

# FCC TEST REPORT

**REPORT NO.:** RF140923C28

**MODEL NO.:** BSX-1100

**FCC ID:** 2ADAIBSX1100

**RECEIVED:** Sep. 23, 2014

**TESTED:** Nov. 04 ~ Nov. 12, 2014

**ISSUED:** Nov. 14, 2014

**APPLICANT:** Raylios Technology Inc.

**ADDRESS:** 12F., No 16, Jian 8th Rd., Zhonghe Dist., New Taipei City 235, Taiwan (ROC)

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

**LAB ADDRESS:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.

**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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## TABLE OF CONTENTS

RELEASE CONTROL RECORD .....	4
1. CERTIFICATION.....	5
2. SUMMARY OF TEST RESULTS .....	6
2.1 MEASUREMENT UNCERTAINTY .....	6
3. GENERAL INFORMATION.....	7
3.1 GENERAL DESCRIPTION OF EUT .....	7
3.2 DESCRIPTION OF TEST MODES .....	8
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL.....	9
3.3 DUTY CYCLE OF TEST SIGNAL.....	11
3.4 DESCRIPTION OF SUPPORT UNITS .....	12
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST .....	13
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	13
4. TEST TYPES AND RESULTS .....	15
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	15
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	15
4.1.2 TEST INSTRUMENTS .....	16
4.1.3 TEST PROCEDURES .....	17
4.1.4 DEVIATION FROM TEST STANDARD .....	17
4.1.5 TEST SETUP.....	18
4.1.6 EUT OPERATING CONDITIONS .....	19
4.1.7 TEST RESULTS .....	20
4.2 CONDUCTED EMISSION MEASUREMENT .....	33
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	33
4.2.2 TEST INSTRUMENTS.....	33
4.2.3 TEST PROCEDURES .....	34
4.2.4 DEVIATION FROM TEST STANDARD .....	34
4.2.5 TEST SETUP.....	34
4.2.6 EUT OPERATING CONDITIONS .....	34
4.2.7 TEST RESULTS .....	35
4.3 6dB BANDWIDTH MEASUREMENT .....	37
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	37
4.3.2 TEST SETUP.....	37
4.3.3 TEST INSTRUMENTS.....	37
4.3.4 TEST PROCEDURE.....	37
4.3.5 DEVIATION FROM TEST STANDARD .....	37
4.3.6 EUT OPERATING CONDITIONS .....	37
4.3.7 TEST RESULTS .....	38
4.4 CONDUCTED OUTPUT POWER .....	40
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT .....	40



A D T

4.4.2	TEST SETUP.....	40
4.4.3	TEST INSTRUMENTS.....	40
4.4.4	TEST PROCEDURES .....	40
4.4.5	DEVIATION FROM TEST STANDARD .....	40
4.4.6	EUT OPERATING CONDITIONS .....	40
4.4.7	TEST RESULTS .....	41
4.5	POWER SPECTRAL DENSITY MEASUREMENT.....	43
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	43
4.5.2	TEST SETUP.....	43
4.5.3	TEST INSTRUMENTS.....	43
4.5.4	TEST PROCEDURE.....	43
4.5.5	DEVIATION FROM TEST STANDARD .....	43
4.5.6	EUT OPERATING CONDITION .....	43
4.5.7	TEST RESULTS .....	44
4.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT .....	46
4.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT.....	46
4.6.2	TEST SETUP.....	46
4.6.3	TEST INSTRUMENTS.....	46
4.6.4	TEST PROCEDURE.....	47
4.6.5	DEVIATION FROM TEST STANDARD .....	47
4.6.6	EUT OPERATING CONDITION .....	47
4.6.7	TEST RESULTS .....	47
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION .....	52
6.	INFORMATION ON THE TESTING LABORATORIES .....	53
7.	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	54



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140923C28	Original release.	Nov. 14, 2014

## 1. CERTIFICATION

**PRODUCT:** WI-FI IP Camera

**MODEL NO.:** BSX-1100

**BRAND:** Raylios

**APPLICANT:** Raylios Technology Inc.

**TESTED:** Nov. 04 ~ Nov. 12, 2014

**TEST SAMPLE:** ENGINEERING SAMPLE

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


The above equipment (model: BSX-1100) 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 :**

  
Polly Chen / Specialist

**, DATE :** Nov. 14, 2014

**APPROVED BY :**

  
Ken Liu / Senior Manager

**, DATE :** Nov. 14, 2014

## 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 -10.23dB at 0.15000MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.50MHz, 2390.00MHz, 7311.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	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 IPEX 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	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 dB
	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 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>	WI-FI IP Camera
<b>MODEL NO.</b>	BSX-1100
<b>POWER SUPPLY</b>	5Vdc (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 150.0Mbps
<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>	373.250mW
<b>ANTENNA TYPE</b>	PCB antenna with 2.72dBi gain
<b>ANTENNA CONNECTOR</b>	IPEX
<b>DATA CABLE</b>	3.15m shielded Micro USB cable with 2 cores
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	N/A

#### NOTE:

- The EUT provides one completed transmitter and one receiver.

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

- The EUT consumes power from the following adapter.

<b>BRAND:</b>	Beseye
<b>MODEL:</b>	KSAPK0110500200FU
<b>INPUT:</b>	100-240Vac, 50/60Hz, 0.5A
<b>OUTPUT:</b>	5.0Vdc, 2.0A

- 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 $\geq$ 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

**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	6.5
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

#### **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)
-	802.11g	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	6.5
-	802.11n (40MHz)	3 to 9	3, 9	OFDM	BPSK	13.5

### **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	6.5
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

### **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang, Tank Wu
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
PLC	25deg. C, 68%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Nick Chen

### 3.3 DUTY CYCLE OF TEST SIGNAL

**802.11b:** Duty cycle of test signal is 100 %

Duty cycle of test signal is < 98%

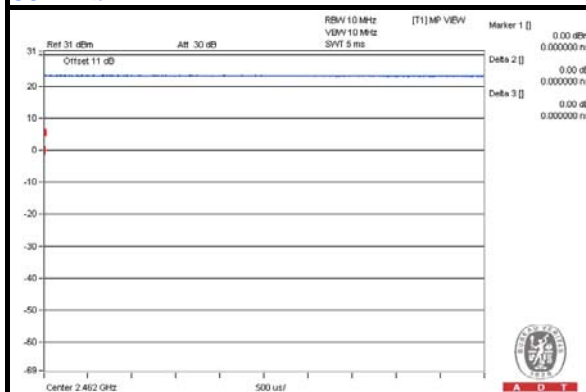
**802.11g:** Duty cycle =  $1.438/1.474 = 0.976$ , Duty factor =  $10 * \log(1/0.976) = 0.11$

**802.11n (40MHz):** Duty cycle =  $0.655/0.677 = 0.968$ , Duty factor =  $10 * \log(1/0.968) = 0.14$

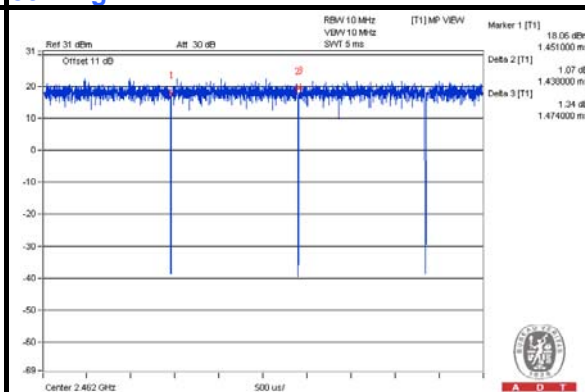
Duty cycle of test signal is > 98 %

**802.11n (20MHz):** Duty cycle =  $1.347/1.359 = 0.991$

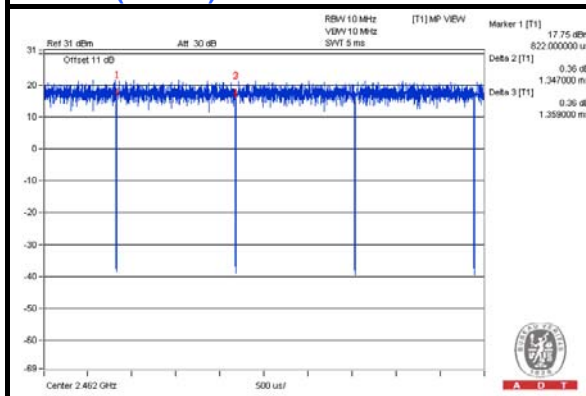
**802.11b**



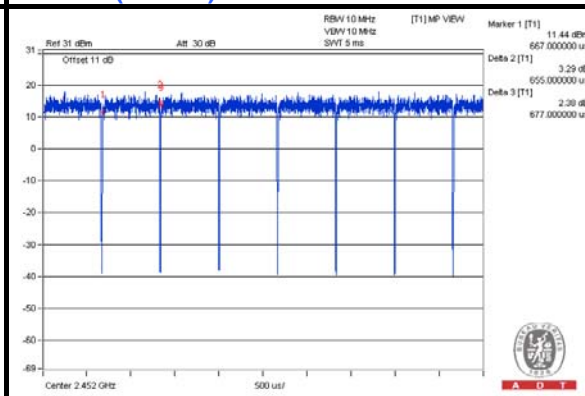
**802.11g**



**802.11n (20MHz)**



**802.11n (40MHz)**



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### 3.4 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.

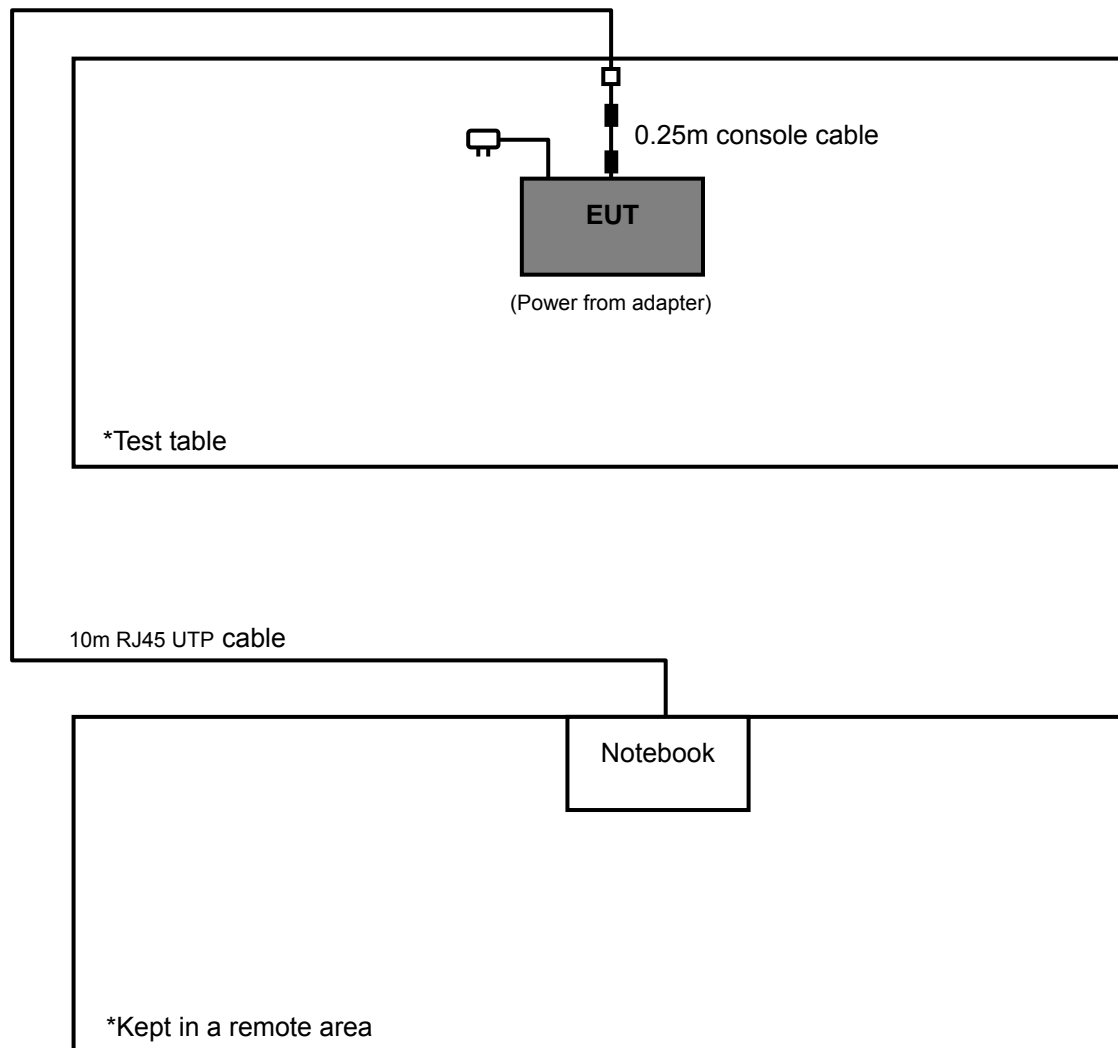
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	D531	CN-0XM006-48643-8 1U-2973	QDS-BRCM1020

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable + 0.25m console cable with 2cores

**NOTE:**

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as a communication partner to transfer data.
3. The 0.25m console cable with 2 cores was provided by client.

### 3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



### 3.5 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 v03r02**

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	ESCS30	100289	Nov. 29, 2013	Nov. 28, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Feb. 11, 2014	Feb. 10, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Feb. 25, 2014	Feb. 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Aug. 25, 2014	Aug. 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2014	Aug. 08, 2015
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	248780/4 309222/4 274092/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable Worken	8D-FB	Cable-CH9-01	Aug. 11, 2014	Aug. 10, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	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	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015

- 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 215374.
5. The IC Site Registration No. is IC 7450F-9.



#### 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:**

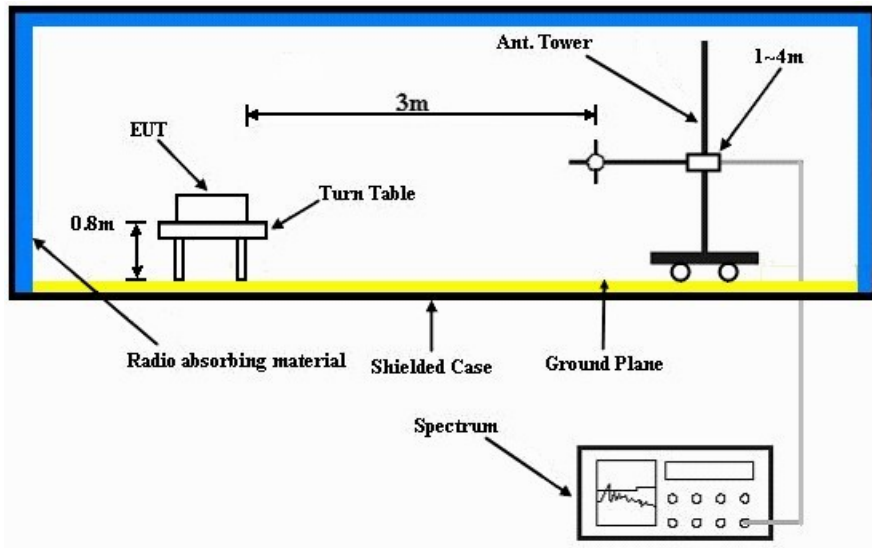
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $> 98\%$ ) 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

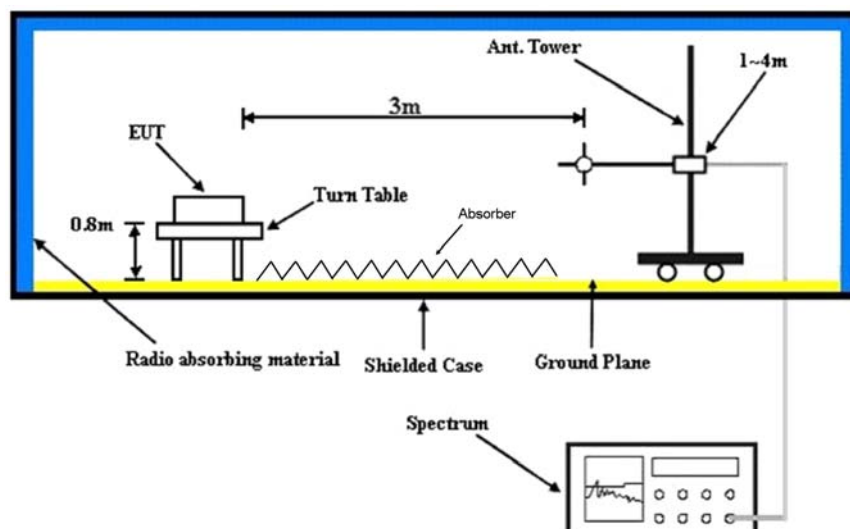
No deviation.

#### 4.1.5 TEST SETUP

##### Frequency range 30MHz~1GHz



##### Frequency range above 1GHz



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



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#### 4.1.6 EUT OPERATING CONDITIONS

- a. Connected the EUT with notebook through console cable and placed on a testing table.
- b. The notebook system 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

##### ABOVE 1GHz DATA :

##### 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, 65%RH	TESTED BY	Ted Chang

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	62.4 PK	74.0	-11.6	1.01 H	337	29.40	33.00
2	2390.00	52.5 AV	54.0	-1.5	1.01 H	337	19.50	33.00
3	*2412.00	109.1 PK			1.01 H	337	76.00	33.10
4	*2412.00	105.7 AV			1.01 H	337	72.60	33.10
5	4824.00	51.6 PK	74.0	-22.4	1.00 H	302	50.10	1.50
6	4824.00	46.8 AV	54.0	-7.2	1.00 H	302	45.30	1.50
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	60.4 PK	74.0	-13.6	1.00 V	261	27.40	33.00
2	2390.00	49.1 AV	54.0	-4.9	1.00 V	261	16.10	33.00
3	*2412.00	101.7 PK			1.00 V	261	68.60	33.10
4	*2412.00	98.2 AV			1.00 V	261	65.10	33.10
5	4824.00	53.0 PK	74.0	-21.0	1.00 V	63	51.50	1.50
6	4824.00	49.9 AV	54.0	-4.1	1.00 V	63	48.40	1.50

##### 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)  
– Pre-Amplifier 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	Tank 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	109.9 PK			1.00 H	0	76.60	33.30
2	*2437.00	106.3 AV			1.00 H	0	73.00	33.30
3	4874.00	51.5 PK	74.0	-22.5	1.00 H	260	50.00	1.50
4	4874.00	47.5 AV	54.0	-6.5	1.00 H	260	46.00	1.50
5	7311.00	57.5 PK	74.0	-16.5	1.00 H	331	49.40	8.10
6	7311.00	48.2 AV	54.0	-5.8	1.00 H	331	40.10	8.10
7	12185.00	61.1 PK	74.0	-12.9	1.00 H	32	45.80	15.30
8	12185.00	49.1 AV	54.0	-4.9	1.00 H	32	33.80	15.30
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	102.2 PK			1.10 V	208	68.90	33.30
2	*2437.00	98.6 AV			1.10 V	208	65.30	33.30
3	4874.00	52.2 PK	74.0	-21.8	1.00 V	350	50.70	1.50
4	4874.00	48.6 AV	54.0	-5.4	1.00 V	350	47.10	1.50
5	7311.00	60.3 PK	74.0	-13.7	1.05 V	9	52.20	8.10
6	7311.00	53.0 AV	54.0	-1.0	1.05 V	9	44.90	8.10
7	12185.00	62.4 PK	74.0	-11.6	1.00 V	257	47.10	15.30
8	12185.00	51.0 AV	54.0	-3.0	1.00 V	257	35.70	15.30

**REMARKS:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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, 65%RH	TESTED BY	Tank 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	107.9 PK			1.00 H	4	74.50	33.40
2	*2462.00	104.5 AV			1.00 H	4	71.10	33.40
3	2483.50	63.3 PK	74.0	-10.7	1.00 H	4	29.90	33.40
4	2483.50	53.0 AV	54.0	-1.0	1.00 H	4	19.60	33.40
5	4924.00	51.7 PK	74.0	-22.3	1.01 H	169	50.10	1.60
6	4924.00	47.6 AV	54.0	-6.4	1.01 H	169	46.00	1.60
7	7386.00	57.6 PK	74.0	-16.4	1.00 H	205	49.40	8.20
8	7386.00	45.8 AV	54.0	-8.2	1.00 H	205	37.60	8.20
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	101.8 PK			1.07 V	209	68.40	33.40
2	*2462.00	98.3 AV			1.07 V	209	64.90	33.40
3	2483.50	61.6 PK	74.0	-12.4	1.07 V	209	28.20	33.40
4	2483.50	50.1 AV	54.0	-3.9	1.07 V	209	16.70	33.40
5	4924.00	52.0 PK	74.0	-22.0	1.00 V	171	50.40	1.60
6	4924.00	48.6 AV	54.0	-5.4	1.00 V	171	47.00	1.60
7	7386.00	57.4 PK	74.0	-16.6	1.00 V	332	49.20	8.20
8	7386.00	46.1 AV	54.0	-7.9	1.00 V	332	37.90	8.20

**REMARKS:**

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



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## 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, 65%RH	TESTED BY	Tank 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	70.8 PK	74.0	-3.2	1.00 H	338	37.80	33.00
2	2390.00	52.8 AV	54.0	-1.2	1.00 H	338	19.80	33.00
3	*2412.00	105.1 PK			1.00 H	338	72.00	33.10
4	*2412.00	96.0 AV			1.00 H	338	62.90	33.10
5	4824.00	46.3 PK	74.0	-27.7	1.00 H	265	44.80	1.50
6	4824.00	33.9 AV	54.0	-20.1	1.00 H	265	32.40	1.50
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	64.0 PK	74.0	-10.0	1.00 V	240	31.00	33.00
2	2390.00	49.4 AV	54.0	-4.6	1.00 V	240	16.40	33.00
3	*2412.00	97.8 PK			1.00 V	240	64.70	33.10
4	*2412.00	89.0 AV			1.00 V	240	55.90	33.10
5	4824.00	47.9 PK	74.0	-26.1	1.00 V	32	46.40	1.50
6	4824.00	34.6 AV	54.0	-19.4	1.00 V	32	33.10	1.50

## 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)  
– Pre-Amplifier 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	Tank 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	61.8 PK	74.0	-12.2	1.00 H	333	28.80	33.00
2	2390.00	49.6 AV	54.0	-4.4	1.00 H	333	16.60	33.00
3	*2437.00	110.3 PK			1.00 H	334	77.00	33.30
4	*2437.00	100.6 AV			1.00 H	334	67.30	33.30
5	2483.50	62.4 PK	74.0	-11.6	1.00 H	333	29.00	33.40
6	2483.50	49.1 AV	54.0	-4.9	1.00 H	333	15.70	33.40
7	4874.00	47.3 PK	74.0	-26.7	1.00 H	269	45.80	1.50
8	4874.00	34.4 AV	54.0	-19.6	1.00 H	269	32.90	1.50
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	60.7 PK	74.0	-13.3	1.26 V	236	27.70	33.00
2	2390.00	48.2 AV	54.0	-5.8	1.26 V	236	15.20	33.00
3	*2437.00	103.4 PK			1.26 V	236	70.10	33.30
4	*2437.00	93.1 AV			1.26 V	236	59.80	33.30
5	2483.50	61.0 PK	74.0	-13.0	1.26 V	236	27.60	33.40
6	2483.50	48.3 AV	54.0	-5.7	1.26 V	236	14.90	33.40
7	4874.00	48.0 PK	74.0	-26.0	1.00 V	255	46.50	1.50
8	4874.00	34.7 AV	54.0	-19.3	1.00 V	255	33.20	1.50

**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)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Tank 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	103.9 PK			1.21 H	20	70.50	33.40
2	*2462.00	94.5 AV			1.21 H	20	61.10	33.40
3	2483.50	68.1 PK	74.0	-5.9	1.21 H	20	34.70	33.40
4	2483.50	52.9 AV	54.0	-1.1	1.21 H	20	19.50	33.40
5	4924.00	47.4 PK	74.0	-26.6	3.22 H	138	45.80	1.60
6	4924.00	33.4 AV	54.0	-20.6	3.22 H	138	31.80	1.60
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	*2462.00	99.2 PK			1.00 V	282	65.80	33.40
2	*2462.00	89.7 AV			1.00 V	282	56.30	33.40
3	2483.50	63.4 PK	74.0	-10.6	1.00 V	282	30.00	33.40
4	2483.50	50.0 AV	54.0	-4.0	1.00 V	282	16.60	33.40
5	4924.00	49.8 PK	74.0	-24.2	1.00 V	96	48.20	1.60
6	4924.00	36.7 AV	54.0	-17.3	1.00 V	96	35.10	1.60

**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)  
– Pre-Amplifier 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	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Tank 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	73.0 PK	74.0	-1.0	1.00 H	0	40.00	33.00
2	2390.00	53.0 AV	54.0	-1.0	1.00 H	0	20.00	33.00
3	*2412.00	104.6 PK			1.00 H	0	71.50	33.10
4	*2412.00	94.9 AV			1.00 H	0	61.80	33.10
5	4824.00	47.4 PK	74.0	-26.6	1.02 H	66	45.90	1.50
6	4824.00	34.0 AV	54.0	-20.0	1.02 H	66	32.50	1.50
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	65.1 PK	74.0	-8.9	1.03 V	303	32.10	33.00
2	2390.00	49.3 AV	54.0	-4.7	1.03 V	303	16.30	33.00
3	*2412.00	98.1 PK			1.03 V	303	65.00	33.10
4	*2412.00	88.8 AV			1.03 V	303	55.70	33.10
5	4824.00	48.1 PK	74.0	-25.9	1.53 V	199	46.60	1.50
6	4824.00	34.0 AV	54.0	-20.0	1.53 V	199	32.50	1.50

## 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)  
– Pre-Amplifier 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	Tank 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	64.2 PK	74.0	-9.8	1.00 H	19	31.20	33.00
2	2390.00	50.2 AV	54.0	-3.8	1.00 H	19	17.20	33.00
3	*2437.00	109.9 PK			1.00 H	19	76.60	33.30
4	*2437.00	99.7 AV			1.00 H	19	66.40	33.30
5	2483.50	63.0 PK	74.0	-11.0	1.00 H	19	29.60	33.40
6	2483.50	49.3 AV	54.0	-4.7	1.00 H	19	15.90	33.40
7	4874.00	49.0 PK	74.0	-25.0	1.00 H	35	47.50	1.50
8	4874.00	36.5 AV	54.0	-17.5	1.00 H	35	35.00	1.50
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	60.3 PK	74.0	-13.7	1.03 V	68	27.30	33.00
2	2390.00	48.0 AV	54.0	-6.0	1.03 V	68	15.00	33.00
3	*2437.00	103.0 PK			1.03 V	68	69.70	33.30
4	*2437.00	93.0 AV			1.03 V	68	59.70	33.30
5	2483.50	61.7 PK	74.0	-12.3	1.03 V	68	28.30	33.40
6	2483.50	48.8 AV	54.0	-5.2	1.03 V	68	15.40	33.40
7	4874.00	48.0 PK	74.0	-26.0	1.23 V	76	46.50	1.50
8	4874.00	33.9 AV	54.0	-20.1	1.23 V	76	32.40	1.50

**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)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Tank Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.4 PK			1.00 H	20	71.00	33.40
2	*2462.00	95.1 AV			1.00 H	20	61.70	33.40
3	2483.50	69.1 PK	74.0	-4.9	1.00 H	20	35.70	33.40
4	2483.50	52.9 AV	54.0	-1.1	1.00 H	20	19.50	33.40
5	4924.00	46.8 PK	74.0	-27.2	1.01 H	326	45.20	1.60
6	4924.00	34.4 AV	54.0	-19.6	1.01 H	326	32.80	1.60
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	*2462.00	100.3 PK			1.57 V	41	66.90	33.40
2	*2462.00	90.9 AV			1.57 V	41	57.50	33.40
3	2483.50	66.3 PK	74.0	-7.7	1.57 V	41	32.90	33.40
4	2483.50	50.1 AV	54.0	-3.9	1.57 V	41	16.70	33.40
5	4924.00	49.5 PK	74.0	-24.5	1.03 V	66	47.90	1.60
6	4924.00	35.8 AV	54.0	-18.2	1.03 V	66	34.20	1.60

**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)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.

## 802.11n (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, 65%RH	TESTED BY	Tank 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	66.9 PK	74.0	-7.1	1.00 H	336	33.90	33.00
2	2390.00	52.9 AV	54.0	-1.1	1.00 H	336	19.90	33.00
3	*2422.00	99.2 PK			1.00 H	336	66.00	33.20
4	*2422.00	89.8 AV			1.00 H	336	56.60	33.20
5	4844.00	48.7 PK	74.0	-25.3	1.00 H	245	47.20	1.50
6	4844.00	34.4 AV	54.0	-19.6	1.00 H	245	32.90	1.50
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	63.6 PK	74.0	-10.4	1.02 V	287	30.60	33.00
2	2390.00	50.0 AV	54.0	-4.0	1.02 V	287	17.00	33.00
3	*2422.00	93.9 PK			1.02 V	287	60.70	33.20
4	*2422.00	84.5 AV			1.02 V	287	51.30	33.20
5	4844.00	48.7 PK	74.0	-25.3	1.00 V	59	47.20	1.50
6	4844.00	36.1 AV	54.0	-17.9	1.00 V	59	34.60	1.50

## REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)  
– Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- \* \*: 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	Tank 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	68.7 PK	74.0	-5.3	1.00 H	20	35.70	33.00
2	2390.00	53.0 AV	54.0	-1.0	1.00 H	20	20.00	33.00
3	*2437.00	102.9 PK			1.00 H	20	69.60	33.30
4	*2437.00	93.2 AV			1.00 H	20	59.90	33.30
5	2483.50	64.7 PK	74.0	-9.3	1.00 H	20	31.30	33.40
6	2483.50	50.6 AV	54.0	-3.4	1.00 H	20	17.20	33.40
7	4874.00	46.9 PK	74.0	-27.1	1.00 H	66	45.40	1.50
8	4874.00	33.9 AV	54.0	-20.1	1.00 H	66	32.40	1.50
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	63.2 PK	74.0	-10.8	1.00 V	285	30.20	33.00
2	2390.00	49.7 AV	54.0	-4.3	1.00 V	285	16.70	33.00
3	*2437.00	96.7 PK			1.00 V	285	63.40	33.30
4	*2437.00	87.0 AV			1.00 V	285	53.70	33.30
5	2483.50	61.3 PK	74.0	-12.7	1.00 V	285	27.90	33.40
6	2483.50	49.0 AV	54.0	-5.0	1.00 V	285	15.60	33.40
7	4874.00	49.0 PK	74.0	-25.0	1.20 V	102	47.50	1.50
8	4874.00	36.9 AV	54.0	-17.1	1.20 V	102	35.40	1.50

**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)  
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ \* “: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Tank 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	*2452.00	102.0 PK			1.00 H	20	68.70	33.30
2	*2452.00	92.5 AV			1.00 H	20	59.20	33.30
3	2483.50	68.2 PK	74.0	-5.8	1.00 H	20	34.80	33.40
4	2483.50	52.7 AV	54.0	-1.3	1.00 H	20	19.30	33.40
5	4904.00	47.0 PK	74.0	-27.0	1.52 H	90	45.40	1.60
6	4904.00	34.9 AV	54.0	-19.1	1.52 H	90	33.30	1.60
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	95.6 PK			1.00 V	284	62.30	33.30
2	*2452.00	86.0 AV			1.00 V	284	52.70	33.30
3	2483.50	63.6 PK	74.0	-10.4	1.00 V	284	30.20	33.40
4	2483.50	49.7 AV	54.0	-4.3	1.00 V	284	16.30	33.40
5	4904.00	48.3 PK	74.0	-25.7	1.26 V	103	46.70	1.60
6	4904.00	35.1 AV	54.0	-18.9	1.26 V	103	33.50	1.60

**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)  
– Pre-Amplifier 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	25deg. C, 65%RH	TESTED BY	Ted Chang

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	124.82	29.9 QP	43.5	-13.6	2.00 H	126	46.00	-16.10
2	249.18	28.7 QP	46.0	-17.3	1.01 H	271	43.10	-14.40
3	564.74	38.5 QP	46.0	-7.5	1.51 H	226	46.00	-7.50
4	588.06	40.1 QP	46.0	-5.9	1.01 H	274	46.70	-6.60
5	612.93	38.2 QP	46.0	-7.8	1.01 H	279	44.20	-6.00
6	684.44	35.5 QP	46.0	-10.5	1.01 H	251	40.60	-5.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.77	35.9 QP	40.0	-4.1	1.00 V	101	51.40	-15.50
2	70.42	37.6 QP	40.0	-2.4	1.00 V	233	53.90	-16.30
3	148.14	30.3 QP	43.5	-13.2	1.00 V	242	44.40	-14.10
4	539.87	37.6 QP	46.0	-8.4	1.00 V	181	45.50	-7.90
5	564.74	39.3 QP	46.0	-6.7	1.00 V	239	46.80	-7.50
6	588.06	36.7 QP	46.0	-9.3	1.00 V	97	43.30	-6.60

**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)  
– Pre-Amplifier 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	ESCI	100612	Sep. 30, 2014	Sep. 29, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
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

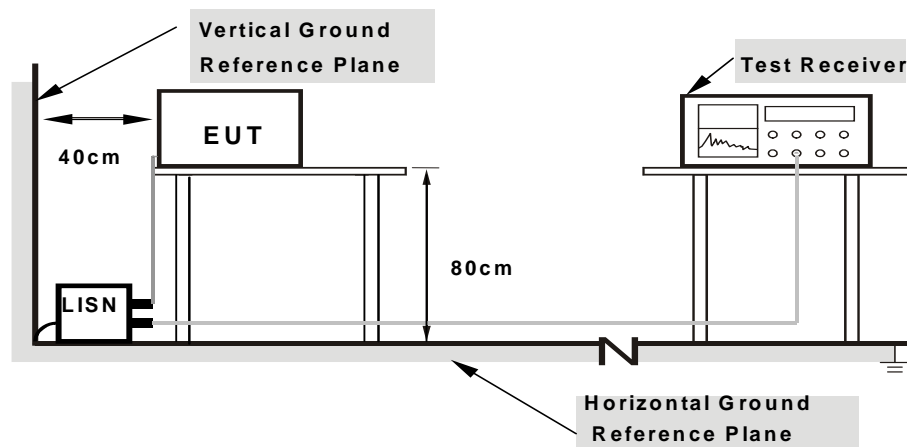
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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 cm from other units and other metal planes

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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

## 4.2.7 TEST RESULTS

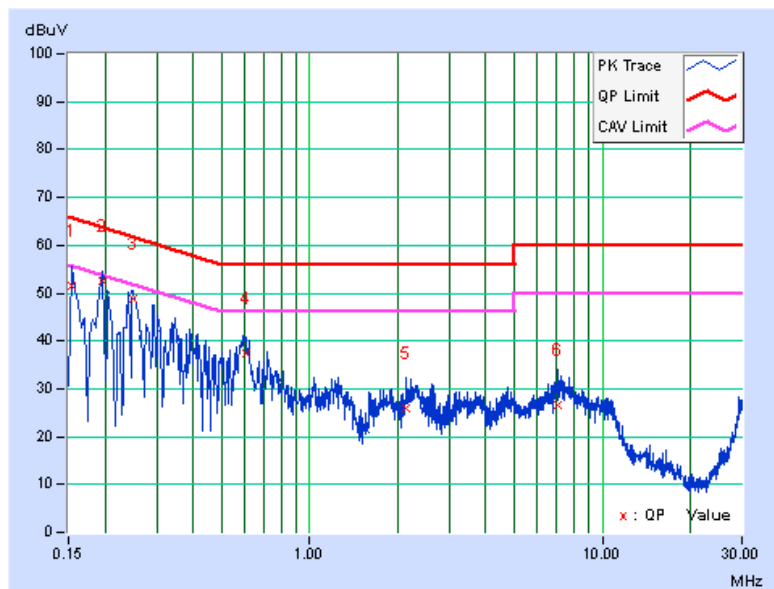
### CONDUCTED WORST-CASE DATA : 802.11g

PHASE	Line 1	6dB BANDWIDTH	9kHz
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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	0.15391	0.08	51.57	38.55	51.65	38.63	65.79	55.79	-14.14	-17.16
2	0.19665	0.07	52.46	40.62	52.53	40.69	63.75	53.75	-11.22	-13.06
3	0.24796	0.07	48.86	36.71	48.93	36.78	61.83	51.83	-12.89	-15.04
4	0.60356	0.09	37.26	28.05	37.35	28.14	56.00	46.00	-18.65	-17.86
5	2.13628	0.16	25.84	16.41	26.00	16.57	56.00	46.00	-30.00	-29.43
6	7.06679	0.37	26.19	15.84	26.56	16.21	60.00	50.00	-33.44	-33.79

#### 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

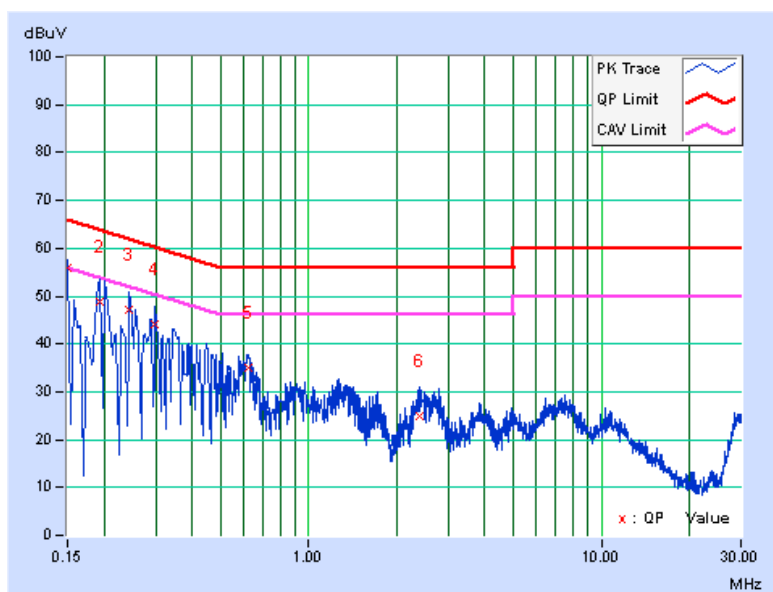


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	55.72	43.93	55.77	43.98	66.00	56.00	-10.23	-12.02
2	0.19301	0.05	48.84	35.54	48.89	35.59	63.91	53.91	-15.02	-18.32
3	0.24407	0.05	47.08	33.87	47.13	33.92	61.96	51.96	-14.82	-18.03
4	0.29858	0.06	43.95	30.71	44.01	30.77	60.28	50.28	-16.27	-19.51
5	0.62311	0.08	34.90	21.95	34.98	22.03	56.00	46.00	-21.02	-23.97
6	2.37870	0.15	24.79	13.26	24.94	13.41	56.00	46.00	-31.06	-32.59

#### 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

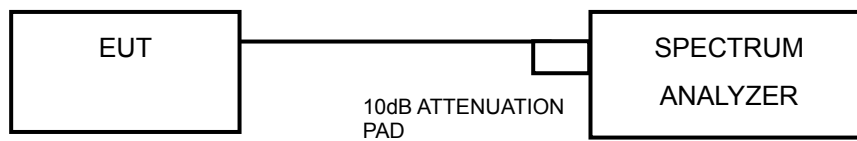


### 4.3 6dB BANDWIDTH MEASUREMENT

#### 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) = 100kHz
- 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
1	2412	9.57	0.5	PASS
6	2437	10.11	0.5	PASS
11	2462	10.08	0.5	PASS

##### 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.41	0.5	PASS
6	2437	16.39	0.5	PASS
11	2462	16.41	0.5	PASS

##### 802.11n (20MHz)

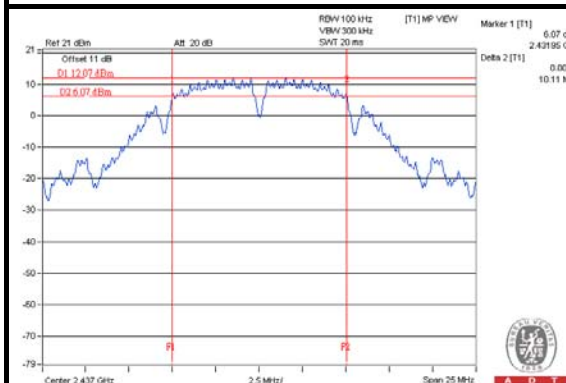
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.33	0.5	PASS
6	2437	17.33	0.5	PASS
11	2462	17.14	0.5	PASS

##### 802.11n (40MHz)

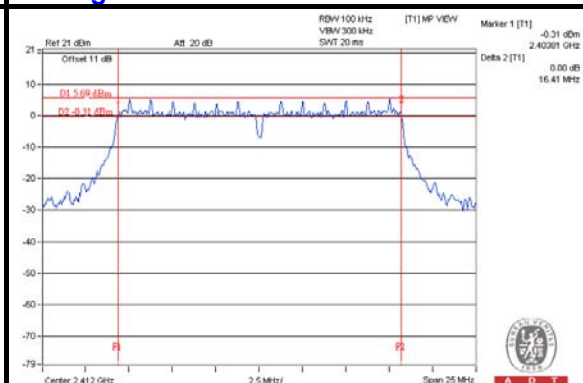
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	36.42	0.5	PASS
6	2437	36.35	0.5	PASS
9	2452	36.36	0.5	PASS

# SPECTRUM PLOT OF WORST VALUE

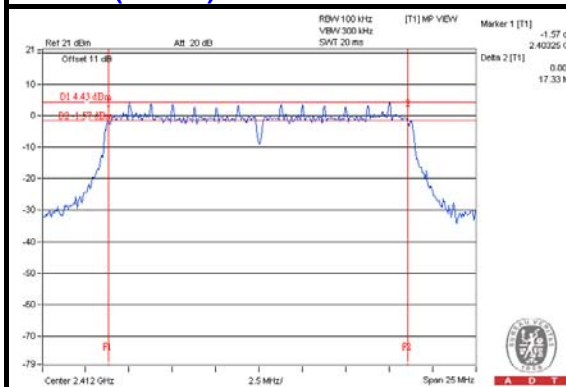
802.11b



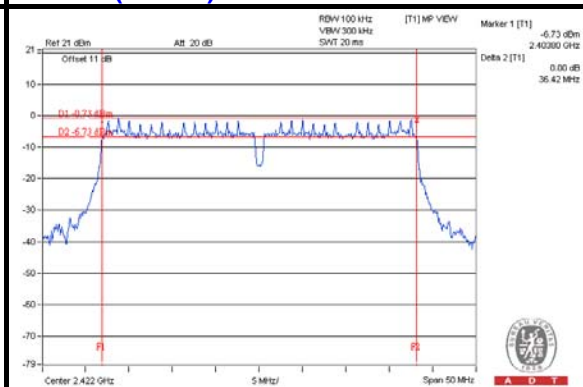
802.11g



802.11n (20MHz)



802.11n (40MHz)

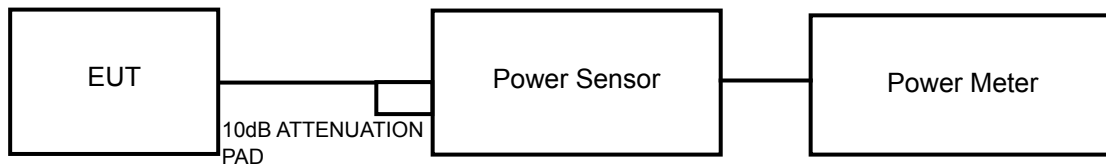


## 4.4 CONDUCTED OUTPUT POWER

### 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

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

##### FOR PEAK POWER

###### 802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	207.491	23.17	30	PASS
6	2437	334.965	25.25	30	PASS
11	2462	283.792	24.53	30	PASS

###### 802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	285.102	24.55	30	PASS
6	2437	<b>373.250</b>	25.72	30	PASS
11	2462	274.157	24.38	30	PASS

###### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	213.796	23.30	30	PASS
6	2437	363.915	25.61	30	PASS
11	2462	286.418	24.57	30	PASS

###### 802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
3	2422	147.231	21.68	30	PASS
6	2437	285.102	24.55	30	PASS
9	2452	256.448	24.09	30	PASS

## FOR AVERAGE POWER

### 802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	100.925	20.04
6	2437	205.589	23.13
11	2462	154.170	21.88

### 802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	55.590	17.45
6	2437	178.238	22.51
11	2462	58.345	17.66

### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	40.179	16.04
6	2437	161.808	22.09
11	2462	53.703	17.30

### 802.11n (40MHz)

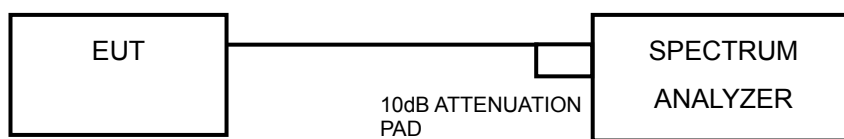
CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	24.378	13.87
6	2437	56.624	17.53
11	2462	44.875	16.52

## 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 analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set the VBW  $\geq 3 \times \text{RBW}$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

### 4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

#### 4.5.7 TEST RESULTS

##### 802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-6.52	8	PASS
6	2437	-2.93	8	PASS
11	2462	-6.78	8	PASS

##### 802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-10.70	8	PASS
6	2437	-5.26	8	PASS
11	2462	-9.71	8	PASS

##### 802.11n (20MHz)

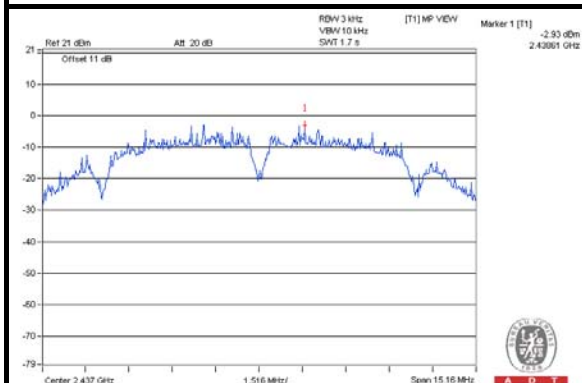
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-11.65	8	PASS
6	2437	-5.36	8	PASS
11	2462	-11.00	8	PASS

##### 802.11n (40MHz)

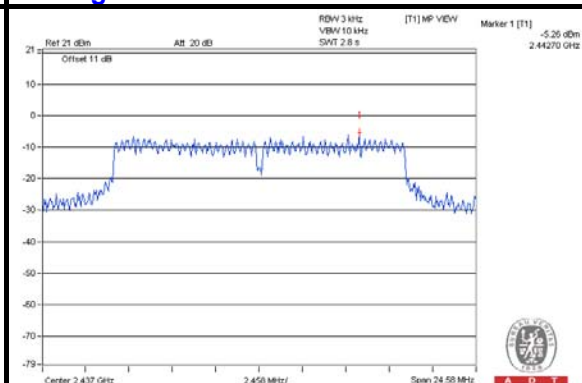
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
3	2422	-17.19	8	PASS
6	2437	-12.75	8	PASS
9	2452	-14.31	8	PASS

# SPECTRUM PLOT OF WORST VALUE

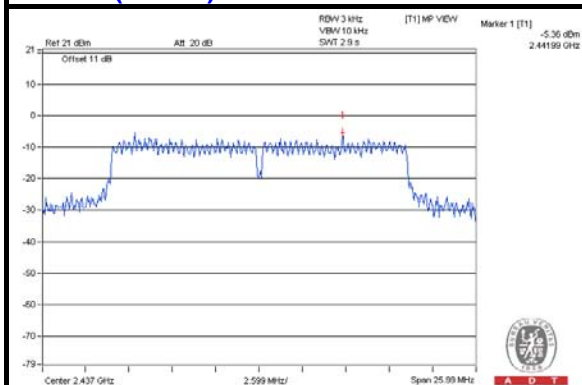
802.11b



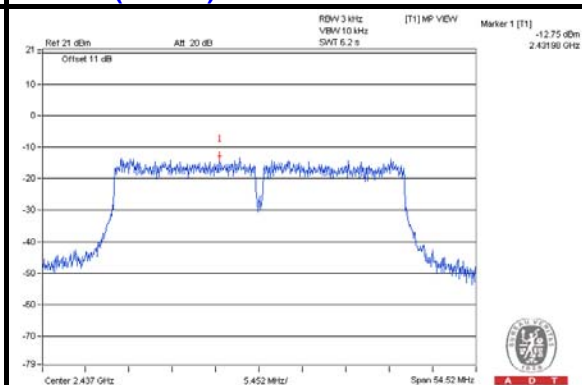
802.11g



802.11n (20MHz)



802.11n (40MHz)

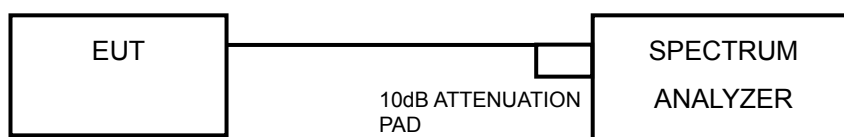


## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

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

### 4.6.2 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 = 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. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

#### 4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

#### 4.6.7 TEST RESULTS

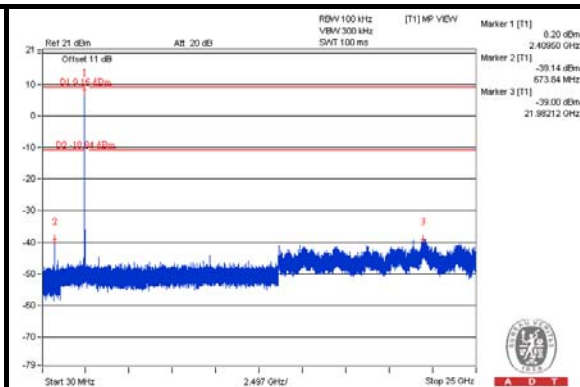
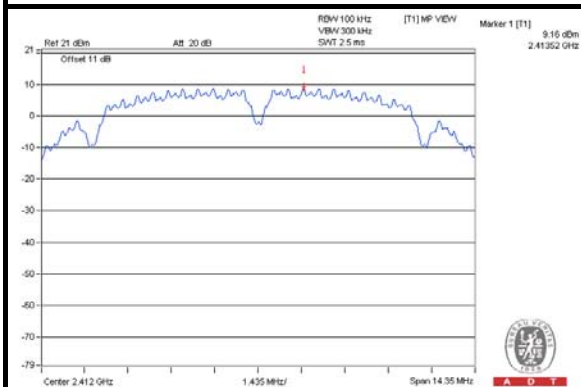
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



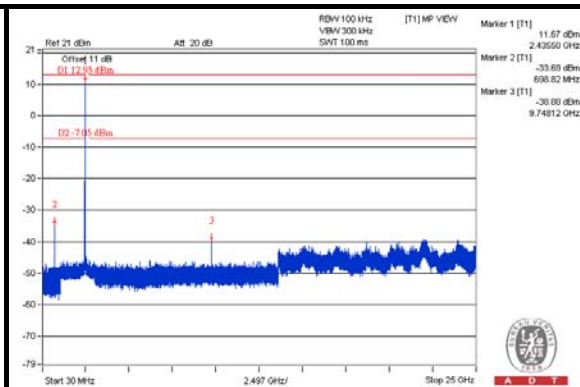
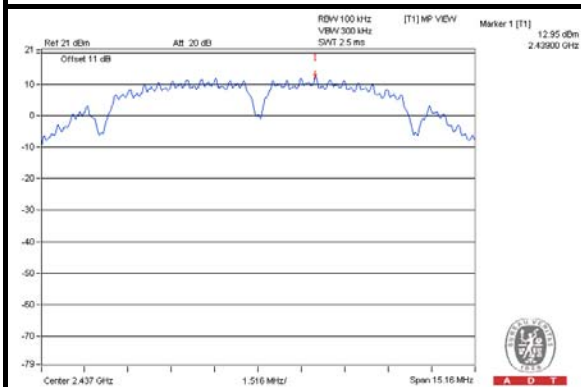
A D T

802.11b

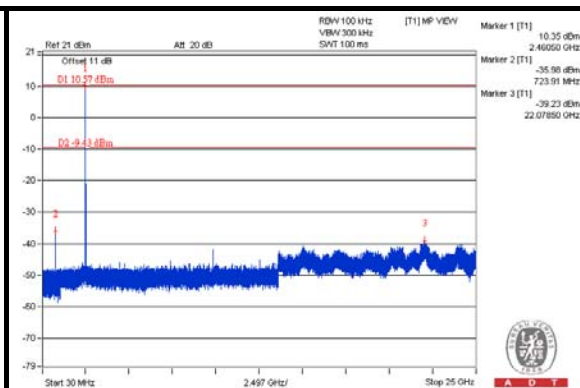
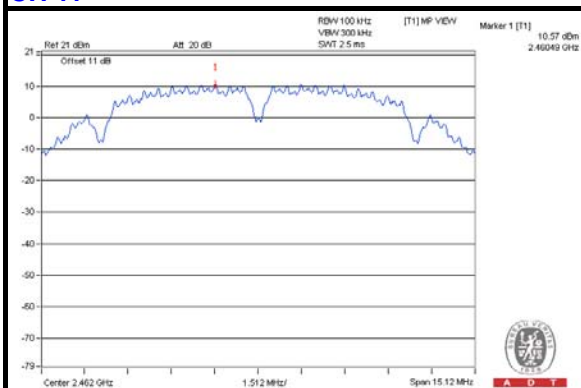
## CH 1



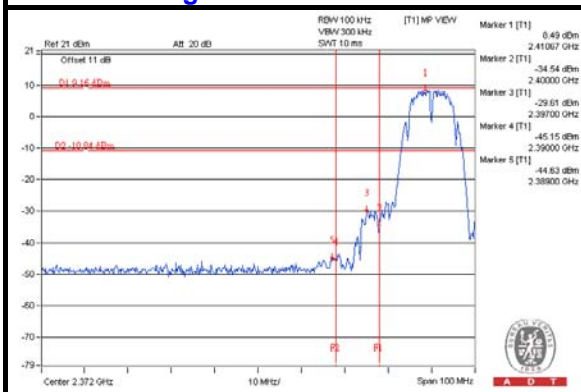
## CH 6



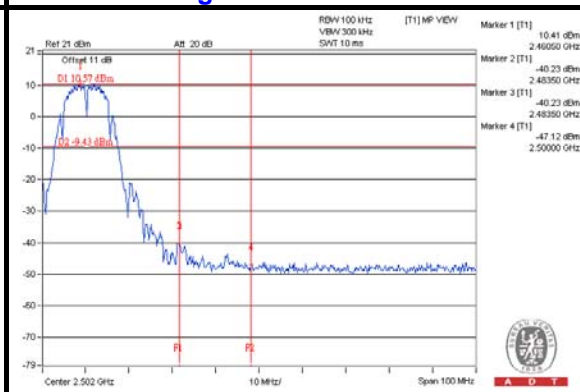
## CH 11



## CH 1 Band edge



## CH 11 Band edge



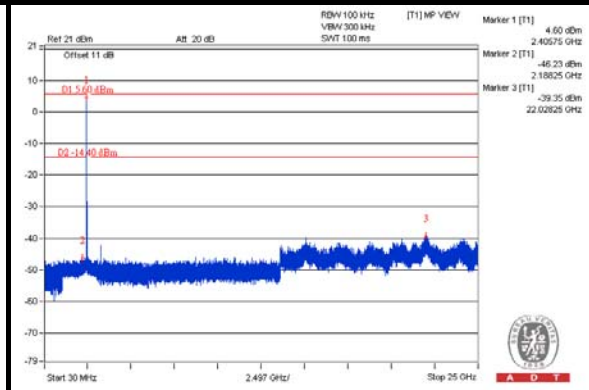
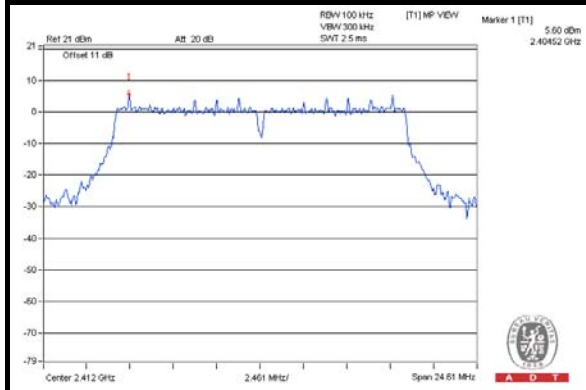




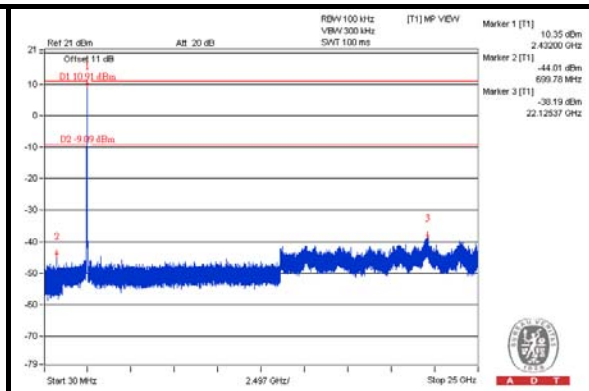
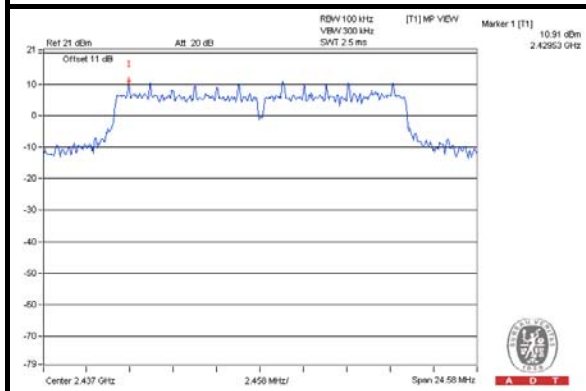
A D T

802.11g

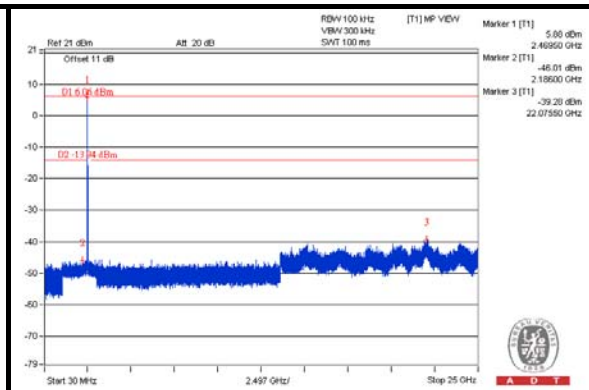
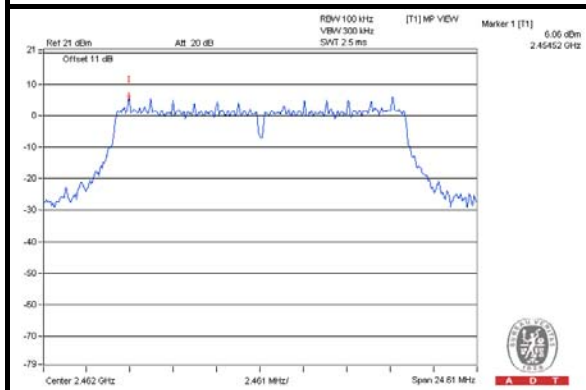
CH 1



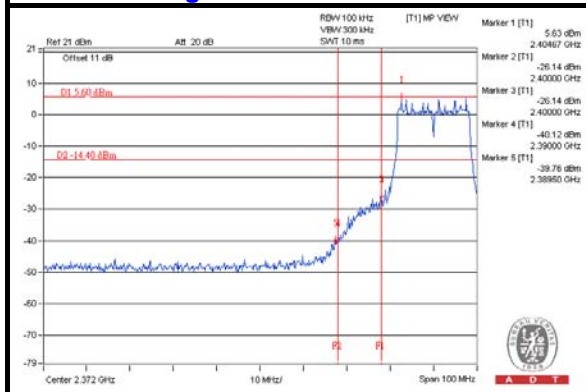
CH 6



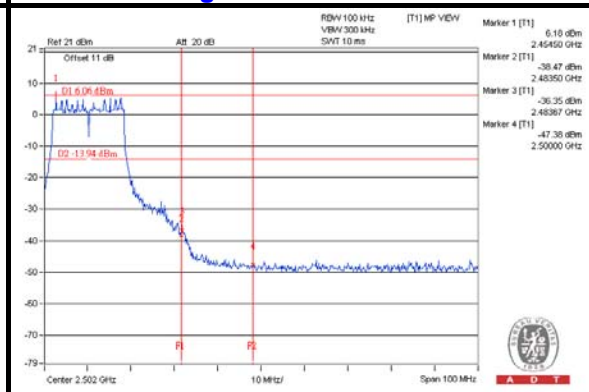
CH 11



CH 1 Band edge



CH 11 Band edge

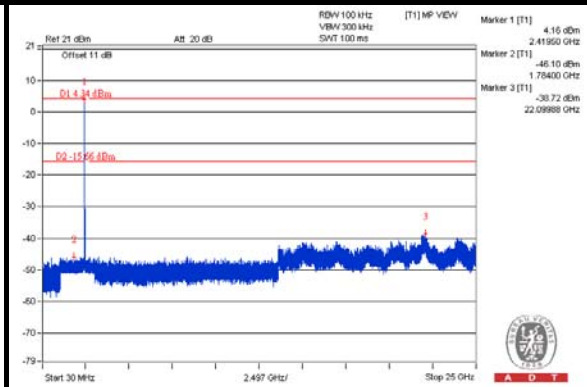
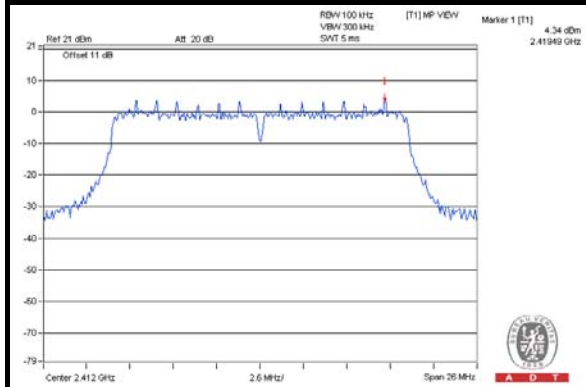




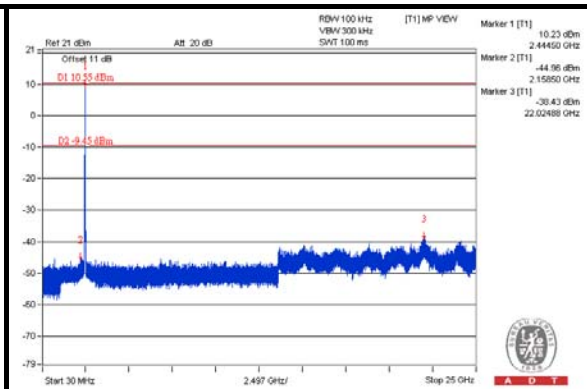
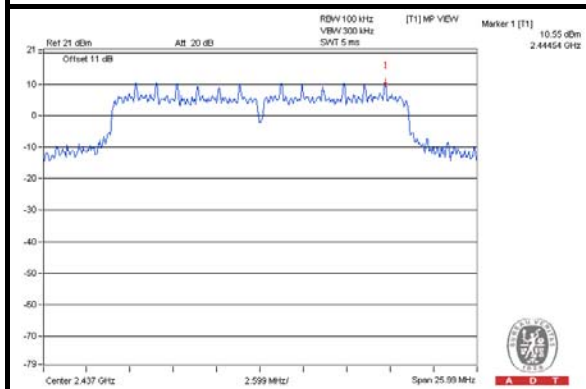
A D T

## 802.11n (20MHz)

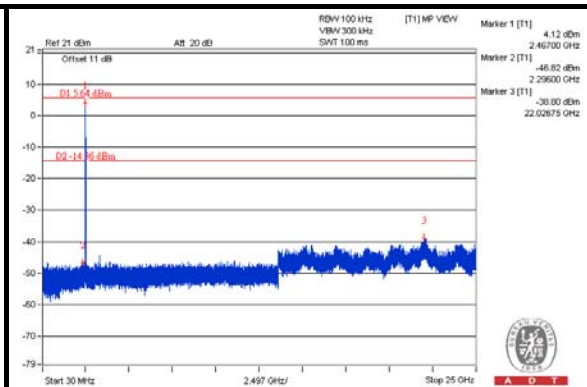
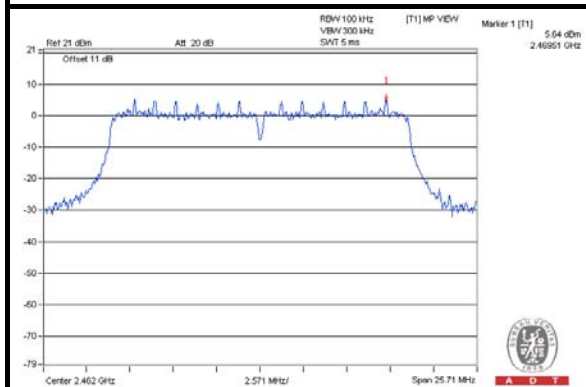
### CH 1



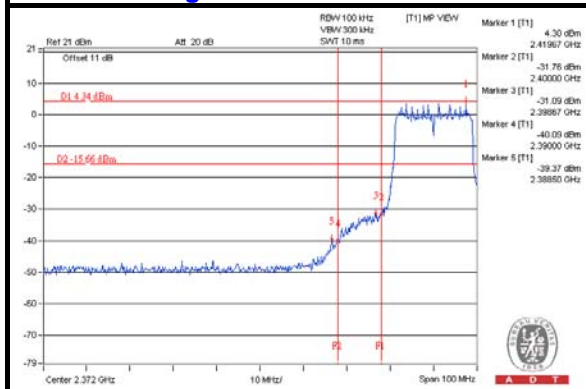
### CH 6



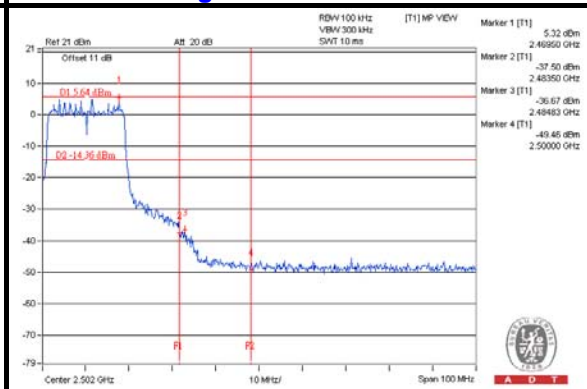
### CH 11



### CH 1 Band edge



### CH 11 Band edge

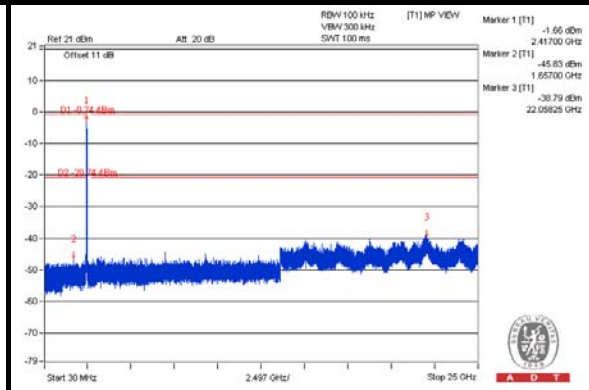
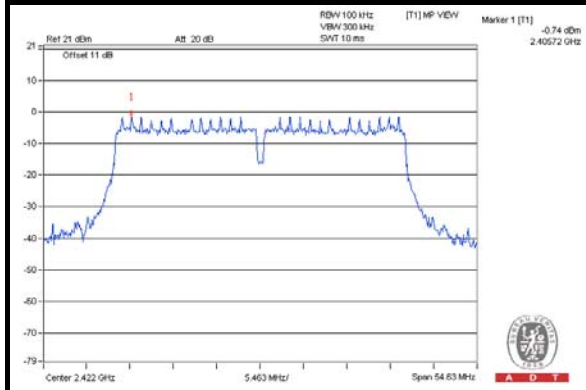




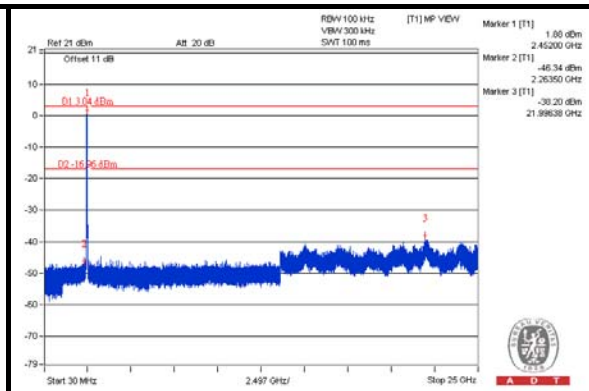
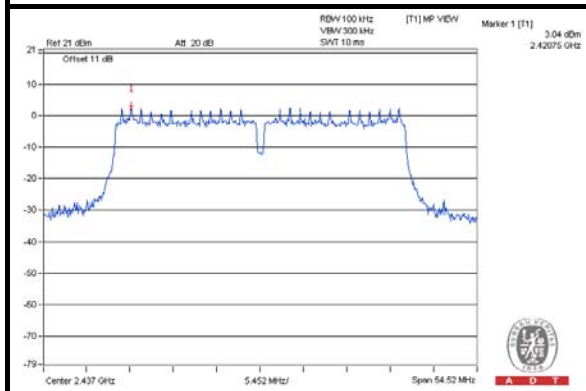
A D T

## 802.11n (40MHz)

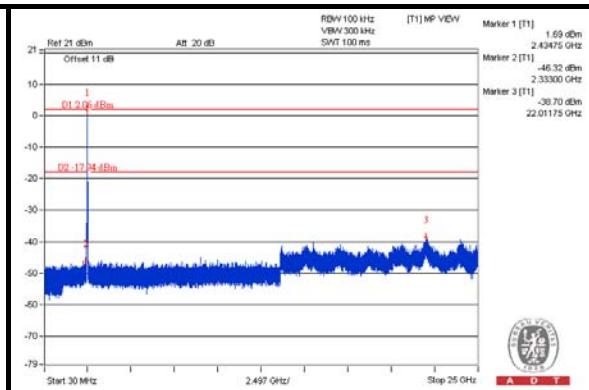
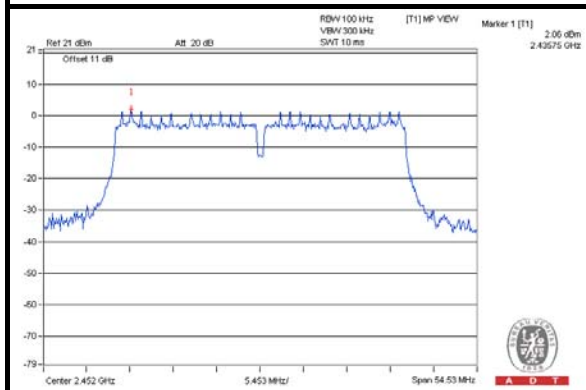
### CH 3



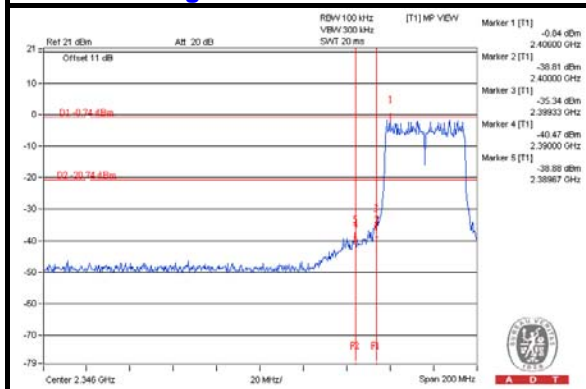
### CH 6



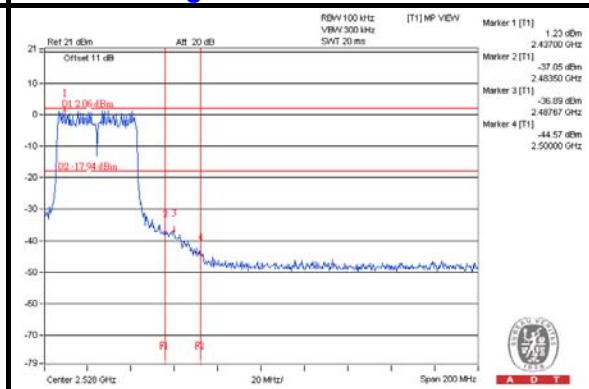
### CH 9



### CH 3 Band edge



### CH 9 Band edge



## 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

Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

Tel: 886-3-3183232

Fax: 886-3-3270892

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

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

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



A D T

## **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---**