



FCC TEST REPORT

REPORT NO.: RF120312C37B
MODEL NO.: CR3000 (Refer to item 3.1 for more details)
FCC ID: U2M-WBR2100AFN
RECEIVED: Jan. 14, 2013
TESTED: Dec. 05, 2012 ~ Jan. 23, 2013
ISSUED: Feb. 02, 2013

APPLICANT: Senao Networks, Inc.

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Taiwan, R.O.C

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

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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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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120312C37B	Original release	Feb. 02, 2013

1. CERTIFICATION

PRODUCT: Wireless 11b/g/n Router
MODEL NO.: CR3000 (Refer to item 3.1 for more details)
BRAND: PowerCloud Systems (Refer to item 3.1 for more details)
APPLICANT: Senao Networks, Inc.
TESTED: Dec. 05, 2012 ~ Jan. 23, 2013
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (model: CR3000) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Jemma Yang , DATE : Feb. 02, 2013
Jemma Yang / Specialist

APPROVED BY : Ken Liu , DATE : Feb. 02, 2013
Ken Liu / Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.22dB at 0.34198MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.2dB at 2390.00MHz and 2483.50MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 200MHz	3.34dB
	200MHz ~1000MHz	3.35dB
	1GHz ~ 18GHz	2.26dB
	18GHz ~ 40GHz	1.94dB

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



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Wireless 11b/g/n Router
MODEL NO.	CR3000 (Refer to NOTE for more details)
POWER SUPPLY	5Vdc (adapter)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
OUTPUT POWER	209.481mW
ANTENNA TYPE	PIFA antenna with 2dBi gain
ANTENNA CONNECTOR	N/A
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

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

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

- The following models are provided to the EUT.

Brand Name	Model No.	Description
PowerCloud Systems	CR3000	The models are electrically identical, different models are for marketing purpose.
Senao Network	WBR2100AFN	



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3. The EUT consumes power from the following adapter.

ADAPTER	
BRAND:	DVE
MODEL:	DSC-5CA-05 050100
INPUT:	100-240Vac, 50/60Hz, 0.2A
OUTPUT:	5Vdc, 1A
POWER LINE:	DC: 1.5m cable without core attached on adapter

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

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

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

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

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



3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

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

RADIATED EMISSION TEST (ABOVE 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

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

RADIATED EMISSION TEST (BELOW 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (40MHz)	3 to 9	6	OFDM	BPSK	15.0

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)
-	802.11n (40MHz)	3 to 9	6	OFDM	BPSK	15.0



BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

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

ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	22deg. C, 70%RH	120Vac, 60Hz	Alan Wu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Martin Lee

3.3 DESCRIPTION OF SUPPORT UNITS

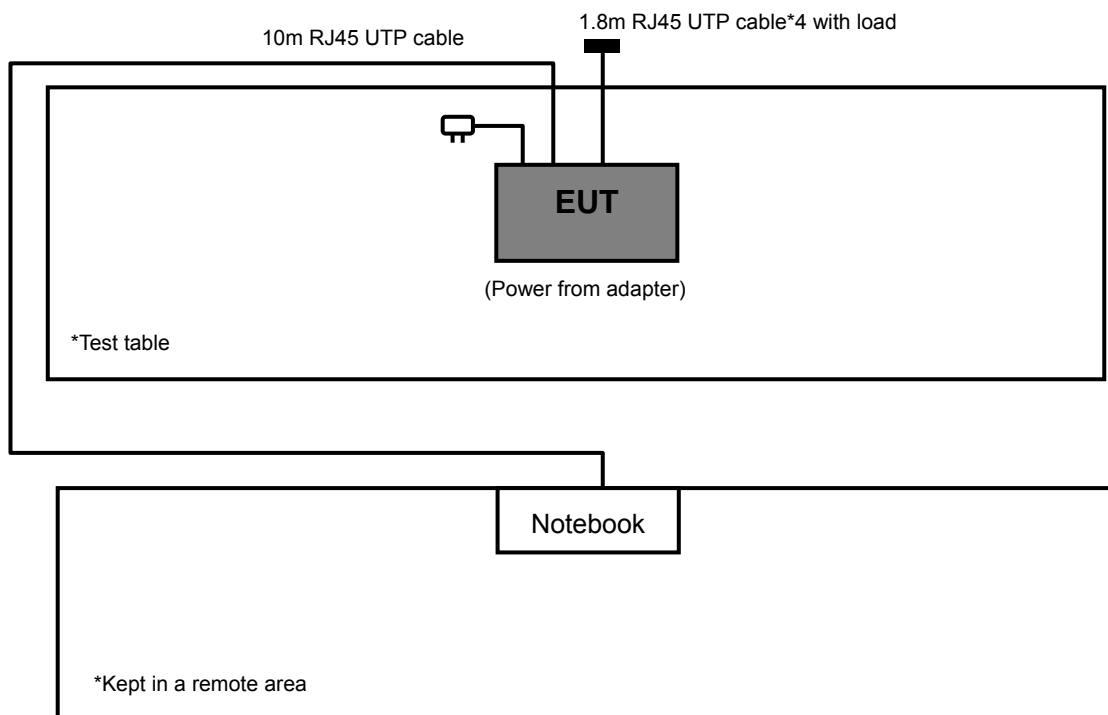
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

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

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable

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

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST



3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v02

662911 D01 Multiple Transmitter Output v01 r02

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.



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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	ESIB7	100212	Aug. 06, 2012	Aug. 05, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Feb. 03, 2012	Feb. 02, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Apr. 06, 2012	Apr. 05, 2013
HORN Antenna SCHWARZBECK	9120D	209	Sep. 03, 2012	Sep. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8449B	3008A01964	Oct. 25, 2012	Oct. 24, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/ 4	Aug. 28, 2012	Aug. 27, 2013
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table ADT.	TT100	TT93021703	NA	NA
Turn Table Controller ADT.	SC100	SC93021703	NA	NA
High Speed Power Meter	ML2495A	0842014	Apr. 28, 2012	Apr. 27, 2013
Power Sensor	MA2411B	0738404	Apr. 28, 2012	Apr. 27, 2013

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. The test was performed in HwaYa Chamber 3.
 4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 5. The FCC Site Registration No. is 988962.
 6. The IC Site Registration No. is IC 7450F-3.

4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Height of receiving antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

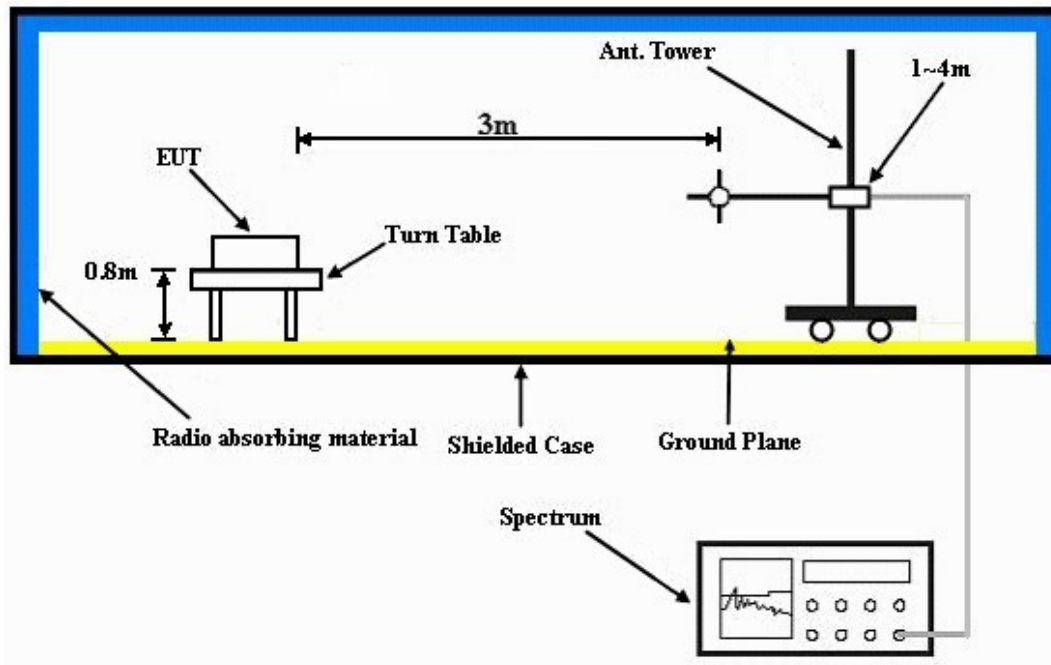
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

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



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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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.1 PK	74.0	-17.9	1.39 H	182	24.90	31.21
2	2390.00	44.5 AV	54.0	-9.6	1.39 H	182	13.24	31.21
3	*2412.00	105.0 PK			1.30 H	49	73.70	31.28
4	*2412.00	101.4 AV			1.30 H	49	70.12	31.28
5	4824.00	52.2 PK	74.0	-21.8	1.07 H	328	15.01	37.23
6	4824.00	47.1 AV	54.0	-6.9	1.07 H	328	9.89	37.23
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	2360.00	56.5 PK	74.0	-17.5	1.00 V	360	25.40	31.11
2	2360.00	46.4 AV	54.0	-7.6	1.00 V	360	15.29	31.11
3	2390.00	56.1 PK	74.0	-17.9	1.00 V	360	24.88	31.21
4	2390.00	44.0 AV	54.0	-10.0	1.00 V	360	12.80	31.21
5	*2412.00	100.8 PK			1.00 V	108	69.56	31.28
6	*2412.00	97.5 AV			1.00 V	108	66.19	31.28
7	4824.00	51.2 PK	74.0	-22.8	1.01 V	118	13.98	37.23
8	4824.00	46.3 AV	54.0	-7.7	1.01 V	118	9.10	37.23

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.0 PK			1.35 H	206	73.99	31.01
2	*2437.00	101.4 AV			1.35 H	206	70.40	31.01
3	4874.00	50.0 PK	74.0	-24.0	1.00 H	360	12.92	37.10
4	4874.00	44.0 AV	54.0	-10.0	1.00 H	360	6.94	37.10
5	7311.00	53.3 PK	74.0	-20.7	1.00 H	154	9.65	43.64
6	7311.00	40.4 AV	54.0	-13.6	1.00 H	154	-3.23	43.64
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			1.00 V	171	71.18	31.01
2	*2437.00	98.9 AV			1.00 V	171	67.91	31.01
3	4874.00	50.3 PK	74.0	-23.7	1.63 V	152	13.19	37.10
4	4874.00	44.5 AV	54.0	-9.5	1.63 V	152	7.41	37.10
5	7311.00	53.9 PK	74.0	-20.1	1.61 V	297	10.22	43.64
6	7311.00	45.1 AV	54.0	-8.9	1.61 V	297	1.44	43.64

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.5 PK			1.29 H	101	72.02	31.46
2	*2462.00	99.8 AV			1.29 H	101	68.34	31.46
3	2483.50	59.4 PK	74.0	-14.6	1.29 H	112	27.86	31.54
4	2483.50	45.8 AV	54.0	-8.2	1.29 H	112	14.26	31.54
5	4924.00	48.8 PK	74.0	-25.2	1.43 H	327	11.36	37.40
6	4924.00	41.2 AV	54.0	-12.8	1.43 H	327	3.78	37.40

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	101.2 PK			1.78 V	175	70.12	31.12
2	*2462.00	97.7 AV			1.78 V	175	66.54	31.12
3	2483.50	57.0 PK	74.0	-17.0	1.20 V	163	25.79	31.21
4	2483.50	44.0 AV	54.0	-10.0	1.20 V	163	12.81	31.21
5	4924.00	49.0 PK	74.0	-25.0	1.02 V	238	11.80	37.23
6	4924.00	42.3 AV	54.0	-11.7	1.02 V	238	5.04	37.23

REMARKS:

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



A D T

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.5 PK	74.0	-11.6	1.11 H	179	31.24	31.21
2	2390.00	47.0 AV	54.0	-7.0	1.11 H	179	15.80	31.21
3	*2412.00	104.2 PK			1.36 H	25	72.90	31.28
4	*2412.00	94.0 AV			1.36 H	25	62.73	31.28
5	4824.00	46.0 PK	74.0	-28.0	1.22 H	0	8.78	37.23
6	4824.00	33.7 AV	54.0	-20.4	1.22 H	0	-3.58	37.23

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	57.7 PK	74.0	-16.3	1.00 V	116	26.90	30.82
2	2390.00	45.9 AV	54.0	-8.1	1.00 V	116	15.09	30.82
3	*2412.00	102.2 PK			1.17 V	320	71.27	30.90
4	*2412.00	91.9 AV			1.17 V	320	61.01	30.90
5	4824.00	47.9 PK	74.0	-26.1	1.62 V	129	10.97	36.96
6	4824.00	34.3 AV	54.0	-19.7	1.62 V	129	-2.67	36.96

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.2 PK			1.33 H	208	74.19	31.01
2	*2437.00	95.1 AV			1.33 H	208	64.04	31.01
3	4874.00	46.0 PK	74.0	-28.0	1.50 H	121	8.86	37.10
4	4874.00	33.9 AV	54.0	-20.1	1.50 H	121	-3.22	37.10
5	7311.00	52.0 PK	74.0	-22.0	1.26 H	169	8.40	43.64
6	7311.00	39.5 AV	54.0	-14.5	1.26 H	169	-4.13	43.64
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	102.5 PK			1.22 V	173	71.53	31.01
2	*2437.00	92.6 AV			1.22 V	173	61.61	31.01
3	4874.00	44.8 PK	74.0	-29.2	1.28 V	88	7.74	37.10
4	4874.00	32.6 AV	54.0	-21.4	1.28 V	88	-4.46	37.10
5	7311.00	53.6 PK	74.0	-20.4	1.00 V	294	9.92	43.64
6	7311.00	40.2 AV	54.0	-13.8	1.00 V	294	-3.43	43.64

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.1 PK			1.31 H	33	74.65	31.46
2	*2462.00	96.1 AV			1.31 H	33	64.63	31.46
3	2483.50	71.3 PK	74.0	-2.7	1.08 H	177	39.74	31.54
4	2483.50	52.1 AV	54.0	-1.9	1.08 H	177	20.54	31.54
5	4924.00	45.5 PK	74.0	-28.5	1.53 H	205	8.14	37.40
6	4924.00	33.0 AV	54.0	-21.0	1.53 H	205	-4.43	37.40

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	102.1 PK			1.21 V	176	71.00	31.12
2	*2462.00	92.5 AV			1.21 V	176	61.34	31.12
3	2483.50	67.7 PK	74.0	-6.3	1.17 V	357	36.51	31.21
4	2483.50	48.5 AV	54.0	-5.5	1.17 V	357	17.30	31.21
5	4924.00	45.2 PK	74.0	-28.8	1.11 V	234	7.95	37.23
6	4924.00	32.3 AV	54.0	-21.7	1.11 V	234	-4.89	37.23

REMARKS:

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



A D T

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.0 PK	74.0	-9.0	1.37 H	207	33.78	31.21
2	2390.00	50.7 AV	54.0	-3.3	1.37 H	207	19.52	31.21
3	*2412.00	104.3 PK			1.34 H	360	73.05	31.28
4	*2412.00	94.9 AV			1.34 H	360	63.60	31.28
5	4824.00	45.6 PK	74.0	-28.4	1.00 H	85	8.36	37.23
6	4824.00	32.9 AV	54.0	-21.1	1.00 H	85	-4.32	37.23

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.8 PK	74.0	-11.2	1.10 V	300	31.57	31.21
2	2390.00	47.7 AV	54.0	-6.3	1.10 V	300	16.47	31.21
3	*2412.00	101.5 PK			1.00 V	318	70.19	31.28
4	*2412.00	91.6 AV			1.00 V	318	60.30	31.28
5	4824.00	44.3 PK	74.0	-29.7	1.16 V	47	7.08	37.23
6	4824.00	32.4 AV	54.0	-21.7	1.16 V	47	-4.88	37.23

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.9 PK			1.07 H	188	74.53	31.37
2	*2437.00	95.5 AV			1.07 H	188	64.12	31.37
3	4874.00	47.0 PK	74.0	-27.0	1.03 H	1	9.68	37.31
4	4874.00	38.3 AV	54.0	-15.7	1.03 H	1	1.02	37.31
5	7311.00	50.7 PK	74.0	-23.3	1.20 H	67	7.09	43.60
6	7311.00	37.9 AV	54.0	-16.1	1.20 H	67	-5.67	43.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	103.2 PK			1.00 V	170	71.78	31.37
2	*2437.00	93.5 AV			1.00 V	170	62.17	31.37
3	4874.00	47.2 PK	74.0	-26.8	1.15 V	136	9.86	37.31
4	4874.00	40.0 AV	54.0	-14.1	1.15 V	136	2.64	37.31
5	7311.00	51.2 PK	74.0	-22.8	1.16 V	20	7.64	43.60
6	7311.00	38.2 AV	54.0	-15.8	1.16 V	20	-5.38	43.60

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.9 PK			1.06 H	187	75.48	31.46
2	*2462.00	96.6 AV			1.06 H	187	65.09	31.46
3	2483.50	70.2 PK	74.0	-3.8	1.06 H	188	38.68	31.54
4	2483.50	52.7 AV	54.0	-1.3	1.06 H	188	21.16	31.54
5	4924.00	47.6 PK	74.0	-26.5	1.44 H	193	10.15	37.40
6	4924.00	35.3 AV	54.0	-18.8	1.44 H	193	-2.15	37.40

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	103.1 PK			1.00 V	162	71.62	31.46
2	*2462.00	92.9 AV			1.00 V	162	61.43	31.46
3	2483.50	68.8 PK	74.0	-5.2	1.14 V	339	37.29	31.54
4	2483.50	51.4 AV	54.0	-2.6	1.14 V	339	19.87	31.54
5	4924.00	45.4 PK	74.0	-28.6	1.40 V	348	8.01	37.40
6	4924.00	33.3 AV	54.0	-20.7	1.40 V	348	-4.14	37.40

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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.5 PK	74.0	-3.5	1.30 H	61	39.27	31.21
2	2390.00	52.8 AV	54.0	-1.2	1.30 H	61	21.55	31.21
3	*2422.00	101.3 PK			1.04 H	30	70.02	31.32
4	*2422.00	91.5 AV			1.04 H	30	60.17	31.32
5	4844.00	45.8 PK	74.0	-28.2	1.35 H	197	8.50	37.26
6	4844.00	32.8 AV	54.0	-21.2	1.35 H	197	-4.47	37.26

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	65.3 PK	74.0	-8.7	1.00 V	345	34.46	30.82
2	2390.00	50.5 AV	54.0	-3.5	1.00 V	345	19.69	30.82
3	*2422.00	99.2 PK			1.00 V	176	68.24	30.94
4	*2422.00	89.8 AV			1.00 V	176	58.88	30.94
5	4844.00	43.9 PK	74.0	-30.1	1.29 V	203	6.89	37.02
6	4844.00	32.2 AV	54.0	-21.8	1.29 V	203	-4.78	37.02

REMARKS:

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.0 PK			1.31 H	205	71.01	31.01
2	*2437.00	92.1 AV			1.31 H	205	61.11	31.01
3	4874.00	45.6 PK	74.0	-28.4	1.64 H	202	8.48	37.10
4	4874.00	32.9 AV	54.0	-21.1	1.64 H	202	-4.24	37.10
5	7311.00	52.2 PK	74.0	-21.8	1.25 H	298	8.57	43.64
6	7311.00	39.0 AV	54.0	-15.0	1.25 H	298	-4.63	43.64
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	99.9 PK			1.00 V	176	68.86	31.01
2	*2437.00	89.7 AV			1.00 V	176	58.66	31.01
3	4874.00	45.2 PK	74.0	-28.8	1.64 V	311	8.06	37.10
4	4874.00	32.6 AV	54.0	-21.5	1.64 V	311	-4.55	37.10
5	7311.00	53.5 PK	74.0	-20.5	1.49 V	297	9.86	43.64
6	7311.00	39.4 AV	54.0	-14.6	1.49 V	297	-4.26	43.64

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	101.3 PK			1.06 H	174	69.87	31.43
2	*2452.00	91.1 AV			1.06 H	174	59.67	31.43
3	2483.50	71.8 PK	74.0	-2.2	1.08 H	177	40.28	31.54
4	2483.50	52.8 AV	54.0	-1.2	1.08 H	177	21.25	31.54
5	4924.00	46.2 PK	74.0	-27.8	1.45 H	200	8.79	37.40
6	4924.00	33.1 AV	54.0	-20.9	1.45 H	200	-4.29	37.40
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	*2452.00	98.0 PK			1.21 V	175	66.89	31.07
2	*2452.00	87.4 AV			1.21 V	175	56.28	31.07
3	2483.50	68.8 PK	74.0	-5.2	1.30 V	185	37.58	31.21
4	2483.50	50.0 AV	54.0	-4.0	1.30 V	185	18.79	31.21
5	4904.00	44.7 PK	74.0	-29.4	1.18 V	63	7.47	37.18
6	4904.00	31.4 AV	54.0	-22.6	1.18 V	63	-5.80	37.18

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 (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	32.6 QP	40.0	-7.4	2.00 H	66	18.96	13.64
2	179.61	32.2 QP	43.5	-11.3	2.00 H	190	19.55	12.63
3	265.16	30.1 QP	46.0	-15.9	1.00 H	62	16.51	13.62
4	399.31	35.4 QP	46.0	-10.6	1.00 H	304	17.90	17.52
5	599.58	37.6 QP	46.0	-8.4	1.25 H	4	15.49	22.14
6	799.84	36.7 QP	46.0	-9.3	2.00 H	306	11.05	25.61

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	57.12	31.9 QP	40.0	-8.2	1.50 V	4	18.21	13.64
2	199.05	31.6 QP	43.5	-11.9	1.24 V	14	20.56	11.07
3	399.31	33.5 QP	46.0	-12.5	1.50 V	54	15.96	17.52
4	599.58	39.8 QP	46.0	-6.2	1.24 V	14	17.64	22.14
5	799.84	37.2 QP	46.0	-8.8	1.24 V	172	11.61	25.61
6	916.50	31.3 QP	46.0	-14.7	1.99 V	325	4.33	26.96

REMARKS:

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
 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	100289	Nov. 16, 2012	Nov. 15, 2013
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 28, 2012	Dec. 27, 2013
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 02, 2012	Jul. 01, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 07, 2012	Feb. 06, 2013
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

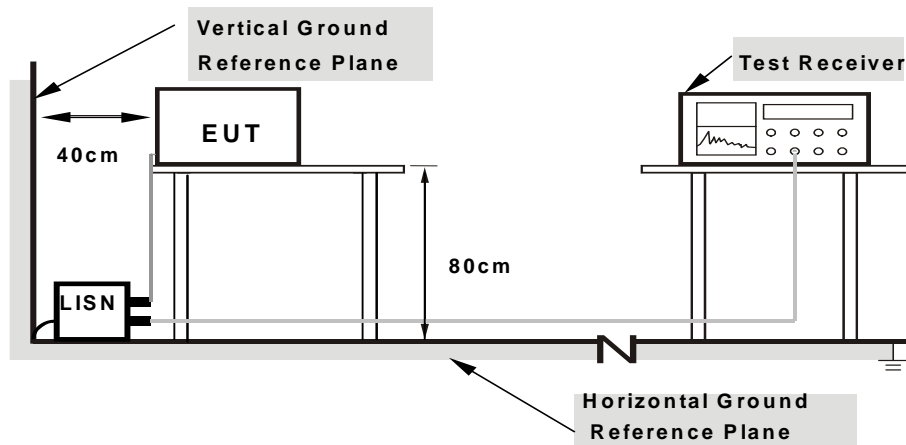
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

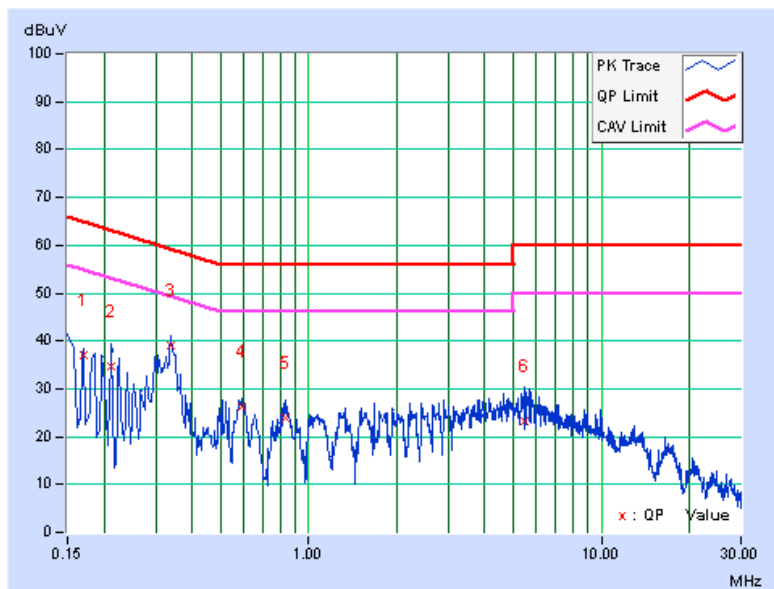
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA : 802.11n (40MHz)

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	0.16955	0.13	36.76	25.46	36.89	25.59	64.98	54.98	-28.10	-29.40
2	0.21256	0.13	34.41	18.58	34.54	18.71	63.10	53.10	-28.56	-34.39
3	0.33768	0.16	38.96	35.40	39.12	35.56	59.26	49.26	-20.14	-13.70
4	0.58792	0.19	26.04	23.49	26.23	23.68	56.00	46.00	-29.77	-22.32
5	0.83425	0.19	23.73	21.41	23.92	21.60	56.00	46.00	-32.08	-24.40
6	5.43632	0.42	22.82	17.68	23.24	18.10	60.00	50.00	-36.76	-31.90

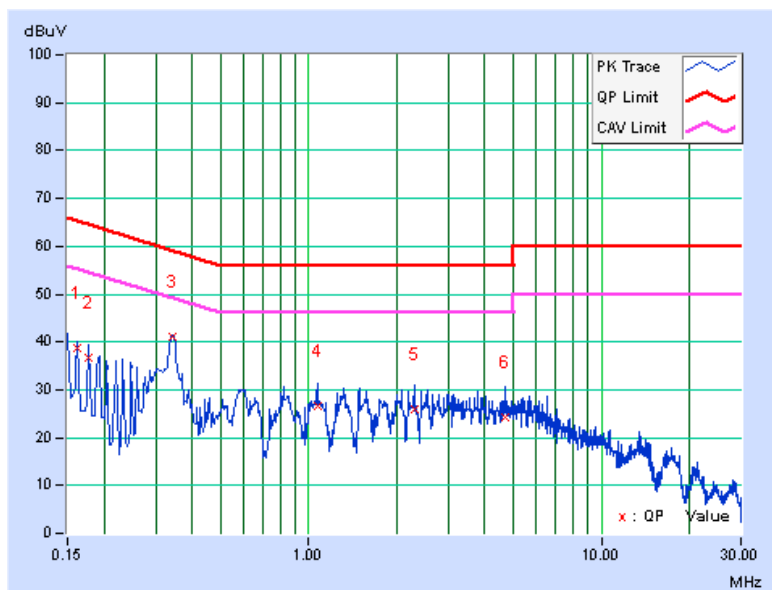
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. 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	0.16173	0.14	38.46	27.61	38.60	27.75	65.37	55.37	-26.78	-27.63
2	0.17737	0.14	36.67	26.62	36.81	26.76	64.61	54.61	-27.80	-27.85
3	0.34198	0.18	41.00	38.75	41.18	38.93	59.16	49.16	-17.97	-10.22
4	1.07667	0.22	26.27	24.21	26.49	24.43	56.00	46.00	-29.51	-21.57
5	2.29268	0.27	25.81	23.24	26.08	23.51	56.00	46.00	-29.92	-22.49
6	4.70124	0.39	23.72	19.45	24.11	19.84	56.00	46.00	-31.89	-26.16

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.

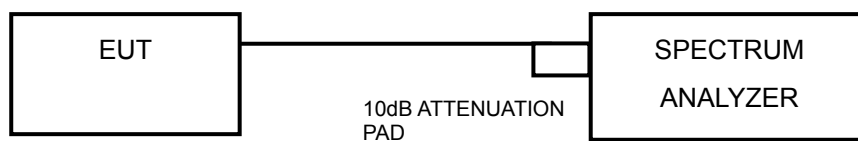


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	10.070	10.110	0.5	PASS
6	2437	10.110	10.120	0.5	PASS
11	2462	10.140	10.110	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.380	16.410	0.5	PASS
6	2437	16.400	16.450	0.5	PASS
11	2462	16.410	16.420	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.480	17.650	0.5	PASS
6	2437	17.620	17.440	0.5	PASS
11	2462	17.640	16.980	0.5	PASS

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	36.090	35.930	0.5	PASS
6	2437	35.890	35.920	0.5	PASS
9	2452	36.060	36.170	0.5	PASS

4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

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

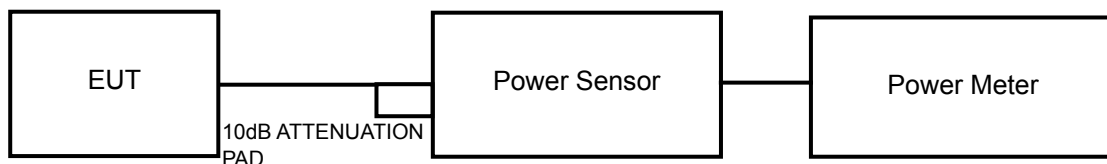
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

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

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

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

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

A peak / average power sensor were 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

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	14.50	14.20	54.487	17.36	30	PASS
6	2437	14.80	14.30	57.115	17.57	30	PASS
11	2462	15.50	14.80	65.681	18.17	30	PASS

802.11g

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	18.70	19.20	157.307	21.97	30	PASS
6	2437	19.10	18.90	158.908	22.01	30	PASS
11	2462	19.50	19.00	168.558	22.27	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	19.00	19.20	162.609	22.11	30	PASS
6	2437	18.90	18.90	155.250	21.91	30	PASS
11	2462	19.30	18.90	162.739	22.11	30	PASS

802.11n (40MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	19.70	19.80	188.824	22.76	30	PASS
6	2437	20.10	20.30	209.481	23.21	30	PASS
9	2452	18.90	18.70	151.756	21.81	30	PASS



FOR AVERAGE POWER

802.11b

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	12.20	12.10	32.814	15.16
6	2437	12.60	12.10	34.415	15.37
11	2462	13.10	12.20	37.013	15.68

802.11g

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	10.50	10.90	23.523	13.71
6	2437	10.80	10.10	22.256	13.47
11	2462	11.40	10.50	25.024	13.98

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	10.70	10.80	23.772	13.76
6	2437	10.60	10.60	22.964	13.61
11	2462	11.20	10.50	24.403	13.87

802.11n (40MHz)

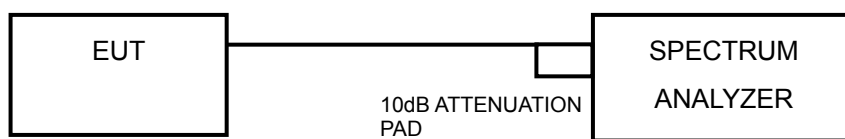
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
3	2422	10.20	10.20	20.942	13.21
6	2437	10.70	11.10	24.631	13.91
9	2452	8.70	8.40	14.331	11.56

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 = 3 kHz, VBW = 10 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.

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

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-11.330	3.01	-8.320	8.00	PASS
	6	2437	-11.570	3.01	-8.560	8.00	PASS
	11	2462	-11.570	3.01	-8.560	8.00	PASS
1	1	2412	-12.01	3.01	-9.00	8.00	PASS
	6	2437	-11.30	3.01	-8.29	8.00	PASS
	11	2462	-12.31	3.01	-9.30	8.00	PASS

NOTE: Directional gain = 2dBi + 10log(2) = 5.01dBi < 6dBi , so the limit no need to reduced.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-14.660	3.01	-11.650	8.00	PASS
	6	2437	-15.360	3.01	-12.350	8.00	PASS
	11	2462	-14.750	3.01	-11.740	8.00	PASS
1	1	2412	-15.16	3.01	-12.15	8.00	PASS
	6	2437	-15.97	3.01	-12.96	8.00	PASS
	11	2462	-13.62	3.01	-10.61	8.00	PASS

NOTE: Directional gain = 2dBi + 10log(2) = 5.01dBi < 6dBi , so the limit no need to reduced.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-15.610	3.01	-12.600	8.00	PASS
	6	2437	-14.620	3.01	-11.610	8.00	PASS
	11	2462	-14.050	3.01	-11.040	8.00	PASS
1	1	2412	-15.62	3.01	-12.61	8.00	PASS
	6	2437	-16.30	3.01	-13.29	8.00	PASS
	11	2462	-14.03	3.01	-11.02	8.00	PASS

NOTE: Directional gain = 2dBi + 10log(2) = 5.01dBi < 6dBi , so the limit no need to reduced.



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802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-19.110	3.01	-16.100	8.00	PASS
	6	2437	-18.160	3.01	-15.150	8.00	PASS
	9	2452	-20.130	3.01	-17.120	8.00	PASS
1	3	2422	-19.24	3.01	-16.23	8.00	PASS
	6	2437	-17.52	3.01	-14.51	8.00	PASS
	9	2452	-20.44	3.01	-17.43	8.00	PASS

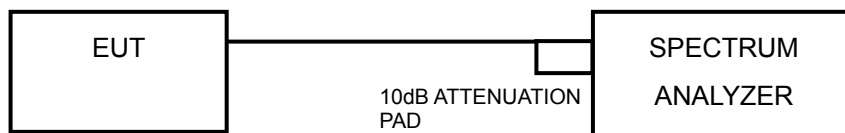
NOTE: Directional gain = $2\text{dBi} + 10\log(2) = 5.01\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.

4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

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

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

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

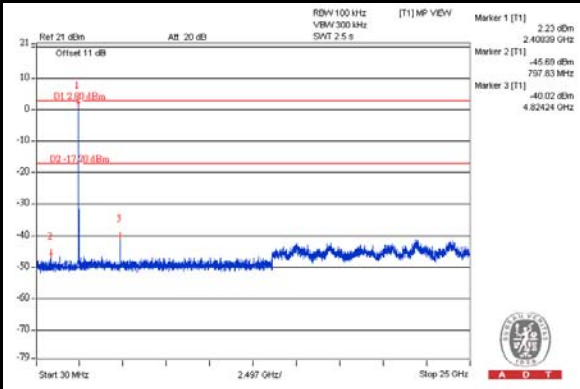
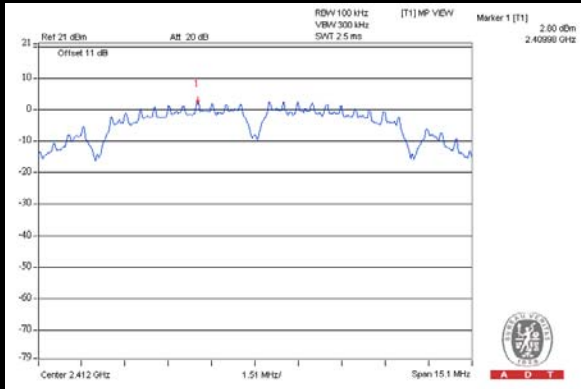
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



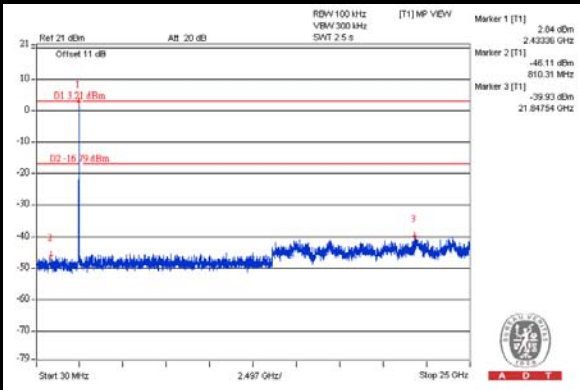
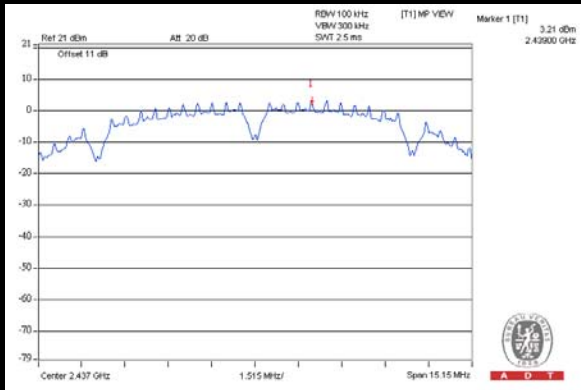
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802.11b
CHAIN 0

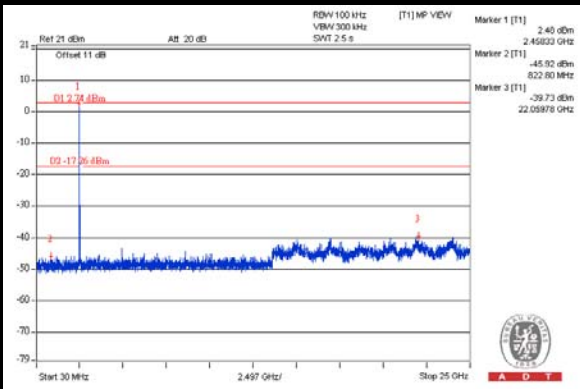
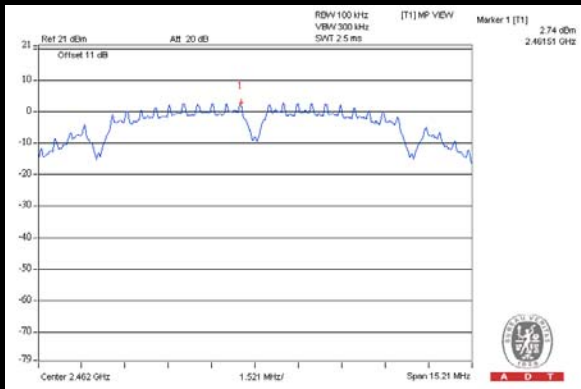
CH 1



CH 6



CH 11

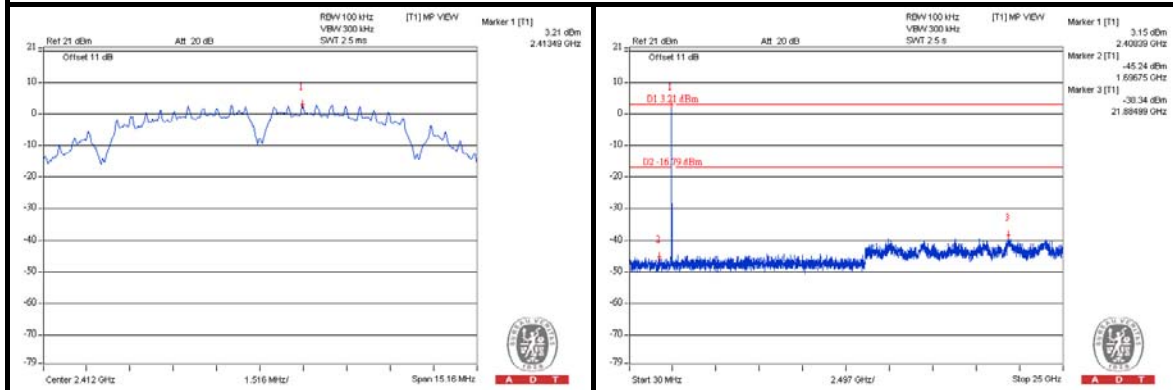




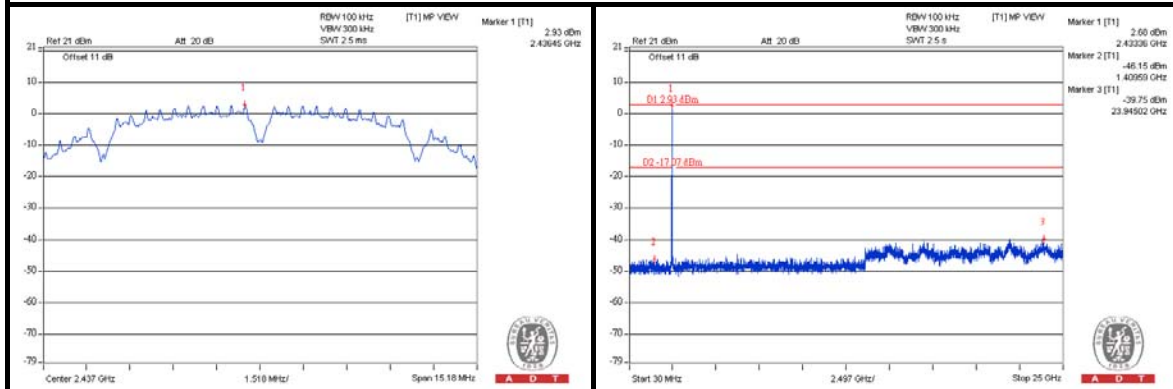
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CHAIN 1

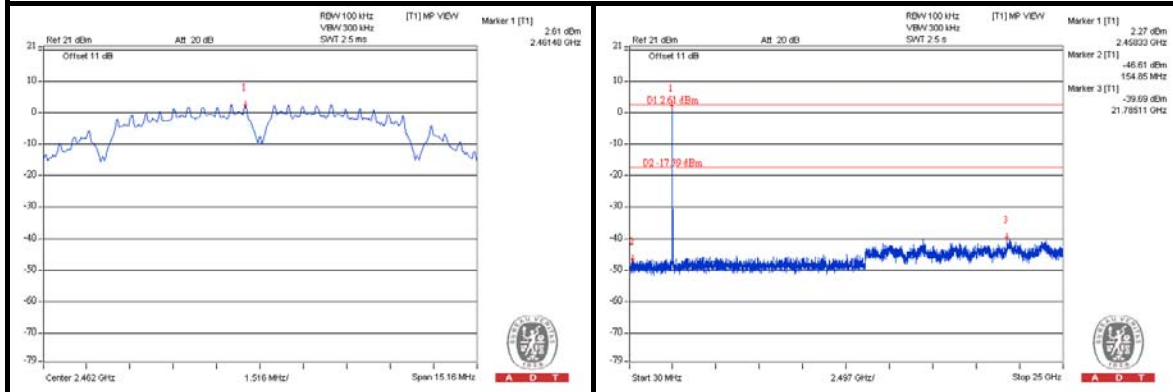
CH 1



CH 6



CH 11

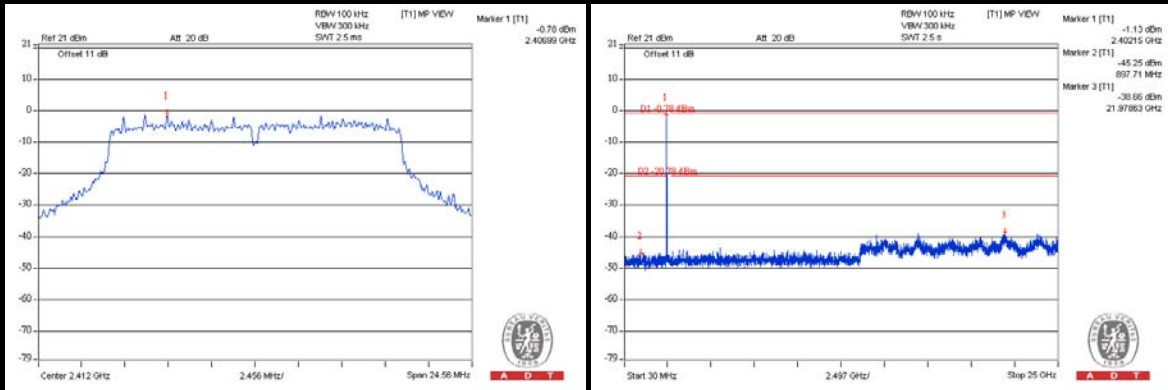




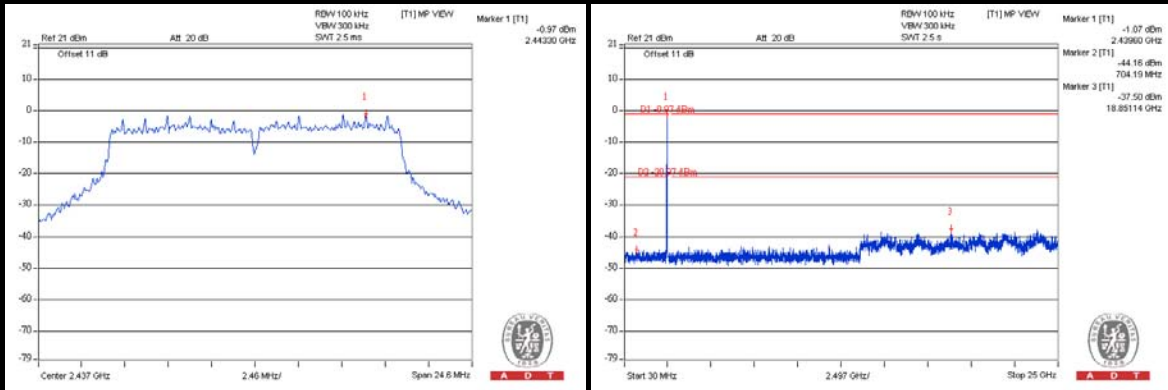
A D T

802.11g

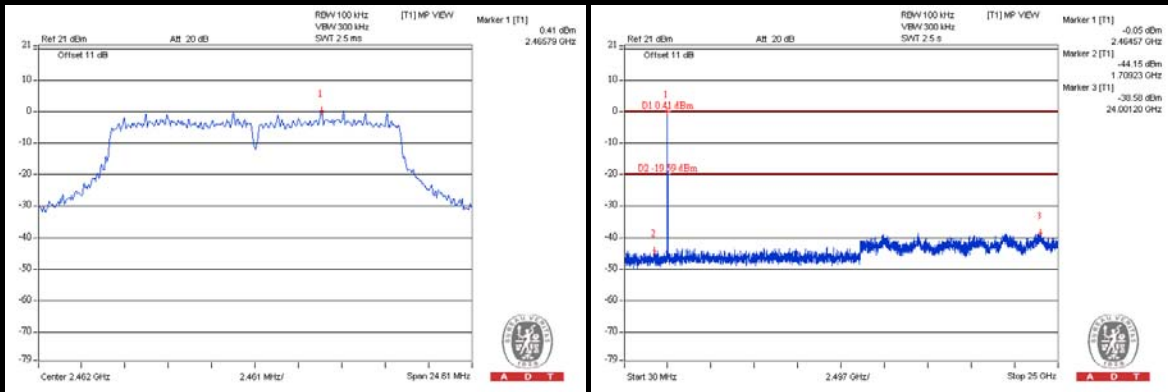
CH 1



CH 6

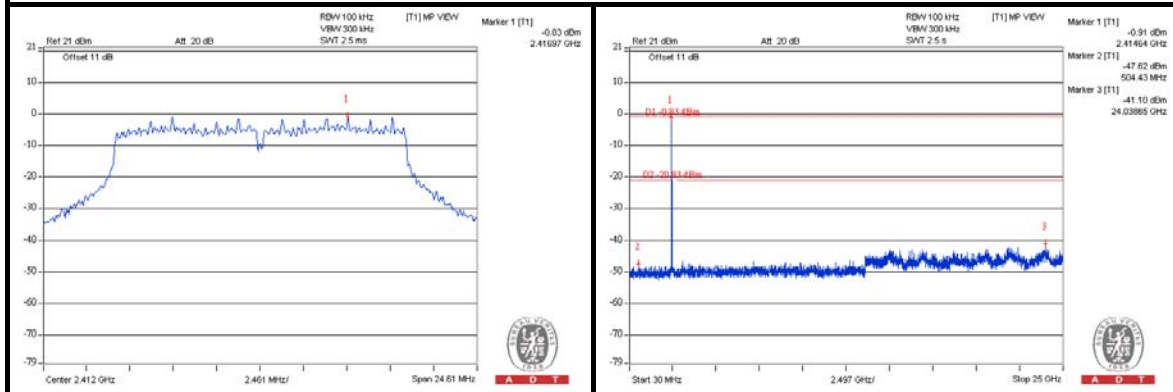


CH 11

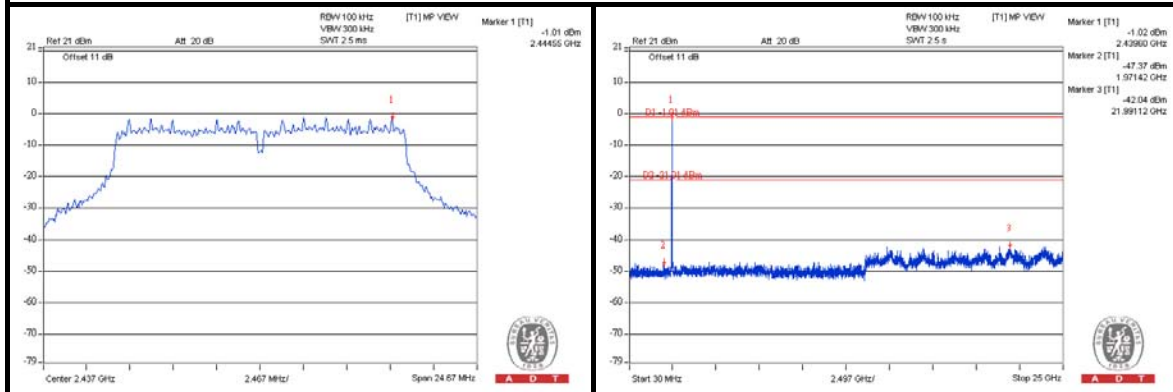


CHAIN 1

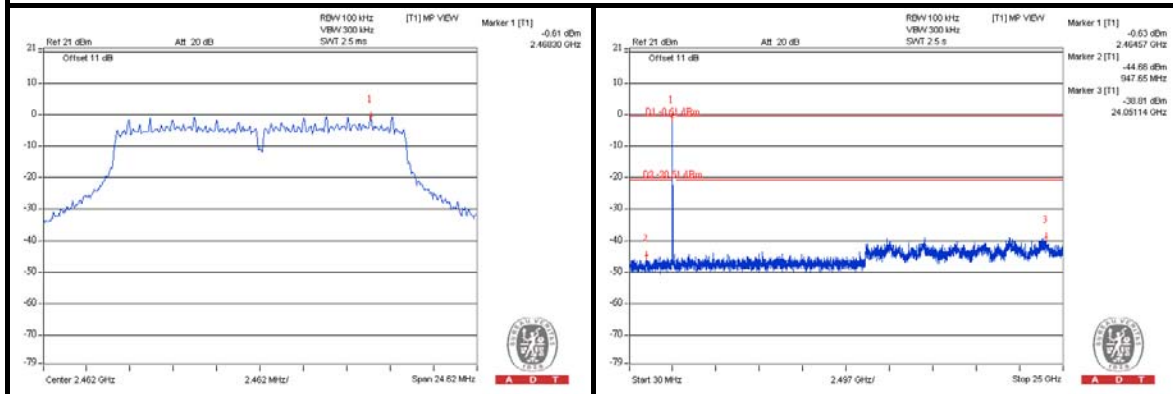
CH 1



CH 6

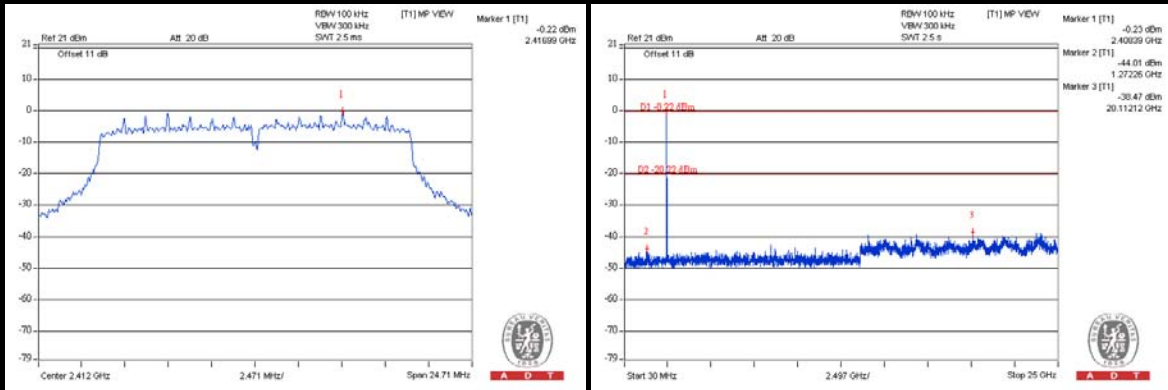


CH 11

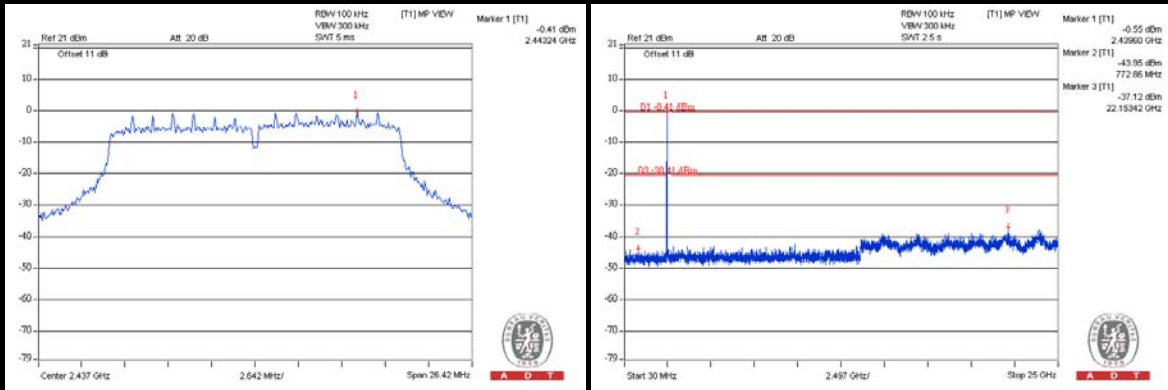


802.11n (20MHz)

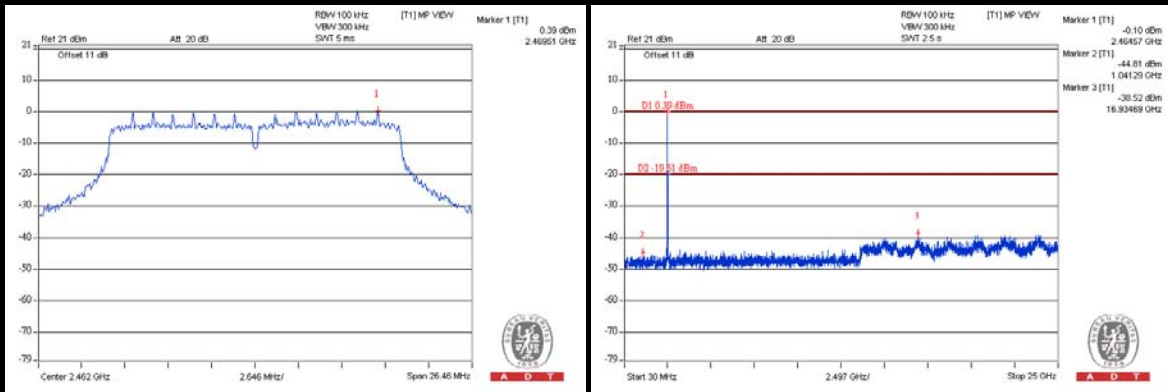
CH 1



CH 6

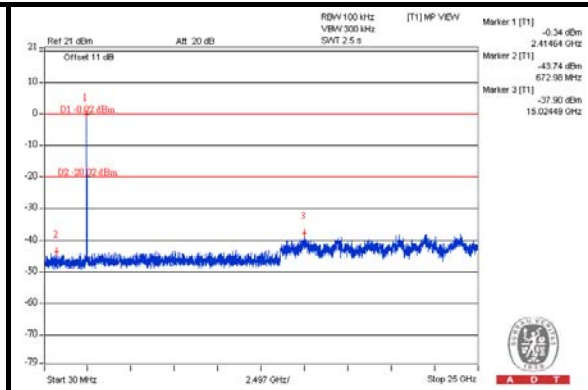
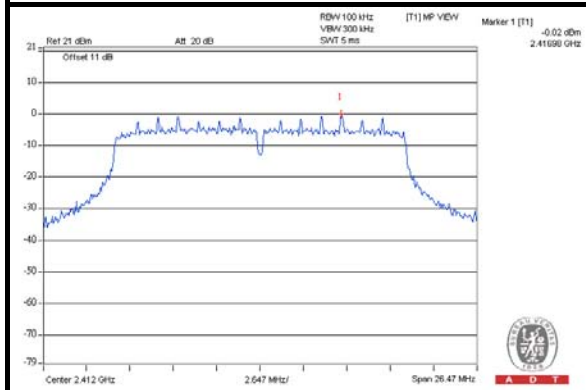


CH 11

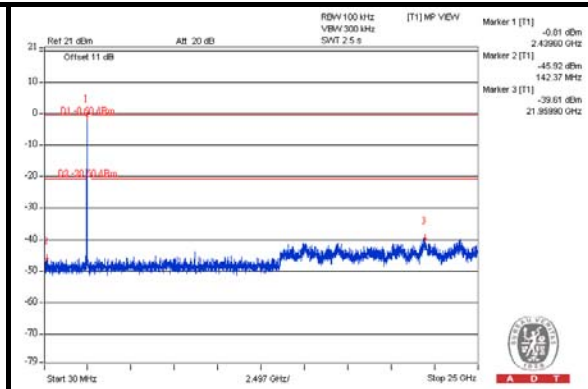
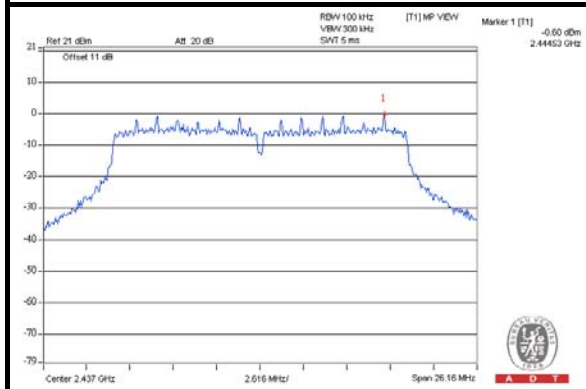


CHAIN 1

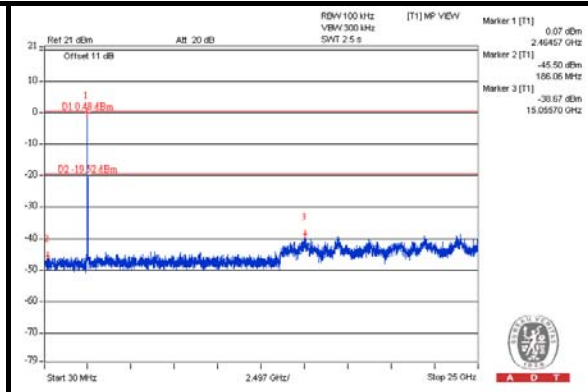
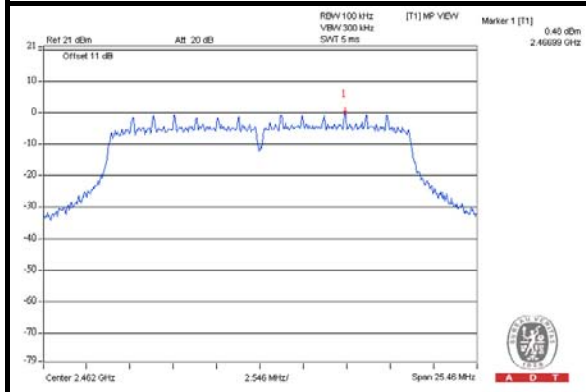
CH 1



CH 6

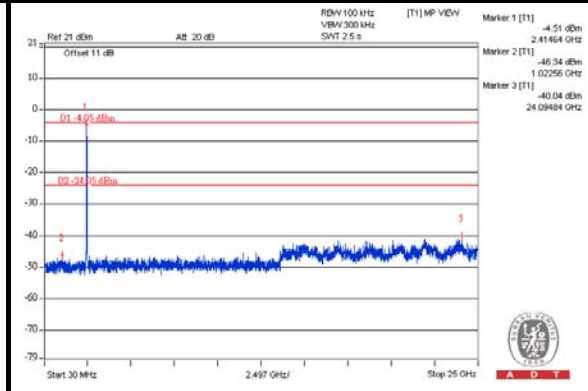
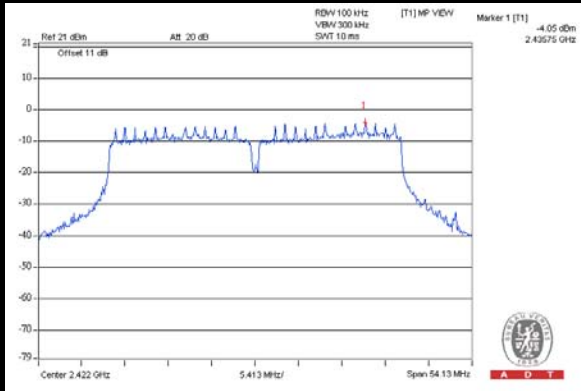


CH 11

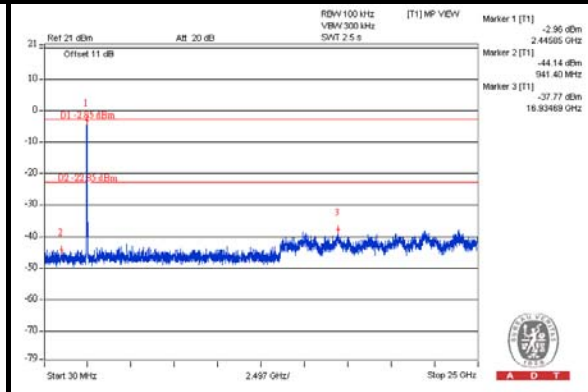
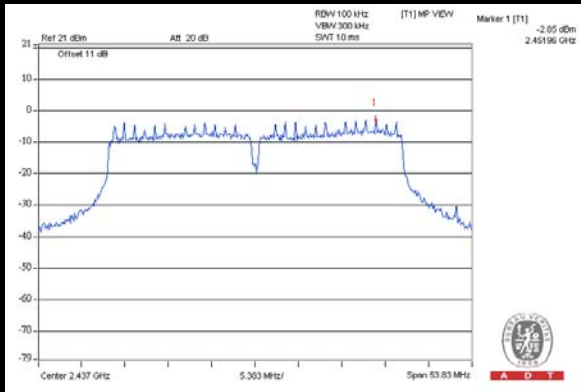


802.11n (40MHz)
CHAIN 0

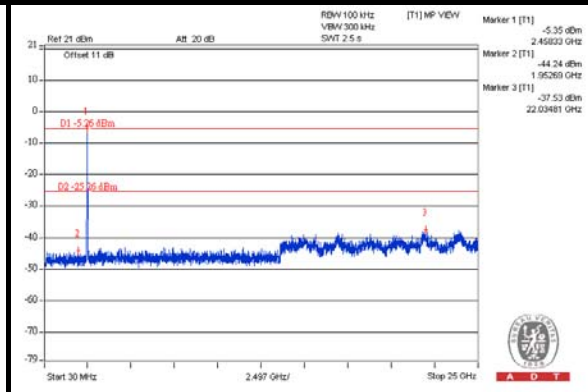
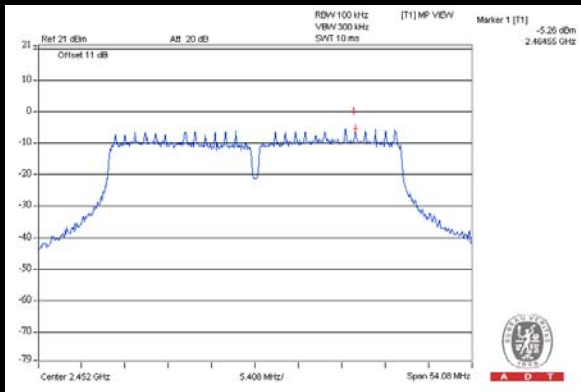
CH 3



CH 6

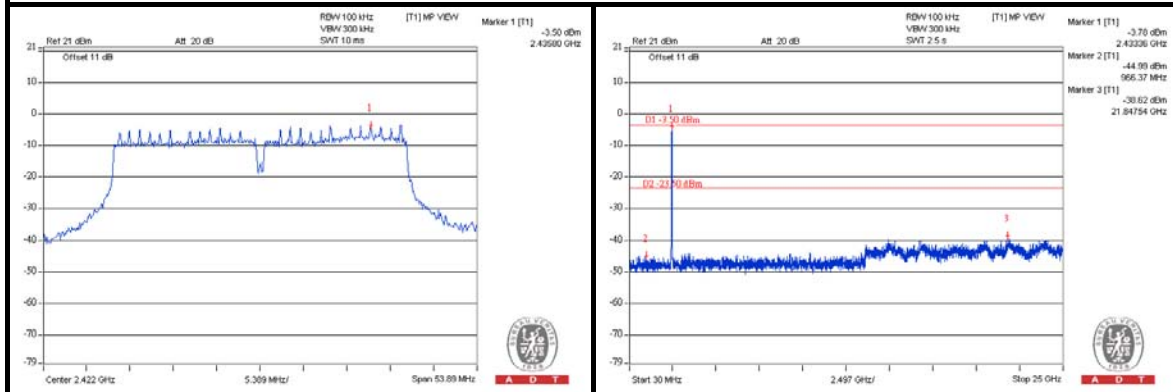


CH 9

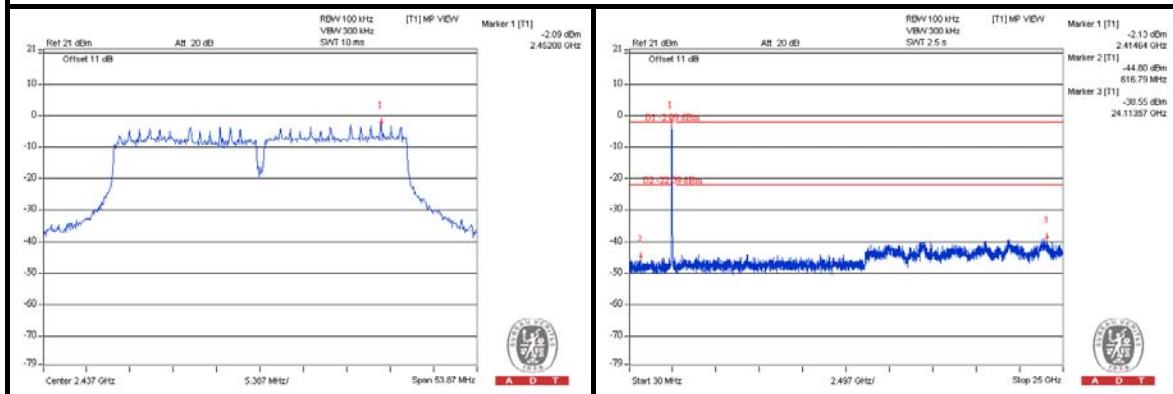


CHAIN 1

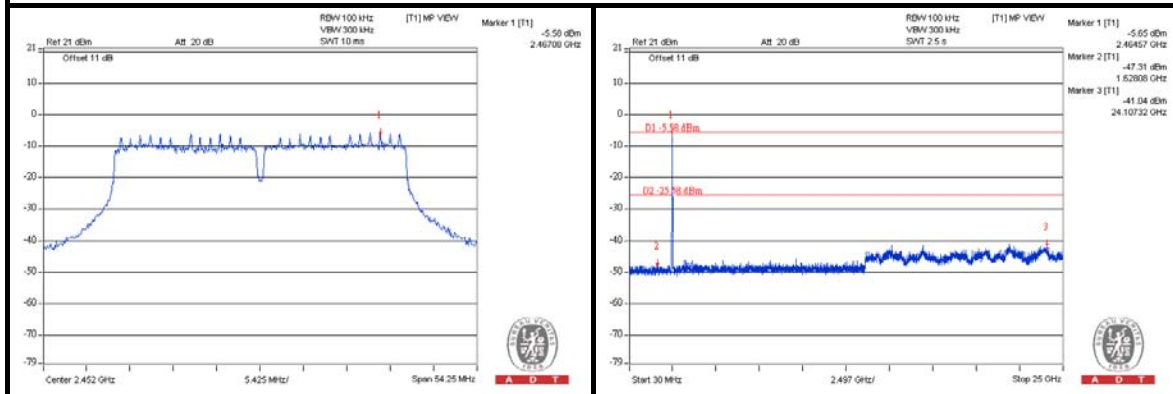
CH 3



CH 6



CH 9



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:

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Web Site: 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---