.08 V	237	68.10	32.00
5	4824.00	45.9 PK	74.0	-28.1	1.00 V	127	7.50	38.40
6	4824.00	34.2 AV	54.0	-19.8	1.00 V	127	-4.20	38.40

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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	57.1 PK	74.0	-16.9	1.40 H	50	25.10	32.00
2	2390.00	46.2 AV	54.0	-7.8	1.40 H	50	14.20	32.00
3	*2437.00	111.2 PK			1.40 H	50	79.10	32.10
4	*2437.00	99.9 AV			1.40 H	50	67.80	32.10
5	4874.00	45.3 PK	74.0	-28.7	1.00 H	76	6.90	38.40
6	4874.00	34.0 AV	54.0	-20.0	1.00 H	76	-4.40	38.40
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	60.6 PK	74.0	-13.4	1.09 V	245	28.60	32.00
2	2390.00	48.3 AV	54.0	-5.7	1.09 V	245	16.30	32.00
3	*2437.00	112.6 PK			1.05 V	239	80.50	32.10
4	*2437.00	100.4 AV			1.05 V	239	68.30	32.10
5	4874.00	46.3 PK	74.0	-27.7	1.00 V	114	7.90	38.40
6	4874.00	34.2 AV	54.0	-19.8	1.00 V	114	-4.20	38.40

**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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	110.6 PK			1.35 H	53	78.40	32.20
2	*2462.00	99.3 AV			1.35 H	53	67.10	32.20
3	2483.50	67.3 PK	74.0	-6.7	1.36 H	50	35.00	32.30
4	2483.50	51.4 AV	54.0	-2.6	1.36 H	50	19.10	32.30
5	4924.00	45.8 PK	74.0	-28.2	1.00 H	69	7.40	38.40
6	4924.00	34.3 AV	54.0	-19.7	1.00 H	69	-4.10	38.40
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	113.4 PK			1.06 V	114	81.20	32.20
2	*2462.00	100.5 AV			1.06 V	114	68.30	32.20
3	2483.50	67.2 PK	74.0	-6.8	1.06 V	116	34.90	32.30
4	2483.50	52.7 AV	54.0	-1.3	1.06 V	116	20.40	32.30
5	4924.00	46.9 PK	74.0	-27.1	1.00 V	127	8.50	38.40
6	4924.00	34.6 AV	54.0	-19.4	1.00 V	127	-3.80	38.40

**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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	63.4 PK	74.0	-10.6	1.39 H	53	31.40	32.00
2	2390.00	50.1 AV	54.0	-3.9	1.39 H	53	18.10	32.00
3	*2422.00	103.6 PK			1.39 H	53	71.50	32.10
4	*2422.00	92.9 AV			1.39 H	53	60.80	32.10
5	4844.00	45.8 PK	74.0	-28.2	1.00 H	47	7.40	38.40
6	4844.00	34.2 AV	54.0	-19.8	1.00 H	47	-4.20	38.40
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	67.9 PK	74.0	-6.1	1.05 V	240	35.90	32.00
2	2390.00	52.6 AV	54.0	-1.4	1.05 V	240	20.60	32.00
3	*2422.00	104.4 PK			1.07 V	238	72.30	32.10
4	*2422.00	94.1 AV			1.07 V	238	62.00	32.10
5	4844.00	46.5 PK	74.0	-27.5	1.00 V	138	8.10	38.40
6	4844.00	34.6 AV	54.0	-19.4	1.00 V	138	-3.80	38.40

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 (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	65.4 PK	74.0	-8.6	1.43 H	152	33.40	32.00
2	2390.00	52.1 AV	54.0	-1.9	1.43 H	152	20.10	32.00
3	*2437.00	108.7 PK			1.37 H	149	76.60	32.10
4	*2437.00	98.6 AV			1.37 H	149	66.50	32.10
5	4874.00	46.2 PK	74.0	-27.8	1.00 H	58	7.80	38.40
6	4874.00	34.7 AV	54.0	-19.3	1.00 H	58	-3.70	38.40
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	66.4 PK	74.0	-7.6	1.06 V	243	34.40	32.00
2	2390.00	52.6 AV	54.0	-1.4	1.06 V	243	20.60	32.00
3	*2437.00	109.3 PK			1.05 V	239	77.20	32.10
4	*2437.00	99.3 AV			1.05 V	239	67.20	32.10
5	4874.00	47.3 PK	74.0	-26.7	1.00 V	126	8.90	38.40
6	4874.00	34.9 AV	54.0	-19.1	1.00 V	126	-3.50	38.40

**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 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	107.1 PK			1.38 H	147	74.90	32.20
2	*2452.00	96.8 AV			1.38 H	147	64.60	32.20
3	2483.50	70.9 PK	74.0	-3.1	1.37 H	145	38.60	32.30
4	2483.50	52.9 AV	54.0	-1.1	1.37 H	145	20.60	32.30
5	4904.00	45.8 PK	74.0	-28.2	1.00 H	49	7.30	38.50
6	4904.00	34.5 AV	54.0	-19.5	1.00 H	49	-4.00	38.50
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	*2452.00	108.1 PK			1.05 V	242	75.90	32.20
2	*2452.00	97.6 AV			1.05 V	242	65.40	32.20
3	2483.50	68.7 PK	74.0	-5.3	1.04 V	214	36.40	32.30
4	2483.50	52.5 AV	54.0	-1.5	1.04 V	214	20.20	32.30
5	4904.00	46.9 PK	74.0	-27.1	1.00 V	107	8.40	38.50
6	4904.00	34.6 AV	54.0	-19.4	1.00 V	107	-3.90	38.50

**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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**BELOW 1GHz WORST-CASE DATA : 802.11n (20MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. 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	166.00	37.5 QP	43.5	-6.0	1.75 H	215	23.40	14.10
2	199.05	39.9 QP	43.5	-3.6	1.25 H	330	28.40	11.50
3	265.16	41.0 QP	46.0	-5.0	1.00 H	268	26.70	14.30
4	300.16	44.5 QP	46.0	-1.5	1.00 H	0	28.80	15.70
5	497.83	44.8 QP	46.0	-1.2	1.99 H	14	23.80	21.00
6	531.53	39.6 QP	46.0	-6.4	1.75 H	2	17.70	21.90
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	47.40	32.8 QP	40.0	-7.2	1.00 V	201	18.70	14.10
2	132.95	31.2 QP	43.5	-12.3	1.25 V	351	17.90	13.30
3	298.21	34.2 QP	46.0	-11.8	1.25 V	291	18.60	15.60
4	377.93	34.8 QP	46.0	-11.2	1.25 V	34	17.00	17.80
5	497.81	44.9 QP	46.0	-1.1	1.00 V	91	23.90	21.00
6	531.53	41.4 QP	46.0	-4.6	1.00 V	85	19.50	21.90

**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.



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## 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. 22, 2011	Dec. 21, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jul. 07, 2011	Jul. 06, 2012
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Dec. 30, 2011	Dec. 29, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	835239/001	Feb. 07, 2012	Feb. 06, 2013
V-LISN SCHWARZBECK	NNBL 8226-2	8226-142	Jun. 30, 2011	Jun. 29, 2012
LISN ROHDE & SCHWARZ	ENV216	100072	Jun. 10, 2011	Jun. 09, 2012
Software ADT	ADT_Cond_ V7.3.7	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

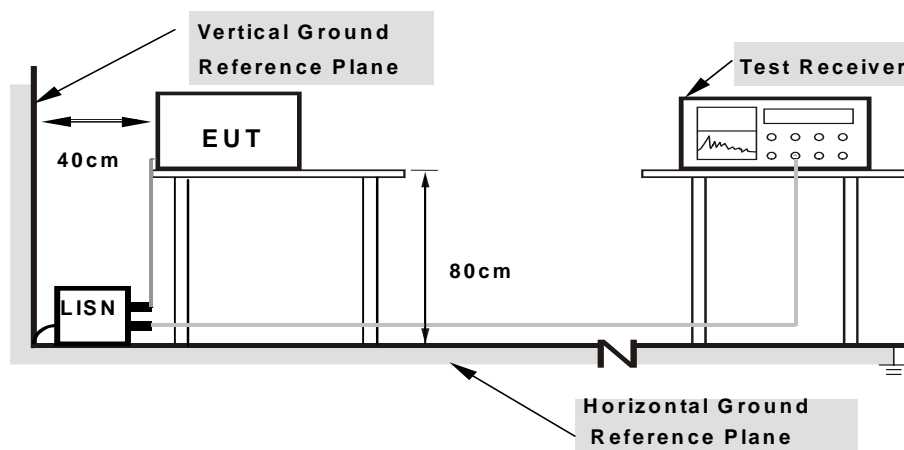
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

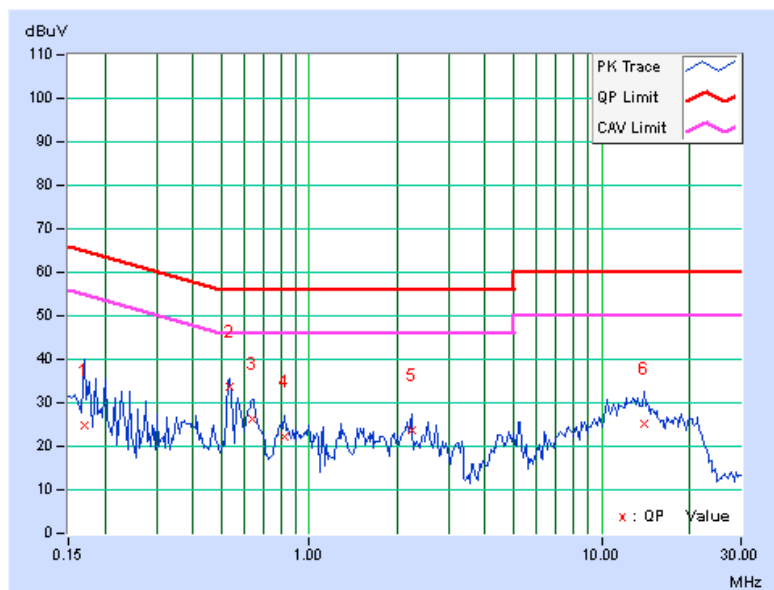
### 4.2.7 TEST RESULTS

**CONDUCTED WORST-CASE DATA : 802.11n (20MHz)**

<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	0.16953	0.17	24.56	15.60	24.73	15.77	64.98	54.98	-40.25	-39.21
2	0.53281	0.17	33.59	29.90	33.76	30.07	56.00	46.00	-22.24	-15.93
3	0.64219	0.18	26.11	17.08	26.29	17.26	56.00	46.00	-29.71	-28.74
4	0.82188	0.20	21.96	15.75	22.16	15.95	56.00	46.00	-33.84	-30.05
5	2.23438	0.25	23.31	8.16	23.56	8.41	56.00	46.00	-32.44	-37.59
6	13.99219	0.69	24.65	18.06	25.34	18.75	60.00	50.00	-34.66	-31.25

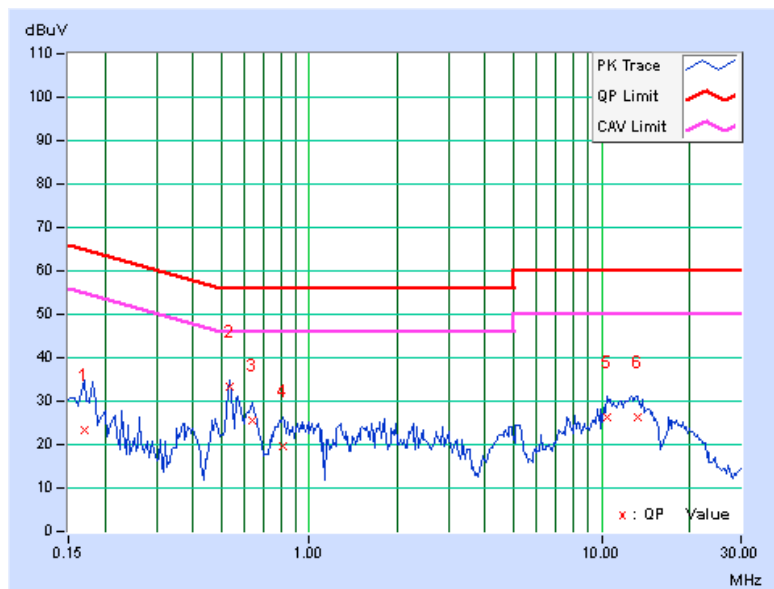
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. The emission levels of other frequencies were very low against the limit.
  3. Margin value = Emission level - Limit value
  4. Correction factor = Insertion loss + Cable loss
  5. Emission Level = Correction 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	0.16953	0.26	22.95	14.34	23.21	14.60	64.98	54.98	-41.77	-40.38
2	0.53281	0.26	32.90	28.90	33.16	29.16	56.00	46.00	-22.84	-16.84
3	0.64219	0.27	25.26	15.56	25.53	15.83	56.00	46.00	-30.47	-30.17
4	0.81406	0.28	19.23	15.43	19.51	15.71	56.00	46.00	-36.49	-30.29
5	10.49219	0.67	25.57	16.03	26.24	16.70	60.00	50.00	-33.76	-33.30
6	13.36719	0.76	25.54	18.30	26.30	19.06	60.00	50.00	-33.70	-30.94

- 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.

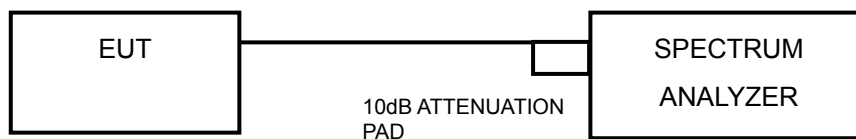


### 4.3 6dB BANDWIDTH MEASUREMENT

#### 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

- Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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	10.28	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	16.53	0.5	PASS
6	2437	16.61	0.5	PASS
11	2462	16.62	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.79	17.82	17.84	0.5	PASS
6	2437	17.81	17.76	17.83	0.5	PASS
11	2462	17.77	17.82	17.84	0.5	PASS

#### 802.11n (40MHz)

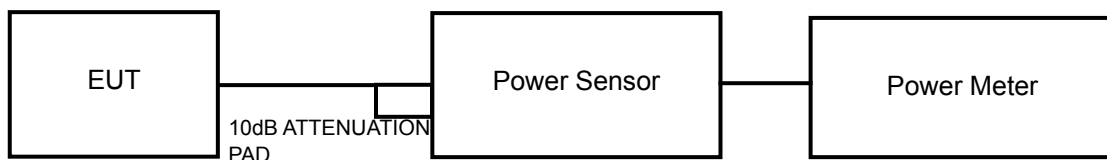
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	36.95	36.80	36.88	0.5	PASS
6	2437	37.05	36.78	37.01	0.5	PASS
9	2452	37.06	36.92	37.11	0.5	PASS

## 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)

### 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

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the average 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)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	40.9	16.12	30	PASS
6	2437	43.2	16.35	30	PASS
11	2462	44.9	16.52	30	PASS

##### 802.11g

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	42.7	16.30	30	PASS
6	2437	42.2	16.25	30	PASS
11	2462	40.8	16.11	30	PASS

##### 802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	12.96	12.75	12.43	56.1	17.5	28.2	PASS
6	2437	14.35	15.25	14.95	<b>92.0</b>	19.6	28.2	PASS
11	2462	13.61	14.12	14.01	74.0	18.7	28.2	PASS

Directional gain =  $3\text{dBi} + 10\log(3) = 7.8\text{dBi} > 6\text{dBi}$ , so the conducted power limit shall be reduced to  $30 - (7.8 - 6) = 28.2\text{dBm}$

##### 802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	10.06	9.93	9.69	29.3	14.7	28.2	PASS
6	2437	14.18	14.87	14.70	86.4	19.4	28.2	PASS
9	2452	11.61	11.91	11.77	45.0	16.5	28.2	PASS

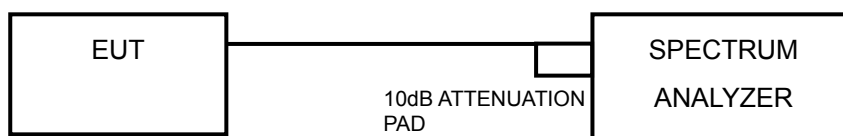
Directional gain =  $3\text{dBi} + 10\log(3) = 7.8\text{dBi} > 6\text{dBi}$ , so the conducted power limit shall be reduced to  $30 - (7.8 - 6) = 28.2\text{dBm}$

## 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

- Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
- Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- 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  $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



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## 4.5.7 TEST RESULTS

### 802.11b

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-1.45	-19.67	8	PASS
6	2437	-1.42	-16.65	8	PASS
11	2462	-1.15	-16.38	8	PASS

### 802.11g

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-4.52	-19.75	8	PASS
6	2437	-4.38	-19.61	8	PASS
11	2462	-4.54	-19.77	8	PASS

### 802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-7.20	-22.43	4.77	-17.66	6.2	PASS
	6	2437	-5.90	-21.13	4.77	-16.36	6.2	PASS
	11	2462	-6.43	-21.66	4.77	-16.89	6.2	PASS
1	1	2412	-8.30	-23.53	4.77	-18.76	6.2	PASS
	6	2437	-5.63	-20.86	4.77	-16.09	6.2	PASS
	11	2462	-6.82	-22.05	4.77	-17.28	6.2	PASS
2	1	2412	-8.44	-23.67	4.77	-18.90	6.2	PASS
	6	2437	-5.71	-20.94	4.77	-16.17	6.2	PASS
	11	2462	-6.76	-21.99	4.77	-17.22	6.2	PASS

Directional gain =  $3\text{dBi} + 10\log(3) = 7.8\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8 - (7.8 - 6) = 6.2\text{dBm}$



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### 802.11n (40MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-13.37	-28.60	4.77	-23.83	6.2	PASS
	6	2437	-9.13	-24.36	4.77	-19.59	6.2	PASS
	9	2452	-11.71	-26.94	4.77	-22.17	6.2	PASS
1	3	2422	-13.94	-29.17	4.77	-24.40	6.2	PASS
	6	2437	-9.09	-24.32	4.77	-19.55	6.2	PASS
	9	2452	-11.98	-27.21	4.77	-22.44	6.2	PASS
2	3	2422	-14.05	-29.28	4.77	-24.51	6.2	PASS
	6	2437	-9.02	-24.25	4.77	-19.48	6.2	PASS
	9	2452	-11.89	-27.12	4.77	-22.35	6.2	PASS

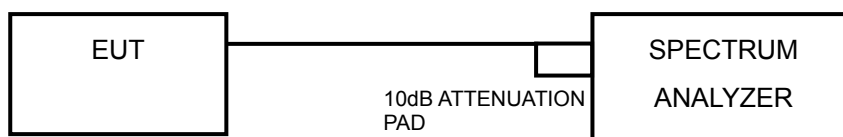
Directional gain =  $3\text{dBi} + 10\log(3) = 7.8\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $8 - (7.8 - 6) = 6.2\text{dBm}$

## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

Below  $-30\text{dB}$  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  $\geq$  300 kHz.
3. Detector = average.
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.



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## 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.

### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

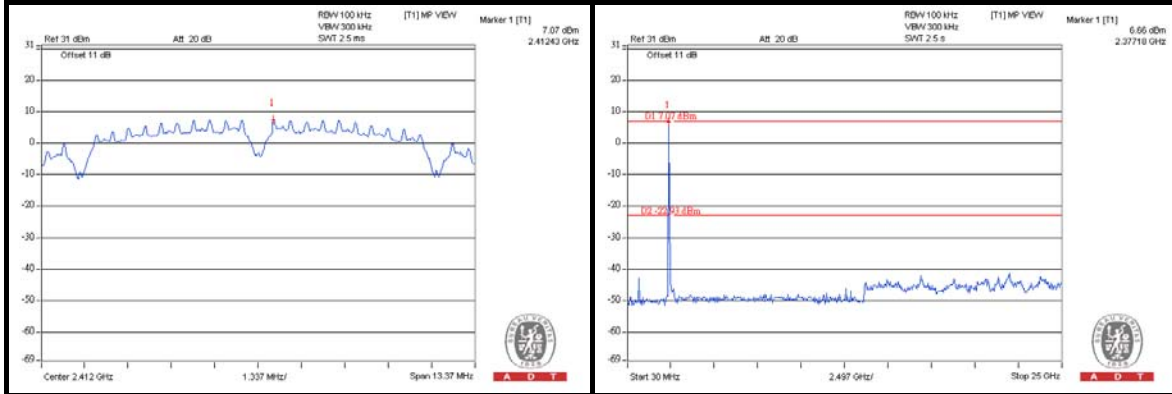
### 4.6.7 TEST RESULTS

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

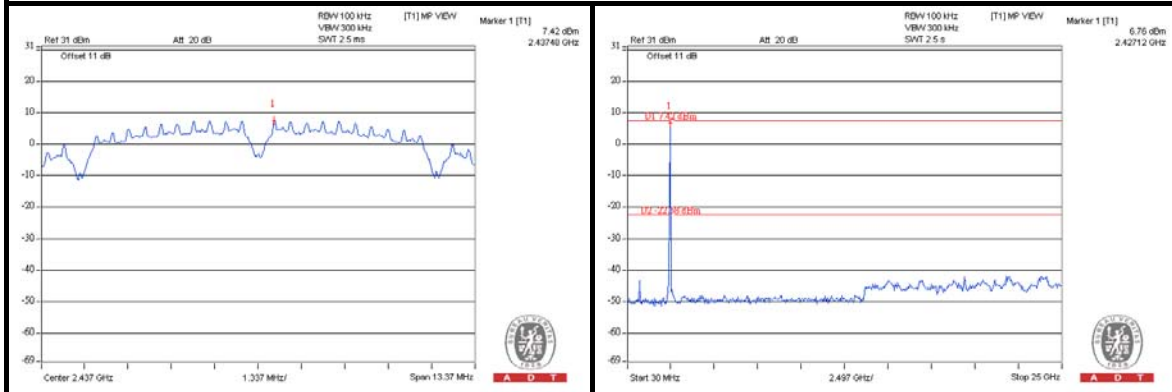
## 4.6.8 TEST RESULTS

### 802.11b

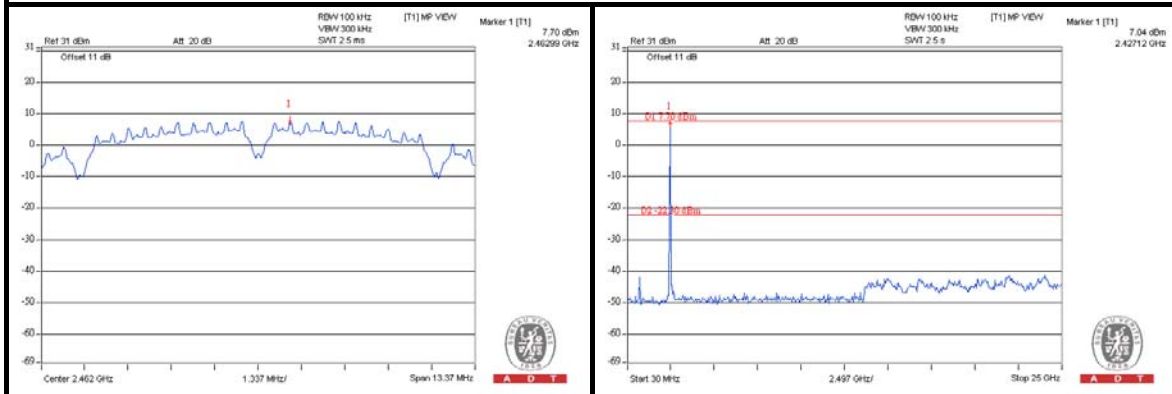
#### CH 1

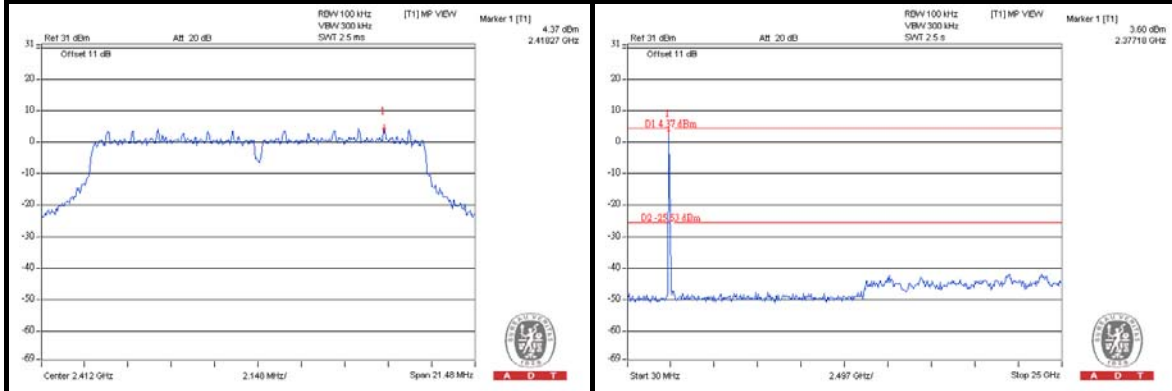
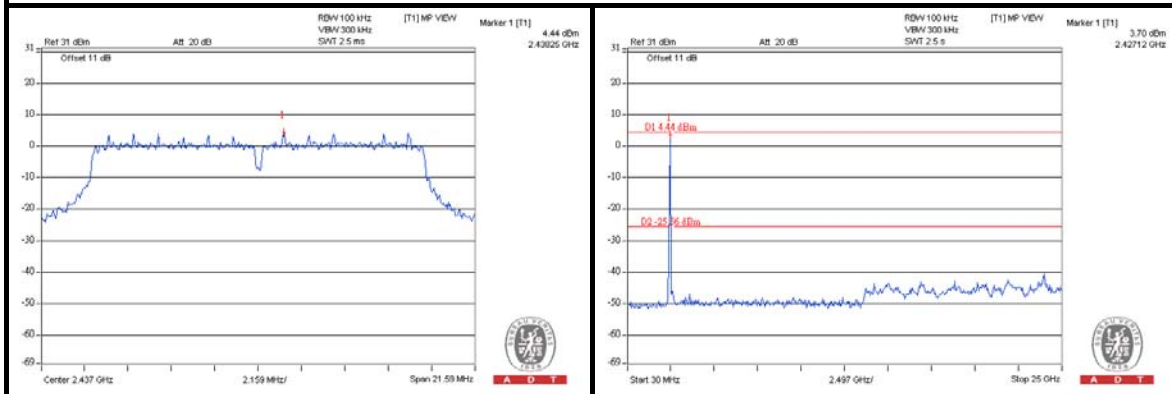
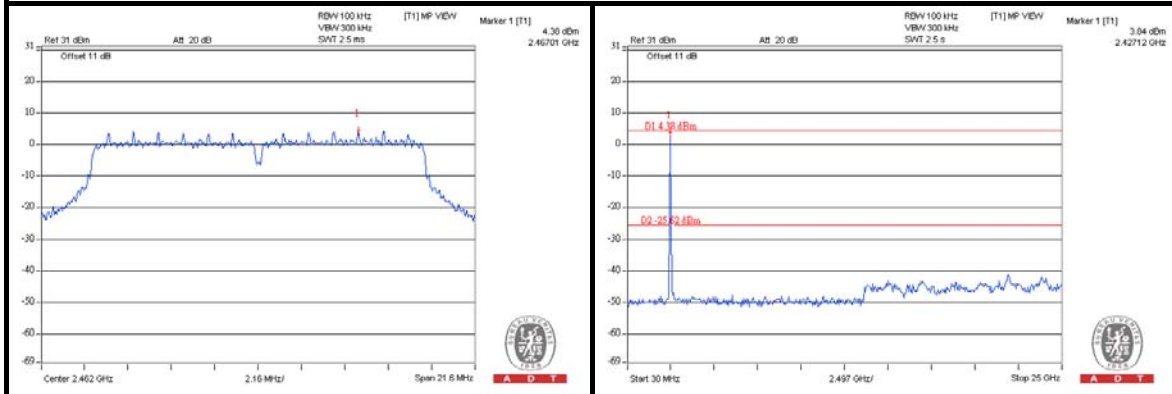


#### CH 6

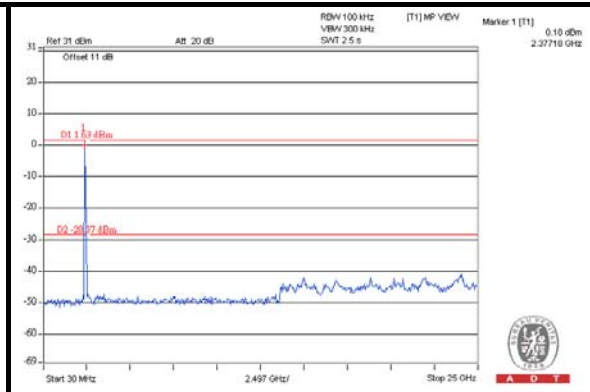
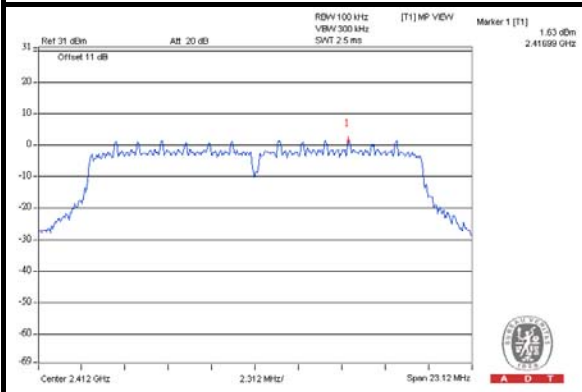
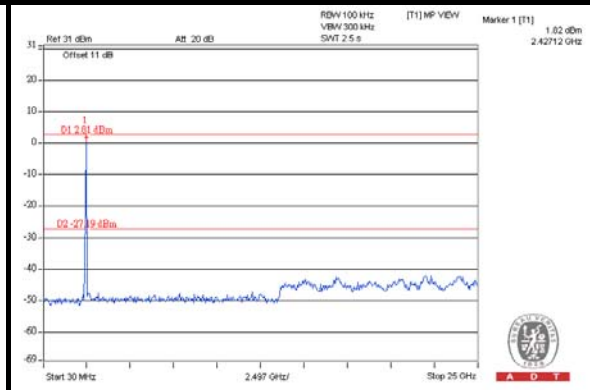
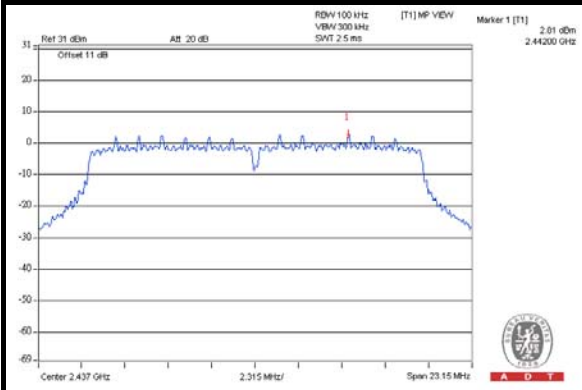
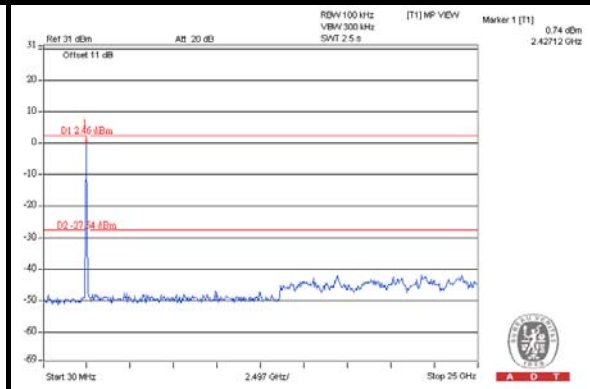
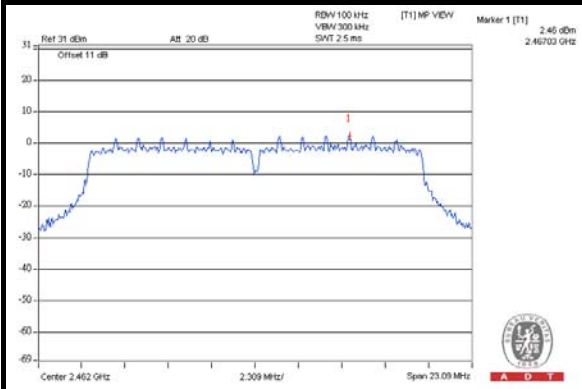


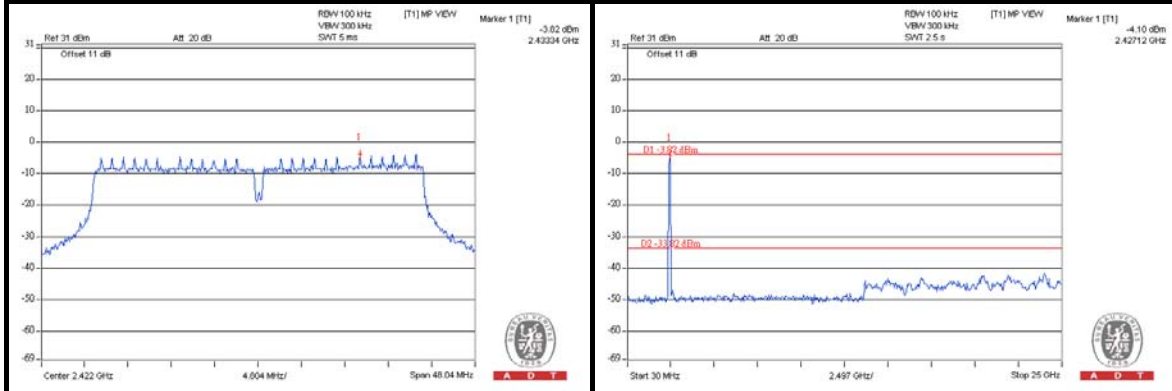
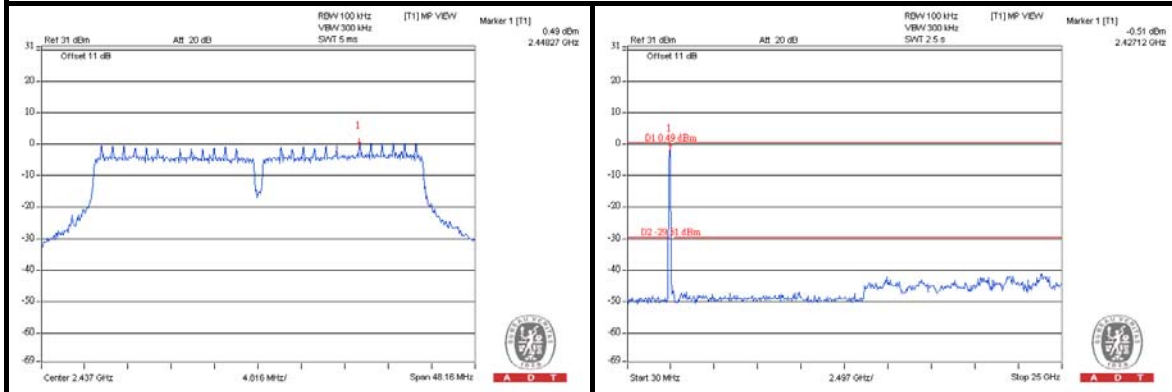
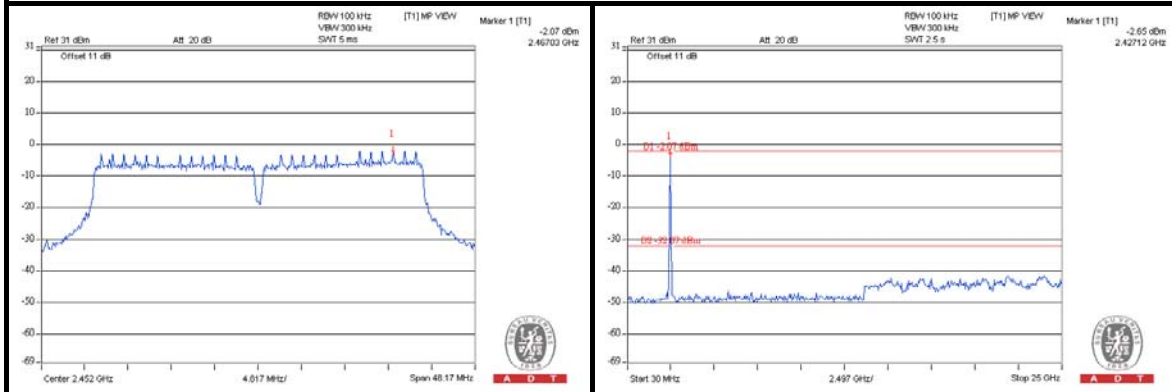
#### CH 11



**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**



## 5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

### 5.1 RADIATED EMISSION MEASUREMENT

#### 5.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

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



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#### 5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

#### 5.1.3 TEST PROCEDURES

Same as item 4.1.3.

#### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 5.1.5 TEST SETUP

Same as item 4.1.5.

#### 5.1.6 EUT OPERATING CONDITIONS

Same as 4.1.6.



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## 5.1.7 TEST RESULTS

### 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	#5725.00	61.8 PK	65.7	-3.9	1.61 H	69	22.30	39.50
2	#5725.00	45.7 AV	55.2	-9.5	1.61 H	69	6.20	39.50
3	*5745.00	95.7 PK			1.61 H	69	56.10	39.60
4	*5745.00	85.2 AV			1.61 H	69	45.60	39.60
5	11490.00	60.5 PK	74.0	-13.5	1.07 H	192	8.80	51.70
6	11490.00	47.5 AV	54.0	-6.5	1.07 H	192	-4.20	51.70
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	#5725.00	70.8 PK	78.9	-8.1	1.19 V	204	31.30	39.50
2	#5725.00	60.2 AV	68.3	-8.1	1.19 V	204	20.70	39.50
3	*5745.00	108.9 PK			1.10 V	207	69.30	39.60
4	*5745.00	98.3 AV			1.10 V	207	58.70	39.60
5	11490.00	60.3 PK	74.0	-13.7	1.00 V	243	8.60	51.70
6	11490.00	47.3 AV	54.0	-6.7	1.00 V	243	-4.40	51.70

#### 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 limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	#5725.00	55.4 PK	64.9	-9.5	1.70 H	67	15.90	39.50
2	#5725.00	42.9 AV	54.6	-11.7	1.70 H	67	3.40	39.50
3	*5785.00	94.9 PK			1.70 H	67	55.20	39.70
4	*5785.00	84.6 AV			1.70 H	67	44.90	39.70
5	11570.00	60.7 PK	74.0	-13.3	1.05 H	184	9.10	51.60
6	11570.00	47.8 AV	54.0	-6.2	1.05 H	184	-3.80	51.60
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	#5725.00	54.9 PK	78.9	-24.0	1.11 V	209	15.40	39.50
2	#5725.00	43.6 AV	68.7	-25.1	1.11 V	209	4.10	39.50
3	*5785.00	108.9 PK			1.11 V	209	69.20	39.70
4	*5785.00	98.7 AV			1.11 V	209	59.00	39.70
5	11570.00	60.2 PK	74.0	-13.8	1.00 V	214	8.60	51.60
6	11570.00	47.5 AV	54.0	-6.5	1.00 V	214	-4.10	51.60

**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 limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	*5825.00	94.6 PK			1.68 H	66	54.90	39.70
2	*5825.00	83.8 AV			1.68 H	66	44.10	39.70
3	#5850.00	56.3 PK	64.6	-8.3	1.68 H	66	16.50	39.80
4	#5850.00	43.8 AV	53.8	-10.0	1.68 H	66	4.00	39.80
5	11650.00	59.9 PK	74.0	-14.1	1.03 H	196	8.30	51.60
6	11650.00	46.1 AV	54.0	-7.9	1.03 H	196	-5.50	51.60
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	*5825.00	108.0 PK			1.32 V	218	68.30	39.70
2	*5825.00	98.3 AV			1.32 V	218	58.60	39.70
3	#5850.00	66.3 PK	78.0	-11.7	1.32 V	222	26.50	39.80
4	#5850.00	50.8 AV	68.3	-17.5	1.32 V	222	11.00	39.80
5	11650.00	60.8 PK	74.0	-13.2	1.00 V	231	9.20	51.60
6	11650.00	46.6 AV	54.0	-7.4	1.00 V	231	-5.00	51.60

**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 limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.



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802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5400.00	57.2 PK	74.0	-16.8	1.00 H	241	18.30	38.90
2	5400.00	44.8 AV	54.0	-9.2	1.00 H	241	5.90	38.90
3	#5725.00	59.0 PK	67.1	-8.1	1.61 H	67	19.50	39.50
4	#5725.00	48.7 AV	56.8	-8.1	1.61 H	67	9.20	39.50
5	*5745.00	97.1 PK			1.61 H	67	57.50	39.60
6	*5745.00	86.8 AV			1.61 H	67	47.20	39.60
7	11490.00	60.8 PK	74.0	-13.2	1.00 H	139	9.10	51.70
8	11490.00	48.0 AV	54.0	-6.0	1.00 H	139	-3.70	51.70
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	5400.00	61.8 PK	74.0	-12.2	1.52 V	116	22.90	38.90
2	5400.00	52.6 AV	54.0	-1.4	1.52 V	116	13.70	38.90
3	#5725.00	82.3 PK	84.5	-2.2	1.38 V	171	42.80	39.50
4	#5725.00	70.6 AV	72.8	-2.2	1.38 V	171	31.10	39.50
5	*5745.00	114.5 PK			1.34 V	178	74.90	39.60
6	*5745.00	102.8 AV			1.34 V	178	63.20	39.60
7	11490.00	61.2 PK	74.0	-12.8	1.00 V	162	9.50	51.70
8	11490.00	48.3 AV	54.0	-5.7	1.00 V	162	-3.40	51.70

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 limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5000.00	55.8 PK	74.0	-18.2	1.00 H	317	17.50	38.30
2	5000.00	42.7 AV	54.0	-11.3	1.00 H	317	4.40	38.30
3	5400.00	57.2 PK	74.0	-16.8	1.03 H	236	18.30	38.90
4	5400.00	44.5 AV	54.0	-9.5	1.03 H	236	5.60	38.90
5	#5725.00	56.0 PK	66.6	-10.6	1.67 H	64	16.50	39.50
6	#5725.00	43.8 AV	55.3	-11.5	1.67 H	64	4.30	39.50
7	*5785.00	96.6 PK			1.61 H	69	56.90	39.70
8	*5785.00	85.3 AV			1.61 H	69	45.60	39.70
9	11570.00	60.9 PK	74.0	-13.1	1.00 H	104	9.30	51.60
10	11570.00	46.5 AV	54.0	-7.5	1.00 H	104	-5.10	51.60

**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 limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5000.00	59.5 PK	74.0	-14.5	1.36 V	67	21.20	38.30
2	5000.00	52.3 AV	54.0	-1.7	1.36 V	67	14.00	38.30
3	5400.00	61.5 PK	74.0	-12.5	1.37 V	123	22.60	38.90
4	5400.00	52.9 AV	54.0	-1.1	1.37 V	123	14.00	38.90
5	#5725.00	56.3 PK	84.1	-27.8	1.33 V	176	16.80	39.50
6	#5725.00	45.4 AV	72.3	-26.9	1.33 V	176	5.90	39.50
7	*5785.00	114.1 PK			1.39 V	179	74.40	39.70
8	*5785.00	102.3 AV			1.39 V	179	62.60	39.70
9	11570.00	59.3 PK	74.0	-14.7	1.00 V	157	7.70	51.60
10	11570.00	47.5 AV	54.0	-6.5	1.00 V	157	-4.10	51.60

**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 limit value is defined as per 15.247.
7. “#“: The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5000.00	56.7 PK	74.0	-17.3	1.00 H	311	18.40	38.30
2	5000.00	43.4 AV	54.0	-10.6	1.00 H	311	5.10	38.30
3	5400.00	57.4 PK	74.0	-16.6	1.04 H	233	18.50	38.90
4	5400.00	45.3 AV	54.0	-8.7	1.04 H	233	6.40	38.90
5	*5825.00	96.2 PK			1.68 H	68	56.50	39.70
6	*5825.00	84.6 AV			1.68 H	68	44.90	39.70
7	#5850.00	56.1 PK	66.2	-10.1	1.68 H	68	16.30	39.80
8	#5850.00	45.1 AV	54.6	-9.5	1.68 H	68	5.30	39.80
9	11650.00	60.4 PK	74.0	-13.6	1.00 H	128	8.80	51.60
10	11650.00	46.3 AV	54.0	-7.7	1.00 H	128	-5.30	51.60

**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 limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5000.00	59.4 PK	74.0	-14.6	1.34 V	66	21.10	38.30
2	5000.00	51.5 AV	54.0	-2.5	1.34 V	66	13.20	38.30
3	5400.00	62.5 PK	74.0	-11.5	1.28 V	120	23.60	38.90
4	5400.00	53.0 AV	54.0	-1.0	1.28 V	120	14.10	38.90
5	*5825.00	113.7 PK			1.31 V	117	74.00	39.70
6	*5825.00	102.1 AV			1.31 V	117	62.40	39.70
7	#5850.00	74.4 PK	83.7	-9.3	1.31 V	117	34.60	39.80
8	#5850.00	58.1 AV	72.1	-14.0	1.31 V	117	18.30	39.80
9	11650.00	58.7 PK	74.0	-15.3	1.00 V	173	7.10	51.60
10	11650.00	47.3 AV	54.0	-6.7	1.00 V	173	-4.30	51.60

**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 limit value is defined as per 15.247.
7. “#“: The radiated frequency is out the restricted band.



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5000.00	56.2 PK	74.0	-17.8	1.00 H	276	17.90	38.30
2	5000.00	44.4 AV	54.0	-9.6	1.00 H	276	6.10	38.30
3	5360.00	56.3 PK	74.0	-17.7	1.00 H	297	17.50	38.80
4	5360.00	45.3 AV	54.0	-8.7	1.00 H	297	6.50	38.80
5	#5725.00	64.0 PK	64.5	-0.5	1.62 H	68	24.50	39.50
6	#5725.00	52.0 AV	55.2	-3.2	1.62 H	68	12.50	39.50
7	*5755.00	94.5 PK			1.62 H	68	54.90	39.60
8	*5755.00	85.2 AV			1.62 H	68	45.60	39.60
9	11510.00	60.3 PK	74.0	-13.7	1.00 H	134	8.60	51.70
10	11510.00	48.6 AV	54.0	-5.4	1.00 H	134	-3.10	51.70

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 limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5000.00	59.3 PK	74.0	-14.7	1.09 V	58	21.00	38.30
2	5000.00	48.9 AV	54.0	-5.1	1.09 V	58	10.60	38.30
3	5360.00	59.1 PK	74.0	-14.9	1.51 V	113	20.30	38.80
4	5360.00	49.5 AV	54.0	-4.5	1.51 V	113	10.70	38.80
5	#5725.00	79.1 PK	80.6	-1.5	1.48 V	177	39.60	39.50
6	#5725.00	68.4 AV	70.0	-1.6	1.48 V	177	28.90	39.50
7	*5755.00	110.6 PK			1.40 V	177	71.00	39.60
8	*5755.00	100.0 AV			1.40 V	177	60.40	39.60
9	11510.00	60.8 PK	74.0	-13.2	1.00 V	257	9.10	51.70
10	11510.00	48.4 AV	54.0	-5.6	1.00 V	257	-3.30	51.70

**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 limit value is defined as per 15.247.
7. “#“: The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5040.00	47.1 PK	74.0	-26.9	1.00 H	192	8.70	38.40
2	5040.00	43.9 AV	54.0	-10.1	1.00 H	192	5.50	38.40
3	5400.00	57.3 PK	74.0	-16.7	1.14 H	271	18.40	38.90
4	5400.00	45.0 AV	54.0	-9.0	1.14 H	271	6.10	38.90
5	*5795.00	93.9 PK			1.51 H	65	54.20	39.70
6	*5795.00	85.2 AV			1.51 H	65	45.50	39.70
7	#5850.00	55.7 PK	63.9	-8.2	1.51 H	65	15.90	39.80
8	#5850.00	44.6 AV	55.2	-10.6	1.51 H	65	4.80	39.80
9	11550.00	59.8 PK	74.0	-14.2	1.00 H	124	8.20	51.60
10	11550.00	48.0 AV	54.0	-6.0	1.00 H	124	-3.60	51.60

**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 limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	TESTED BY	Haru Yang

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	5040.00	59.1 PK	74.0	-14.9	1.40 V	120	20.70	38.40
2	5040.00	52.2 AV	54.0	-1.8	1.40 V	120	13.80	38.40
3	5400.00	59.8 PK	74.0	-14.2	1.42 V	122	20.90	38.90
4	5400.00	52.3 AV	54.0	-1.7	1.42 V	122	13.40	38.90
5	*5795.00	110.9 PK			1.41 V	175	71.20	39.70
6	*5795.00	100.0 AV			1.41 V	175	60.30	39.70
7	#5850.00	64.3 PK	80.9	-16.6	1.39 V	176	24.50	39.80
8	#5850.00	51.7 AV	70.0	-18.3	1.39 V	176	11.90	39.80
9	11550.00	60.3 PK	74.0	-13.7	1.00 V	219	8.70	51.60
10	11550.00	47.0 AV	54.0	-7.0	1.00 V	219	-4.60	51.60

**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 limit value is defined as per 15.247.
7. "#": The radiated frequency is out the restricted band.





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**BELOW 1GHz WORST-CASE DATA : 802.11n (20MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. 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	199.05	38.1 QP	43.5	-5.4	1.50 H	339	26.60	11.50
2	265.16	40.7 QP	46.0	-5.3	1.00 H	279	26.40	14.30
3	298.21	44.5 QP	46.0	-1.5	1.00 H	0	28.90	15.60
4	498.47	44.8 QP	46.0	-1.2	2.00 H	16	23.80	21.00
5	531.53	39.3 QP	46.0	-6.7	1.50 H	9	17.40	21.90
6	908.72	36.1 QP	46.0	-9.9	1.00 H	324	7.40	28.70

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	47.40	33.5 QP	40.0	-6.5	1.00 V	192	19.40	14.10
2	166.00	30.9 QP	43.5	-12.6	1.75 V	289	16.80	14.10
3	298.21	36.1 QP	46.0	-9.9	1.25 V	312	20.50	15.60
4	375.98	34.2 QP	46.0	-11.8	1.25 V	16	16.40	17.80
5	498.47	44.9 QP	46.0	-1.1	1.00 V	82	23.90	21.00
6	531.53	41.1 QP	46.0	-4.9	1.00 V	94	19.20	21.90

**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.

## 5.2 CONDUCTED EMISSION MEASUREMENT

### 5.2.1 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.

### 5.2.2 TEST INSTRUMENTS

Same as item 4.2.2.

### 5.2.3 TEST PROCEDURES

Same as item 4.2.3.

### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

### 5.2.5 TEST SETUP

Same as item 4.2.5.

### 5.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

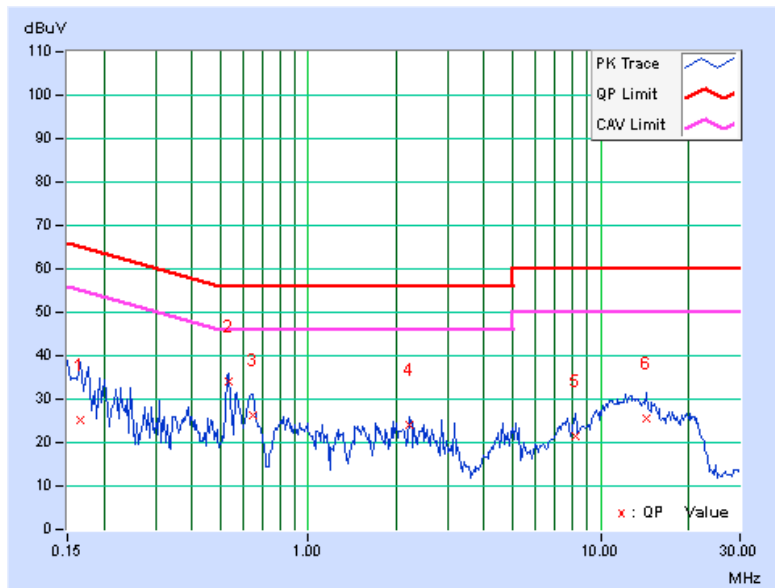
### 5.2.7 TEST RESULTS

**CONDUCTED WORST-CASE DATA : 802.11n (20MHz)**

<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.16	24.94	14.85	25.10	15.01	65.18	55.18	-40.07	-40.16
<b>2</b>	<b>0.53281</b>	<b>0.17</b>	<b>33.93</b>	<b>30.80</b>	<b>34.10</b>	<b>30.97</b>	<b>56.00</b>	<b>46.00</b>	<b>-21.90</b>	<b>-15.03</b>
3	0.64609	0.18	26.03	17.50	26.21	17.68	56.00	46.00	-29.79	-28.32
4	2.22656	0.25	24.00	13.46	24.25	13.71	56.00	46.00	-31.75	-32.29
5	8.17969	0.50	20.86	10.81	21.36	11.31	60.00	50.00	-38.64	-38.69
6	14.39063	0.71	24.82	16.47	25.53	17.18	60.00	50.00	-34.47	-32.82

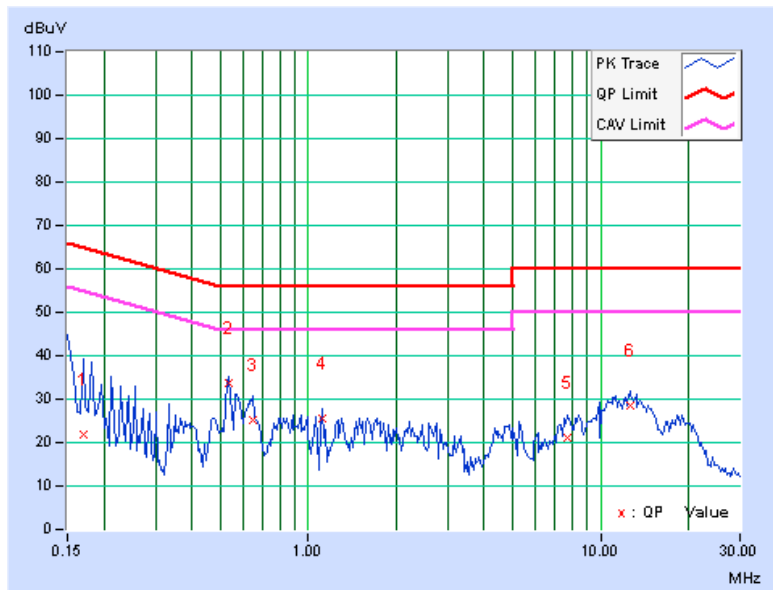
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. The emission levels of other frequencies were very low against the limit.
  3. Margin value = Emission level - Limit value
  4. Correction factor = Insertion loss + Cable loss
  5. Emission Level = Correction 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	0.16953	0.26	21.60	15.20	21.86	15.46	64.98	54.98	-43.12	-39.52
2	0.53281	0.26	33.30	29.84	33.56	30.10	56.00	46.00	-22.44	-15.90
3	0.65000	0.27	24.89	17.82	25.16	18.09	56.00	46.00	-30.84	-27.91
4	1.11719	0.30	25.09	13.47	25.39	13.77	56.00	46.00	-30.61	-32.23
5	7.72266	0.57	20.58	11.28	21.15	11.85	60.00	50.00	-38.85	-38.15
6	12.67188	0.74	27.65	19.80	28.39	20.54	60.00	50.00	-31.61	-29.46

- 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.





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### **5.3 6dB BANDWIDTH MEASUREMENT**

#### **5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT**

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

#### **5.3.2 TEST SETUP**

Same as item 4.3.2.

#### **5.3.3 TEST INSTRUMENTS**

Refer to section 4.1.2 to get information of above instrument.

#### **5.3.4 TEST PROCEDURE**

Same as item 4.3.4.

#### **5.3.5 DEVIATION FROM TEST STANDARD**

No deviation.

#### **5.3.6 EUT OPERATING CONDITIONS**

Same as item 4.3.6.



### 5.3.7 TEST RESULTS

#### 802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.63	0.5	PASS
157	5785	16.63	0.5	PASS
165	5825	16.60	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.86	17.80	17.85	0.5	PASS
157	5785	17.81	17.77	17.83	0.5	PASS
165	5825	17.84	17.78	17.82	0.5	PASS

#### 802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	37.33	37.03	36.71	0.5	PASS
159	5795	37.21	37.04	36.68	0.5	PASS



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## **5.4 CONDUCTED OUTPUT POWER**

### **5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT**

For systems using digital modulation in the 5725 –5850 MHz bands: 1 Watt (30dBm)

### **5.4.2 TEST SETUP**

Same as Item 4.4.2.

### **5.4.3 INSTRUMENTS**

Refer to section 4.1.2 to get information of above instrument.

### **5.4.4 TEST PROCEDURES**

Same as Item 4.4.4.

### **5.4.5 DEVIATION FROM TEST STANDARD**

No deviation.

### **5.4.6 EUT OPERATING CONDITIONS**

Same as Item 4.3.6.



## 5.4.7 TEST RESULTS

### 802.11a

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	32.6	15.13	30	PASS
157	5785	33.4	15.24	30	PASS
165	5825	33.5	15.25	30	PASS

### 802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	16.28	15.27	16.50	<b>120.8</b>	20.8	26.2	PASS
157	5785	15.44	14.69	16.24	106.5	20.3	26.2	PASS
165	5825	14.96	14.57	16.21	101.8	20.1	26.2	PASS

**NOTE:** Directional gain =  $5\text{dBi} + 10\log(3) = 9.8\text{dBi} > 6\text{dBi}$ , so the conducted power limit shall be reduced to  $30 - (9.8 - 6) = 26.2\text{dBm}$ .

### 802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	15.76	14.99	16.32	112.1	20.5	26.2	PASS
159	5795	15.64	15.29	16.23	112.4	20.5	26.2	PASS

**NOTE:** Directional gain =  $5\text{dBi} + 10\log(3) = 9.8\text{dBi} > 6\text{dBi}$ , so the conducted power limit shall be reduced to  $30 - (9.8 - 6) = 26.2\text{dBm}$ .





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## **5.5 POWER SPECTRAL DENSITY MEASUREMENT**

### **5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT**

The Maximum of Power Spectral Density Measurement is 8dBm.

### **5.5.2 TEST SETUP**

Same as item 4.5.2.

### **5.5.3 TEST INSTRUMENTS**

Refer to section 4.1.2 to get information of above instrument.

### **5.5.4 TEST PROCEDURE.**

Same as item 4.5.4.

### **5.5.5 DEVIATION FROM TEST STANDARD**

No deviation.

### **5.5.6 EUT OPERATING CONDITION**

Same as item 4.3.6.



## 5.5.7 TEST RESULTS

### 802.11a

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
149	5745	-5.88	-21.11	8	PASS
157	5785	-5.97	-21.20	8	PASS
165	5825	-5.89	-21.12	8	PASS

### 802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-4.49	-19.72	4.77	-14.95	4.2	PASS
	157	5785	-5.14	-20.37	4.77	-15.60	4.2	PASS
	165	5825	-5.70	-20.93	4.77	-16.16	4.2	PASS
1	149	5745	-6.17	-21.40	4.77	-16.63	4.2	PASS
	157	5785	-6.69	-21.92	4.77	-17.15	4.2	PASS
	165	5825	-6.76	-21.99	4.77	-17.22	4.2	PASS
2	149	5745	-4.95	-20.18	4.77	-15.41	4.2	PASS
	157	5785	-5.06	-20.29	4.77	-15.52	4.2	PASS
	165	5825	-5.28	-20.51	4.77	-15.74	4.2	PASS

**NOTE:** Directional gain =5dBi + 10log(3)=9.8dBi > 6dBi, so the power density limit shall be reduced to 8-(9.8-6)=4.2dBm

### 802.11n (40MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-7.49	-22.72	4.77	-17.95	4.2	PASS
	159	5795	-7.45	-22.68	4.77	-17.91	4.2	PASS
1	151	5755	-8.25	-23.48	4.77	-18.71	4.2	PASS
	159	5795	-7.84	-23.07	4.77	-18.30	4.2	PASS
2	151	5755	-7.44	-22.67	4.77	-17.90	4.2	PASS
	159	5795	-7.36	-22.59	4.77	-17.82	4.2	PASS

**NOTE:** Directional gain =5dBi + 10log(3)=9.8dBi > 6dBi, so the power density limit shall be reduced to 8-(9.8-6)=4.2dBm



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## **5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT**

### **5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT**

Below  $-30\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### **5.6.2 TEST SETUP**

Same as Item 4.6.2

### **5.6.3 TEST INSTRUMENTS**

Refer to section 4.1.2 to get information of above instrument.

### **5.6.4 TEST PROCEDURE**

Same as Item 4.6.4

### **5.6.5 DEVIATION FROM TEST STANDARD**

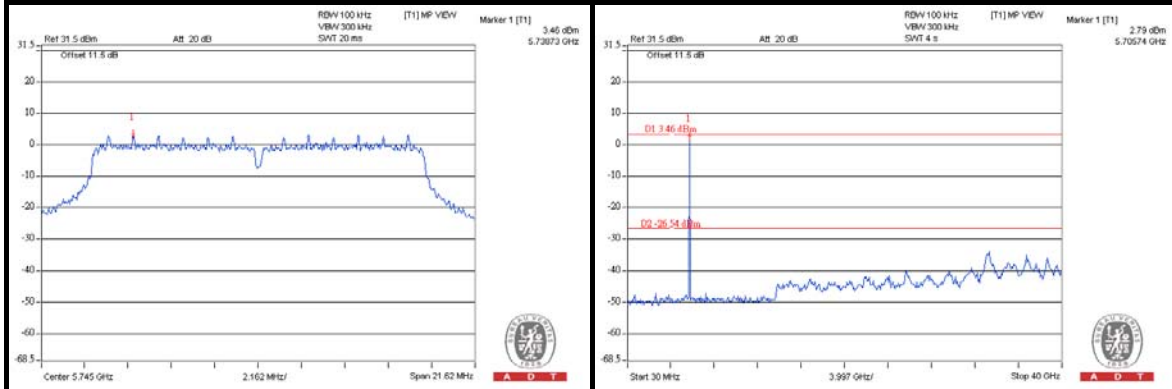
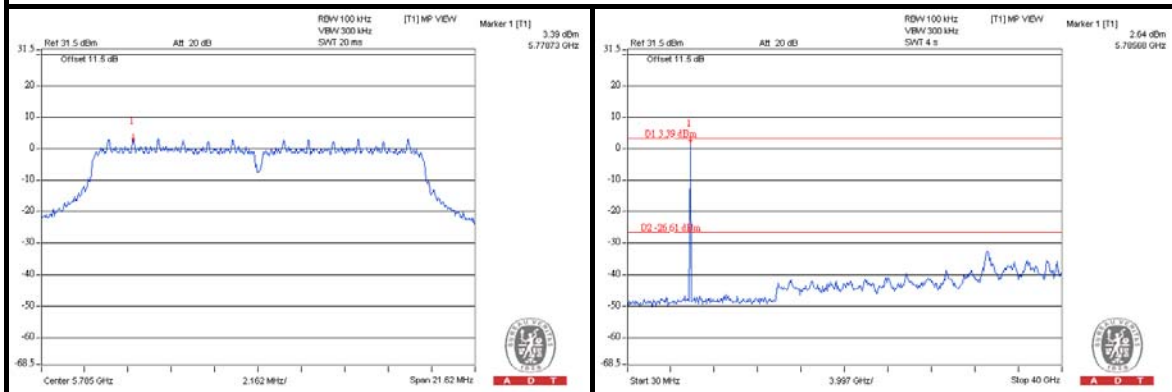
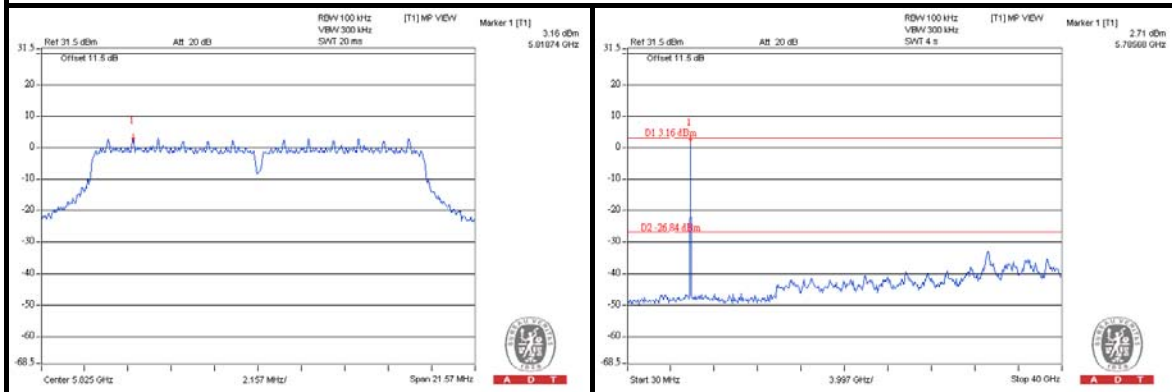
No deviation.

### **5.6.6 EUT OPERATING CONDITION**

Same as Item 4.3.6

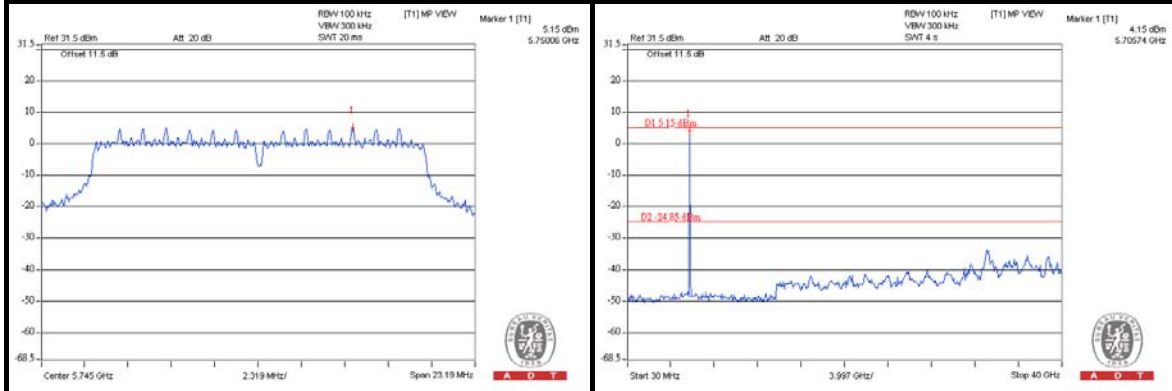
### **5.6.7 TEST RESULTS**

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

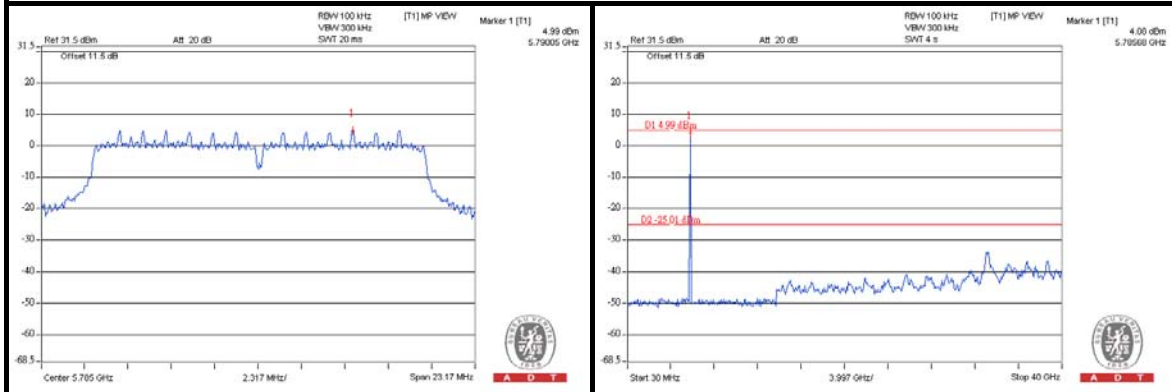
**802.11a****CH 149****CH 157****CH 165**

802.11n (20MHz)

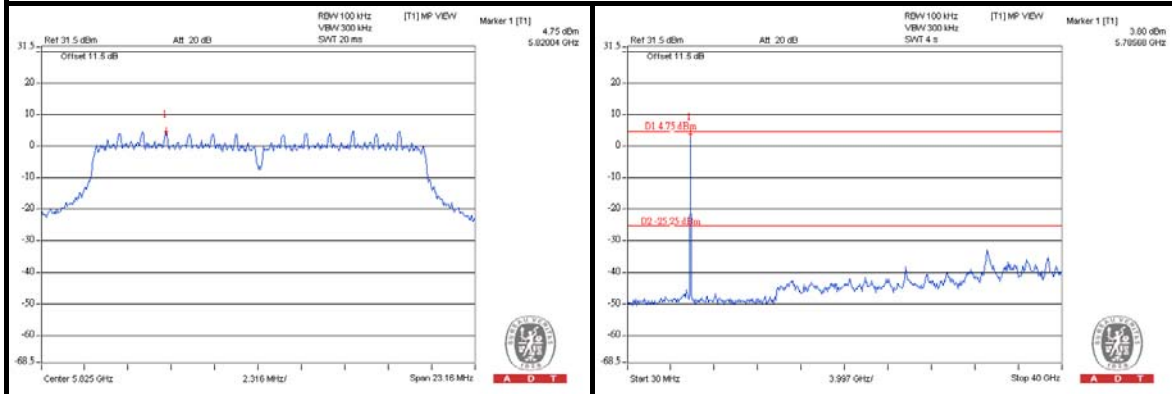
CH 149



CH 157

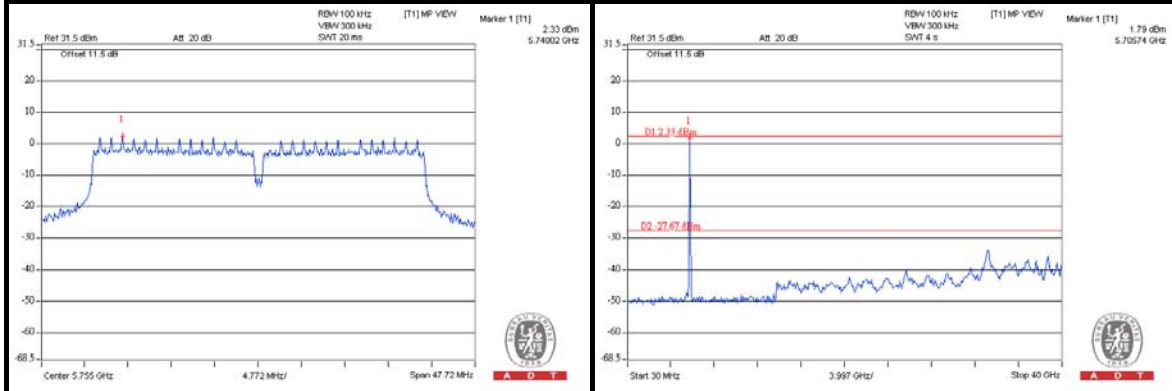


CH 165

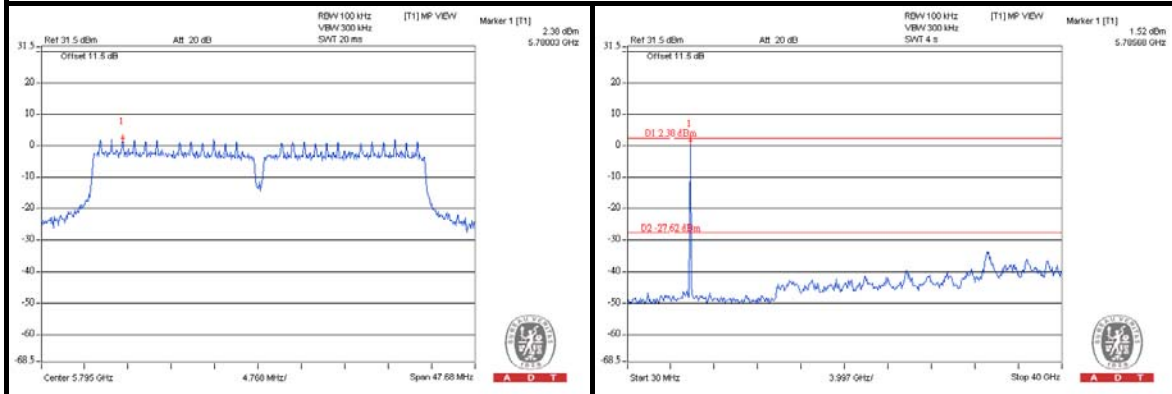


### 802.11n (40MHz)

#### CH 151



#### CH 159





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## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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## 7. 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.

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml).

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

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**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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## **8. 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---**