

FCC TEST REPORT (15.247)

REPORT NO.: RF111222C15

MODEL NO.: BR200-WP

FCC ID: WBV-BR200-WP

RECEIVED: Dec. 22, 2011

TESTED: Jan. 03 ~ Jan. 18, 2012

ISSUED: Jan. 30, 2012

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	NA	Jan. 30, 2012



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1. CERTIFICATION

PRODUCT: AP Router

MODEL: BR200-WP

BRAND: Aerohive

APPLICANT: Aerohive Networks, Inc.

TESTED: Jan. 03 ~ Jan. 18, 2012

TEST SAMPLE: ENGINEERING SAMPLE

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

ANSI C63.4-2003

ANSI C63.10-2009

The above equipment (Model: BR200-WP) 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 : Ivy Lin , **DATE:** Jan. 30, 2012

Ivy Lin / Specialist

APPROVED BY : Cody Chang , **DATE:** Jan. 30, 2012

Cody Chang / 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 AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -5.30dB at 4.974MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2390MHz & 2483.5 MHz
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	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	AP Router
MODEL NO.	BR200-WP
FCC ID	WBV-BR200-WP
POWER SUPPLY	48Vdc (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 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps
OPERATING FREQUENCY	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5745 ~ 5825MHz
NUMBER OF CHANNEL	2.4GHz: 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) 5.0GHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	878.1mW for 2412 ~ 2462MHz 603.5mW for 5745 ~ 5825MHz
ANTENNA TYPE	Refer to Note for more details
ANTENNA CONNECTOR	Refer to Note for more details
DATA CABLE	1.6m non-shielded console cable w/o core 1.8m non-shielded RJ45 cable w/o core
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

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

Frequency Band (MHz)	2412~2462	5180~5240	5745~5825
802.11b	√		
802.11g	√		
802.11a		√	√
802.11n (20MHz)	√	√	√
802.11n (40MHz)	√	√	√

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

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

3. The following antennas provided to EUT.

ANTENNA	ANTENNA TYPE	ANTENNA GAIN (dBi)		ANTENNA CONNECTOR
		2412~2462MHz	5745~5825MHz	
0	Printed	0.91	2.51	NA
1	Printed	-2.3	-0.3	NA
2	Printed	1.91	0.73	NA

4. The EUT uses following adapter.

Brand	LEADER ELECTRONICS INC.
Model	NU60-F480125-I1NN
Input Power	100-240Vac, 50/60Hz, 1.4A
Output Power	48.0Vdc, 1.25A
Power Line	1.8m non-shielded cable with 1 core

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

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2422MHz	5	2442MHz
2	2427MHz	6	2447MHz
3	2432MHz	7	2452MHz
4	2437MHz		

FOR 5.0GHz (5745 ~ 5825MHz):

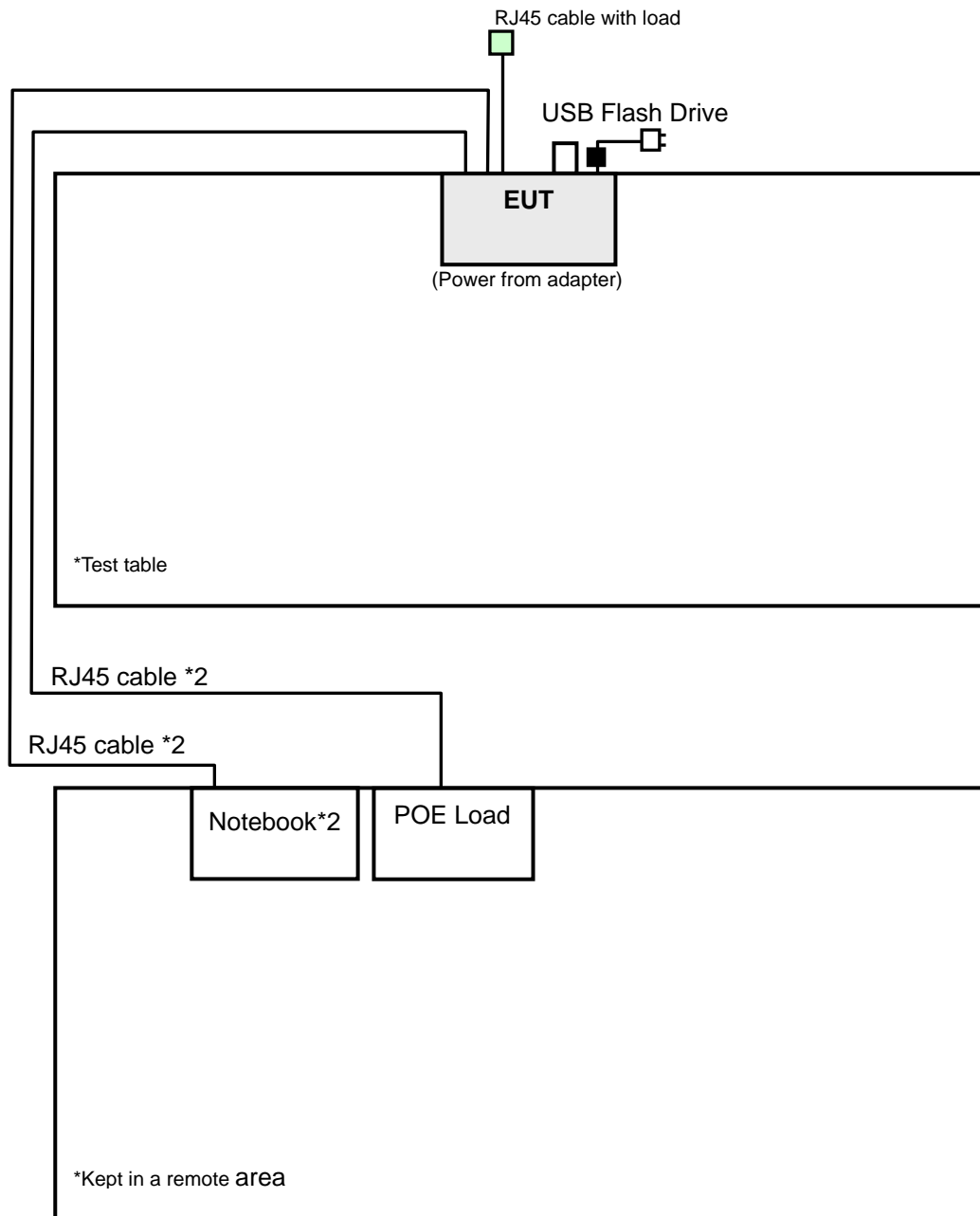
5 channels are provided for 802.11a, 802.11n (20MHz):

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 2.4GHz:

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

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

RADIATED EMISSION TEST (ABOVE 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations 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)	1 to 7	1, 4, 7	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 and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	7.2

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	7.2

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, 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)	1 to 7	1, 4, 7	OFDM	BPSK	15.0

ANTENNA PORT CONDUCTED 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, 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)	1 to 7	1, 4, 7	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	25deg. C, 65%RH, 25deg. C, 68%RH	120Vac, 60Hz	David Huang, Sun Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Aska Huang
PLC	23deg. C, 62%RH	120Vac, 60Hz	Antony Lee
APCM	25deg. C, 68%RH	120Vac, 60Hz	Sun Lin

FOR 5.745 ~ 5.825GHz:

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

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

RADIATED EMISSION TEST (ABOVE 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	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 and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	149 to 165	149	OFDM	BPSK	7.2

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	149 to 165	149	OFDM	BPSK	7.2

BANDEDGE MEASUREMENT:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0

ANTENNA PORT CONDUCTED MEASUREMENT:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE _≥ 1G	25deg. C, 65%RH, 25deg. C, 68%RH	120Vac, 60Hz	David Huang, Sun Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	David Huang
PLC	23deg. C, 62%RH	120Vac, 60Hz	Antony Lee
APCM	25deg. C, 68%RH	120Vac, 60Hz	Sun Lin

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.247)

ANSI C63.4-2003

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.

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	E5410	1HC2XM1	FCC DoC Approved
2	NOTEBOOK	DELL	D830	12103274121	E2K4965AGNM
3	USB FLASH DEVICE	Transcend	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable without core.
2	10m RJ45 UTP cable without core.
3	NA

NOTE:

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

4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). 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. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 19, 2011	Apr. 18, 2012
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 04, 2011	Aug. 03, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Sep. 06, 2011	Sep. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 20, 2011	Jul. 19, 2012
Preamplifier Agilent	8449B	3008A01911	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10638	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Aug. 19, 2011	Aug. 18, 2012
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 13, 2011	Aug. 12, 2012
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
High Speed Peak Power Meter	ML2495A	0842014	Apr. 26, 2011	Apr. 25, 2012
Power Sensor	MA2411B	0738404	Apr. 26, 2011	Apr. 25, 2012

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 460141.
5. The IC Site Registration No. is IC 7450F-4.

4.1.3 TEST PROCEDURES

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

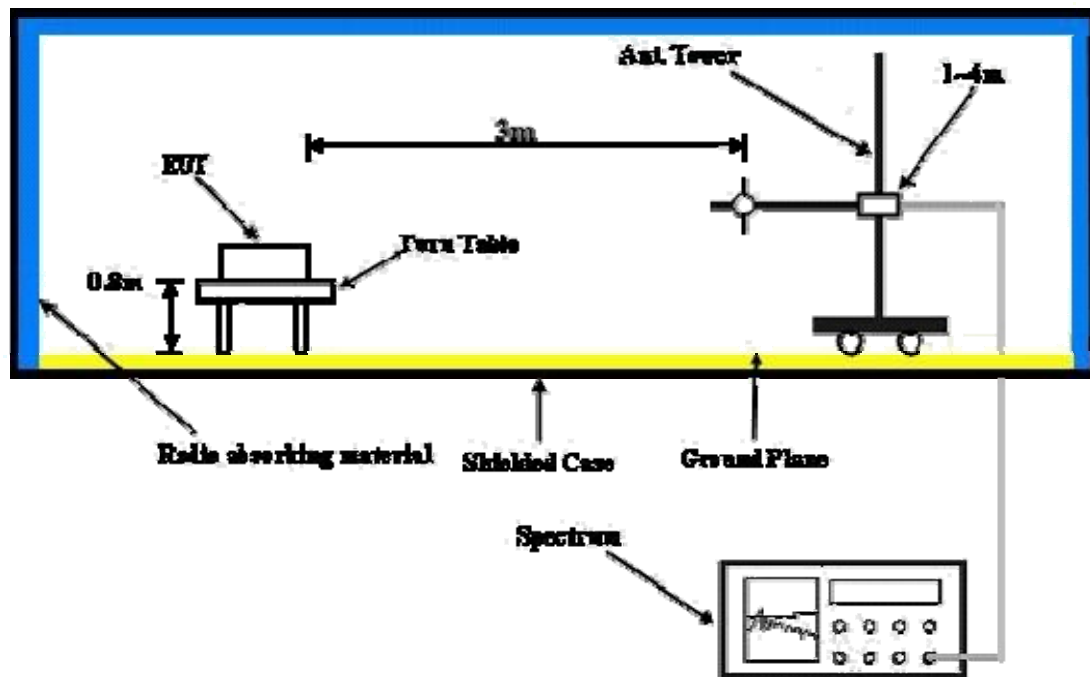
NOTE:

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on the testing table.
- Prepared notebooks 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 communication partner read and wrote with the USB flash device via EUT.

4.1.7 TEST RESULTS

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.2 PK	74.0	-18.8	1.05 H	330	23.80	31.40
2	2390.00	45.3 AV	54.0	-8.7	1.05 H	330	13.90	31.40
3	*2412.00	112.1 PK			1.02 H	330	80.70	31.40
4	*2412.00	107.0 AV			1.02 H	330	75.60	31.40
5	2497.50	60.4 PK	74.0	-13.6	1.00 H	331	28.70	31.70
6	2497.50	52.0 AV	54.0	-2.0	1.00 H	331	20.30	31.70
7	4824.00	51.4 PK	74.0	-22.6	1.34 H	205	14.10	37.30
8	4824.00	45.5 AV	54.0	-8.5	1.34 H	205	8.20	37.30
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	2390.00	52.4 PK	74.0	-21.6	1.00 V	141	21.00	31.40
2	2390.00	41.4 AV	54.0	-12.6	1.00 V	141	10.00	31.40
3	*2412.00	97.8 PK			1.00 V	141	66.40	31.40
4	*2412.00	93.5 AV			1.00 V	141	62.10	31.40
5	2497.50	53.5 PK	74.0	-20.5	1.00 V	141	21.80	31.70
6	2497.50	43.7 AV	54.0	-10.3	1.00 V	141	12.00	31.70
7	4824.00	48.4 PK	74.0	-25.6	1.00 V	118	11.10	37.30
8	4824.00	37.4 AV	54.0	-16.6	1.00 V	118	0.10	37.30

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



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

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	2352.80	53.5 PK	74.0	-20.5	1.01 H	332	22.30	31.20
2	2352.80	45.5 AV	54.0	-8.5	1.01 H	332	14.30	31.20
3	*2437.00	111.2 PK			1.01 H	332	79.70	31.50
4	*2437.00	106.4 AV			1.01 H	332	74.90	31.50
5	4874.00	51.1 PK	74.0	-22.9	1.32 H	206	13.70	37.40
6	4874.00	47.1 AV	54.0	-6.9	1.32 H	206	9.70	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	2352.80	54.5 PK	74.0	-19.5	1.35 V	206	23.30	31.20
2	2352.80	41.8 AV	54.0	-12.2	1.35 V	206	10.60	31.20
3	*2437.00	101.8 PK			1.35 V	206	70.30	31.50
4	*2437.00	97.6 AV			1.35 V	206	66.10	31.50
5	4874.00	47.7 PK	74.0	-26.3	1.00 V	124	10.30	37.40
6	4874.00	37.9 AV	54.0	-16.1	1.00 V	124	0.50	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.



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

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	2376.00	56.9 PK	74.0	-17.1	1.02 H	335	25.60	31.30
2	2376.00	46.8 AV	54.0	-7.2	1.02 H	335	15.50	31.30
3	*2462.00	110.7 PK			1.02 H	335	79.10	31.60
4	*2462.00	106.5 AV			1.02 H	335	74.90	31.60
5	2483.50	58.1 PK	74.0	-15.9	1.02 H	335	26.40	31.70
6	2483.50	48.6 AV	54.0	-5.4	1.02 H	335	16.90	31.70
7	4924.00	50.2 PK	74.0	-23.8	1.13 H	144	12.70	37.50
8	4924.00	44.7 AV	54.0	-9.3	1.13 H	144	7.20	37.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2376.00	52.7 PK	74.0	-21.3	1.05 V	213	21.40	31.30
2	2376.00	41.6 AV	54.0	-12.4	1.05 V	213	10.30	31.30
3	*2462.00	100.0 PK			1.05 V	213	68.40	31.60
4	*2462.00	96.0 AV			1.05 V	213	64.40	31.60
5	2483.50	52.8 PK	74.0	-21.2	1.05 V	213	21.10	31.70
6	2483.50	42.2 AV	54.0	-11.8	1.05 V	213	10.50	31.70
7	4924.00	47.7 PK	74.0	-26.3	1.00 V	319	10.20	37.50
8	4924.00	38.8 AV	54.0	-15.2	1.00 V	319	1.30	37.50

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



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802.11g

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

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	72.7 PK	74.0	-1.3	1.02 H	331	41.30	31.40
2	2390.00	53.0 AV	54.0	-1.0	1.02 H	331	21.60	31.40
3	*2412.00	110.5 PK			1.02 H	331	79.10	31.40
4	*2412.00	97.2 AV			1.02 H	331	65.80	31.40
5	2496.50	59.3 PK	74.0	-14.7	1.02 H	331	27.60	31.70
6	2496.50	48.0 AV	54.0	-6.0	1.02 H	331	16.30	31.70
7	4824.00	46.6 PK	74.0	-27.4	1.00 H	165	9.30	37.30
8	4824.00	32.9 AV	54.0	-21.1	1.00 H	165	-4.40	37.30
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	2390.00	56.9 PK	74.0	-17.1	1.00 V	140	25.50	31.40
2	2390.00	43.8 AV	54.0	-10.2	1.00 V	140	12.40	31.40
3	*2412.00	97.9 PK			1.00 V	140	66.50	31.40
4	*2412.00	85.2 AV			1.00 V	140	53.80	31.40
5	2496.50	52.8 PK	74.0	-21.2	1.00 V	140	21.10	31.70
6	2496.50	42.4 AV	54.0	-11.6	1.00 V	140	10.70	31.70
7	4824.00	46.0 PK	74.0	-28.0	1.00 V	159	8.70	37.30
8	4824.00	32.5 AV	54.0	-21.5	1.00 V	159	-4.80	37.30

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



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

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	2353.00	55.1 PK	74.0	-18.9	1.04 H	334	23.90	31.20
2	2353.00	44.8 AV	54.0	-9.2	1.04 H	334	13.60	31.20
3	*2437.00	113.2 PK			1.04 H	334	81.70	31.50
4	*2437.00	100.1 AV			1.04 H	334	68.60	31.50
5	4824.00	47.5 PK	74.0	-26.5	1.10 H	254	10.20	37.30
6	4824.00	32.3 AV	54.0	-21.7	1.10 H	254	-5.00	37.30
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	2353.00	52.6 PK	74.0	-21.4	1.34 V	206	21.40	31.20
2	2353.00	41.4 AV	54.0	-12.6	1.34 V	206	10.20	31.20
3	*2437.00	104.3 PK			1.34 V	206	72.80	31.50
4	*2437.00	91.7 AV			1.34 V	206	60.20	31.50
5	4874.00	46.2 PK	74.0	-27.8	1.00 V	187	8.80	37.40
6	4874.00	32.2 AV	54.0	-21.8	1.00 V	187	-5.20	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.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.9 PK			1.02 H	333	79.30	31.60
2	*2462.00	98.1 AV			1.02 H	333	66.50	31.60
3	2483.50	68.5 PK	74.0	-5.5	1.02 H	333	36.80	31.70
4	2483.50	52.4 AV	54.0	-1.6	1.02 H	333	20.70	31.70
5	4924.00	47.6 PK	74.0	-26.4	1.00 H	197	10.10	37.50
6	4924.00	33.4 AV	54.0	-20.6	1.00 H	197	-4.10	37.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	100.9 PK			1.06 V	214	69.30	31.60
2	*2462.00	88.8 AV			1.06 V	214	57.20	31.60
3	2483.50	60.8 PK	74.0	-13.2	1.06 V	214	29.10	31.70
4	2483.50	45.1 AV	54.0	-8.9	1.06 V	214	13.40	31.70
5	4924.00	46.6 PK	74.0	-27.4	1.00 V	139	9.10	37.50
6	4924.00	32.7 AV	54.0	-21.3	1.00 V	139	-4.80	37.50

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



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802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	62.5 PK	74.0	-11.5	1.12 H	218	31.40	31.10
2	2288.00	52.7 AV	54.0	-1.3	1.12 H	218	21.60	31.10
3	2390.00	71.5 PK	74.0	-2.5	1.07 H	193	40.00	31.50
4	2390.00	52.8 AV	54.0	-1.2	1.07 H	193	21.30	31.50
5	*2412.00	112.8 PK			1.07 H	193	81.20	31.60
6	*2412.00	100.5 AV			1.07 H	193	68.90	31.60
7	4824.00	46.3 PK	74.0	-27.7	1.59 H	267	8.60	37.70
8	4824.00	35.3 AV	54.0	-18.7	1.59 H	267	-2.40	37.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	55.9 PK	74.0	-18.1	1.02 V	318	24.80	31.10
2	2288.00	47.0 AV	54.0	-7.0	1.02 V	318	15.90	31.10
3	2390.00	57.5 PK	74.0	-16.5	1.48 V	105	26.00	31.50
4	2390.00	45.9 AV	54.0	-8.1	1.48 V	105	14.40	31.50
5	*2412.00	104.5 PK			1.44 V	95	72.90	31.60
6	*2412.00	92.4 AV			1.44 V	95	60.80	31.60
7	4824.00	43.2 PK	74.0	-30.8	1.37 V	48	5.50	37.70
8	4824.00	32.7 AV	54.0	-21.3	1.37 V	48	-5.00	37.70

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	63.0 PK	74.0	-11.0	1.40 H	218	31.90	31.10
2	2288.00	52.6 AV	54.0	-1.4	1.40 H	218	21.50	31.10
3	2353.00	62.2 PK	74.0	-11.8	1.09 H	162	30.80	31.40
4	2353.00	52.9 AV	54.0	-1.1	1.09 H	162	21.50	31.40
5	2390.00	67.4 PK	74.0	-6.6	1.08 H	168	35.90	31.50
6	2390.00	51.3 AV	54.0	-2.7	1.08 H	168	19.80	31.50
7	*2437.00	117.0 PK			1.08 H	182	85.30	31.70
8	*2437.00	104.5 AV			1.08 H	182	72.80	31.70
9	4874.00	48.2 PK	74.0	-25.8	1.78 H	182	10.40	37.80
10	4874.00	36.1 AV	54.0	-17.9	1.78 H	182	-1.70	37.80
11	7311.00	56.3 PK	74.0	-17.7	1.45 H	225	12.40	43.90
12	7311.00	42.7 AV	54.0	-11.3	1.45 H	225	-1.20	43.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	57.2 PK	74.0	-16.8	1.08 V	298	26.10	31.10
2	2288.00	48.3 AV	54.0	-5.7	1.08 V	298	17.20	31.10
3	2353.00	58.2 PK	74.0	-15.8	1.47 V	98	26.80	31.40
4	2353.00	46.1 AV	54.0	-7.9	1.47 V	98	14.70	31.40
5	2390.00	58.0 PK	74.0	-16.0	1.42 V	88	26.50	31.50
6	2390.00	45.8 AV	54.0	-8.2	1.42 V	88	14.30	31.50
7	*2437.00	108.3 PK			1.48 V	100	76.60	31.70
8	*2437.00	96.2 AV			1.48 V	100	64.50	31.70
9	4874.00	43.7 PK	74.0	-30.3	1.28 V	32	5.90	37.80
10	4874.00	33.2 AV	54.0	-20.8	1.28 V	32	-4.60	37.80
11	7311.00	56.8 PK	74.0	-17.2	1.08 V	325	12.90	43.90
12	7311.00	42.2 AV	54.0	-11.8	1.08 V	325	-1.70	43.90

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



A D T

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	62.9 PK	74.0	-11.1	1.40 H	217	31.80	31.10
2	2288.00	52.6 AV	54.0	-1.4	1.40 H	217	21.50	31.10
3	*2462.00	112.3 PK			1.02 H	194	80.50	31.80
4	*2462.00	100.4 AV			1.02 H	194	68.60	31.80
5	2483.50	72.7 PK	74.0	-1.3	1.03 H	203	40.80	31.90
6	2483.50	52.3 AV	54.0	-1.7	1.03 H	203	20.40	31.90
7	4924.00	46.9 PK	74.0	-27.1	1.32 H	228	9.00	37.90
8	4924.00	36.1 AV	54.0	-17.9	1.32 H	228	-1.80	37.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	55.2 PK	74.0	-18.8	1.07 V	322	24.10	31.10
2	2288.00	46.2 AV	54.0	-7.8	1.07 V	322	15.10	31.10
3	*2462.00	104.1 PK			1.42 V	107	72.30	31.80
4	*2462.00	92.0 AV			1.42 V	107	60.20	31.80
5	2483.50	57.8 PK	74.0	-16.2	1.37 V	112	25.90	31.90
6	2483.50	45.7 AV	54.0	-8.3	1.37 V	112	13.80	31.90
7	4924.00	43.5 PK	74.0	-30.5	1.22 V	178	5.60	37.90
8	4924.00	32.6 AV	54.0	-21.4	1.22 V	178	-5.30	37.90

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



A D T

802.11n (40MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	63.2 PK	74.0	-10.8	1.13 H	198	32.10	31.10
2	2288.00	51.9 AV	54.0	-2.1	1.13 H	198	20.80	31.10
3	2390.00	70.7 PK	74.0	-3.3	1.04 H	202	39.20	31.50
4	2390.00	53.0 AV	54.0	-1.0	1.04 H	202	21.50	31.50
5	*2422.00	109.5 PK			1.03 H	178	77.90	31.60
6	*2422.00	96.4 AV			1.03 H	178	64.80	31.60
7	4844.00	45.7 PK	74.0	-28.3	1.32 H	58	8.00	37.70
8	4844.00	35.1 AV	54.0	-18.9	1.32 H	58	-2.60	37.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	59.2 PK	74.0	-14.8	1.08 V	321	28.10	31.10
2	2288.00	49.3 AV	54.0	-4.7	1.08 V	321	18.20	31.10
3	2390.00	60.7 PK	74.0	-13.3	1.31 V	102	29.20	31.50
4	2390.00	50.8 AV	54.0	-3.2	1.31 V	102	19.30	31.50
5	*2422.00	101.2 PK			1.37 V	89	69.60	31.60
6	*2422.00	88.2 AV			1.37 V	89	56.60	31.60
7	4844.00	43.5 PK	74.0	-30.5	1.21 V	47	5.80	37.70
8	4844.00	32.3 AV	54.0	-21.7	1.21 V	47	-5.40	37.70

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 4	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	62.7 PK	74.0	-11.3	1.12 H	217	31.60	31.10
2	2288.00	52.4 AV	54.0	-1.6	1.12 H	217	21.30	31.10
3	2390.00	67.3 PK	74.0	-6.7	1.07 H	190	35.80	31.50
4	2390.00	52.7 AV	54.0	-1.3	1.07 H	190	21.20	31.50
5	*2437.00	110.1 PK			1.05 H	195	78.40	31.70
6	*2437.00	96.7 AV			1.05 H	195	65.00	31.70
7	4874.00	48.1 PK	74.0	-25.9	1.08 H	89	10.30	37.80
8	4874.00	36.8 AV	54.0	-17.2	1.08 H	89	-1.00	37.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	55.8 PK	74.0	-18.2	1.00 V	198	24.70	31.10
2	2288.00	46.5 AV	54.0	-7.5	1.00 V	198	15.40	31.10
3	2390.00	56.1 PK	74.0	-17.9	1.27 V	132	24.60	31.50
4	2390.00	47.5 AV	54.0	-6.5	1.27 V	132	16.00	31.50
5	*2437.00	102.1 PK			1.29 V	85	70.40	31.70
6	*2437.00	89.3 AV			1.29 V	85	57.60	31.70
7	4874.00	45.3 PK	74.0	-28.7	1.28 V	228	7.50	37.80
8	4874.00	33.7 AV	54.0	-20.3	1.28 V	228	-4.10	37.80

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	62.2 PK	74.0	-11.8	1.12 H	147	31.10	31.10
2	2288.00	52.2 AV	54.0	-1.8	1.12 H	147	21.10	31.10
3	*2452.00	108.8 PK			1.03 H	180	77.00	31.80
4	*2452.00	95.7 AV			1.03 H	180	63.90	31.80
5	2483.50	73.0 PK	74.0	-1.0	1.04 H	196	41.10	31.90
6	2483.50	52.7 AV	54.0	-1.3	1.04 H	196	20.80	31.90
7	4904.00	46.8 PK	74.0	-27.2	1.08 H	325	9.00	37.80
8	4904.00	34.8 AV	54.0	-19.2	1.08 H	325	-3.00	37.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2288.00	58.3 PK	74.0	-15.7	1.12 V	328	27.20	31.10
2	2288.00	48.8 AV	54.0	-5.2	1.12 V	328	17.70	31.10
3	*2452.00	100.5 PK			1.21 V	69	68.70	31.80
4	*2452.00	87.7 AV			1.21 V	69	55.90	31.80
5	2483.50	58.9 PK	74.0	-15.1	1.28 V	123	27.00	31.90
6	2483.50	49.2 AV	54.0	-4.8	1.28 V	123	17.30	31.90
7	4904.00	45.8 PK	74.0	-28.2	1.32 V	324	8.00	37.80
8	4904.00	34.5 AV	54.0	-19.5	1.32 V	324	-3.30	37.80

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



A D T

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

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

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	64.90	28.0 QP	40.0	-12.0	1.00 H	337	15.30	12.70
2	125.17	36.9 QP	43.5	-6.6	3.00 H	271	23.90	13.00
3	284.60	34.1 QP	46.0	-11.9	1.50 H	325	19.60	14.50
4	374.04	42.2 QP	46.0	-3.8	1.00 H	208	25.20	17.00
5	500.42	36.7 QP	46.0	-9.3	1.50 H	181	16.10	20.60
6	624.85	39.3 QP	46.0	-6.7	1.50 H	319	15.90	23.40
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	35.73	24.8 QP	40.0	-15.2	1.00 V	287	12.10	12.70
2	62.95	35.0 QP	40.0	-5.0	1.50 V	115	22.10	12.90
3	125.17	38.2 QP	43.5	-5.3	1.50 V	10	25.20	13.00
4	296.27	42.3 QP	46.0	-3.7	1.50 V	343	27.40	14.90
5	374.04	36.5 QP	46.0	-9.5	1.50 V	307	19.50	17.00
6	624.85	39.3 QP	46.0	-6.7	1.00 V	10	15.90	23.40

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.

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	100291	Nov. 23, 2011	Nov. 22, 2012
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 22, 2011	Dec. 21, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jul. 07, 2011	Jul. 06, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	835239/001	Feb. 22, 2011	Feb. 21, 2012
Software ADT	ADT_Cond_ V7.3.7	NA	NA	NA

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

4.2.3 TEST PROCEDURES

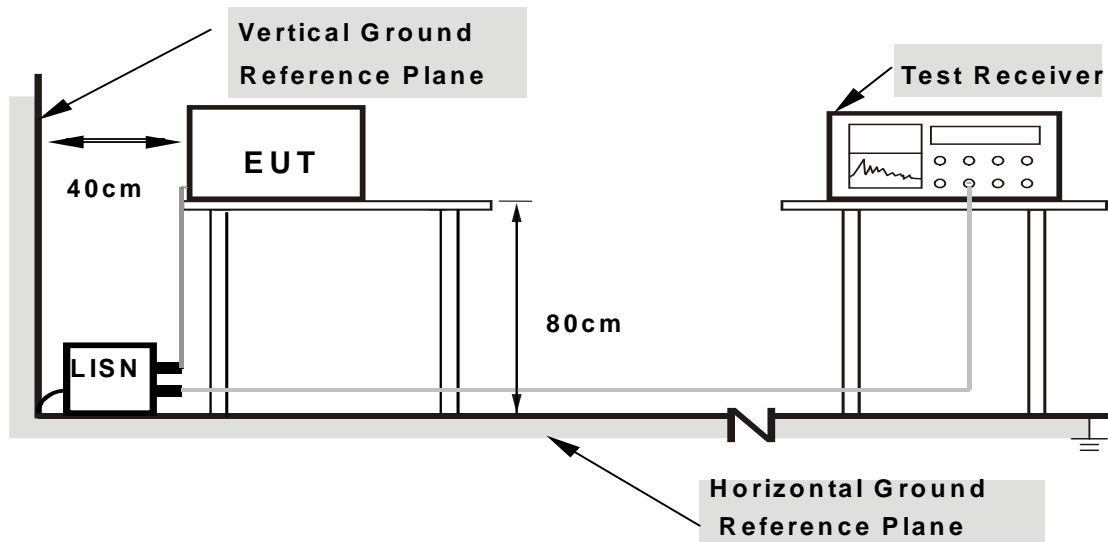
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

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

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

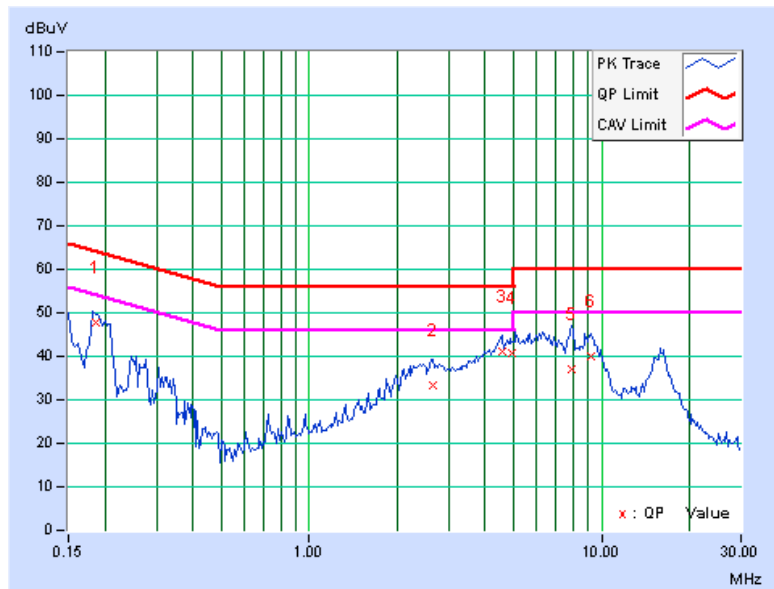
4.2.7 TEST RESULTS

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

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)] Q.P.	[dB (uV)] AV.	[dB (uV)] Q.P.	[dB (uV)] AV.	[dB (uV)] Q.P.	[dB (uV)] AV.	(dB) Q.P.	(dB) AV.
1	0.186	0.15	47.53	30.92	47.68	31.07	64.20	54.20	-16.52	-23.13
2	2.641	0.29	33.17	20.66	33.46	20.95	56.00	46.00	-22.54	-25.05
3	4.572	0.42	40.60	36.68	41.02	37.10	56.00	46.00	-14.98	-8.90
4	4.969	0.44	40.41	36.57	40.85	37.01	56.00	46.00	-15.15	-8.99
5	7.941	0.60	36.28	30.09	36.88	30.69	60.00	50.00	-23.12	-19.31
6	9.254	0.67	39.48	30.84	40.15	31.51	60.00	50.00	-19.85	-18.49

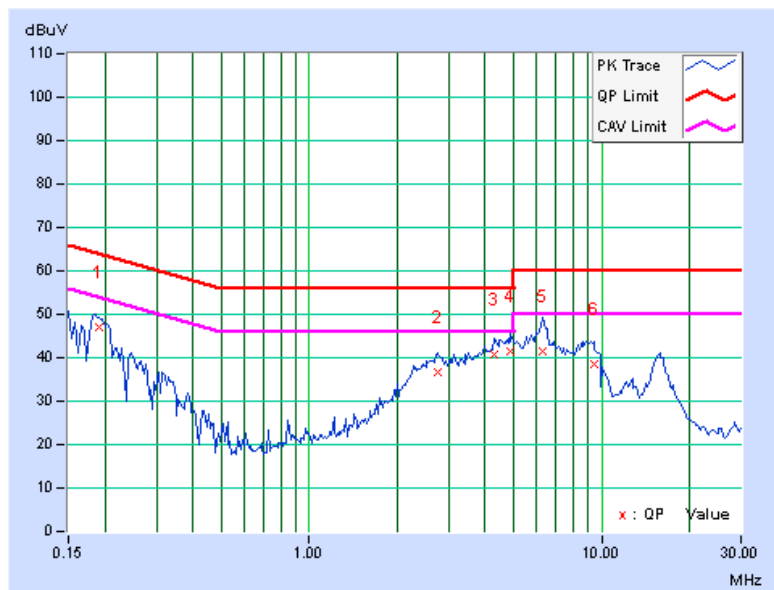
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.190	0.21	46.97	30.85	47.18	31.06	64.03	54.03	-16.85	-22.97
2	2.758	0.35	36.29	23.56	36.64	23.91	56.00	46.00	-19.36	-22.09
3	4.285	0.44	40.19	35.56	40.63	36.00	56.00	46.00	-15.37	-10.00
4	4.859	0.47	41.06	37.12	41.53	37.59	56.00	46.00	-14.47	-8.41
5	6.289	0.53	40.77	37.72	41.30	38.25	60.00	50.00	-18.70	-11.75
6	9.465	0.67	38.00	29.60	38.67	30.27	60.00	50.00	-21.33	-19.73

- 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.

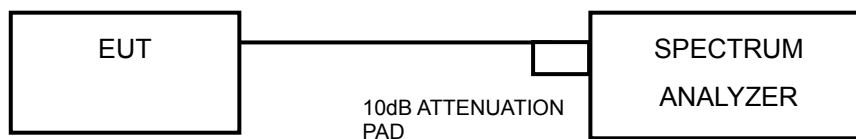


4.3 6dB BANDWIDTH MEASUREMENT

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

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.28	0.5	PASS
6	2437	10.30	0.5	PASS
11	2462	10.28	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.42	0.5	PASS
6	2437	16.63	0.5	PASS
11	2462	16.54	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.73	17.84	17.85	0.5	PASS
6	2437	17.75	17.85	17.82	0.5	PASS
11	2462	17.78	17.87	17.85	0.5	PASS

802.11n (40MHz)

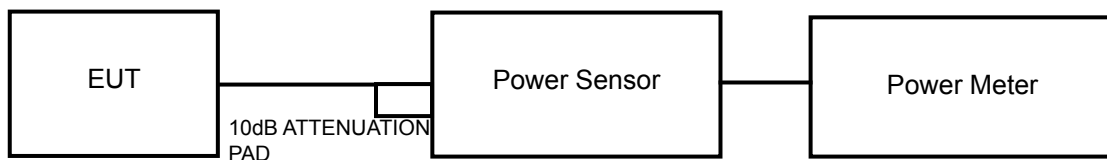
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2422	37.33	36.60	36.65	0.5	PASS
4	2437	37.45	36.67	36.81	0.5	PASS
7	2452	37.25	37.10	37.09	0.5	PASS

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

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	143.55	21.57	30	PASS
6	2437	133.35	21.25	30	PASS
11	2462	145.55	21.63	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	215.28	23.33	30	PASS
6	2437	326.59	25.14	30	PASS
11	2462	206.06	23.14	30	PASS

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	22.51	22.48	22.38	528.23	27.23	30	PASS
6	2437	24.78	24.59	24.62	878.08	29.44	30	PASS
11	2462	22.13	21.77	22.05	473.94	26.76	30	PASS

802.11n (40MHz)

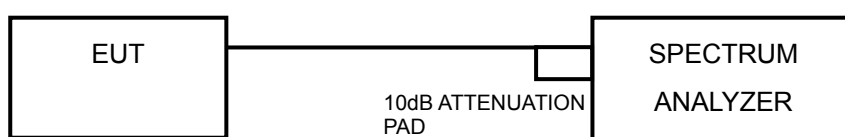
CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2422	20.97	20.68	20.82	362.76	25.60	30	PASS
4	2437	22.05	22.21	22.12	489.60	26.90	30	PASS
7	2452	20.23	20.28	20.31	319.50	25.04	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	9.34	-5.89	8	PASS
6	2437	9.27	-5.96	8	PASS
11	2462	9.31	-5.92	8	PASS

802.11g

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	5.82	-9.41	8	PASS
6	2437	7.78	-7.45	8	PASS
11	2462	5.71	-9.52	8	PASS

802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	2.41	-12.82	4.77	-8.05	8	PASS
	6	2437	4.50	-10.73	4.77	-5.96	8	PASS
	11	2462	2.15	-13.08	4.77	-8.31	8	PASS
1	1	2412	1.59	-13.64	4.77	-8.87	8	PASS
	6	2437	3.72	-11.51	4.77	-6.74	8	PASS
	11	2462	0.79	-14.44	4.77	-9.67	8	PASS
2	1	2412	1.59	-13.64	4.77	-8.87	8	PASS
	6	2437	3.97	-11.26	4.77	-6.49	8	PASS
	11	2462	1.19	-14.04	4.77	-9.27	8	PASS

802.11n (40MHz)

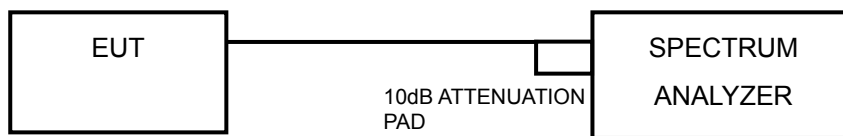
TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2422	-3.74	-18.97	4.77	-14.20	8	PASS
	4	2437	-2.48	-17.71	4.77	-12.94	8	PASS
	7	2452	-4.33	-19.56	4.77	-14.79	8	PASS
1	1	2422	-3.68	-18.91	4.77	-14.14	8	PASS
	4	2437	-1.96	-17.19	4.77	-12.42	8	PASS
	7	2452	-4.33	-19.56	4.77	-14.79	8	PASS
2	1	2422	-3.57	-18.80	4.77	-14.03	8	PASS
	4	2437	-2.28	-17.51	4.77	-12.74	8	PASS
	7	2452	-3.86	-19.09	4.77	-14.32	8	PASS

4.6 CONDUCTED EMISSION MEASUREMENT

4.6.1 LIMITS OF BAND EDGES 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

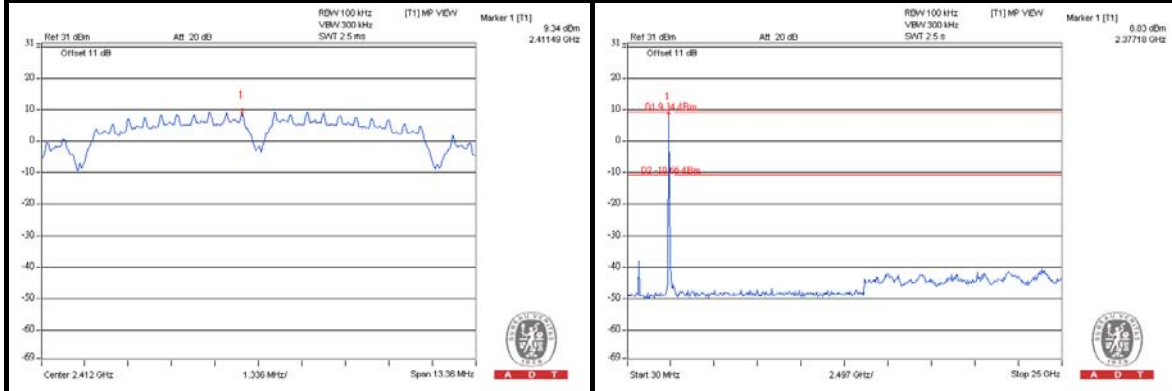
The conducted emission test is performed on each TX port of operating mode without summing or adding $10\log(N)$ since the limit is relative emission limit. Only worst data of each operating mode is presented.

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

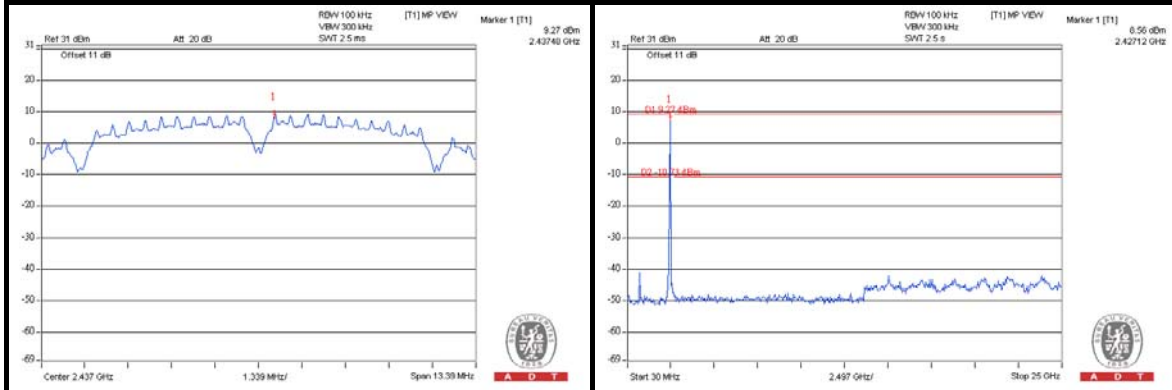
4.6.8 TEST RESULTS

802.11b

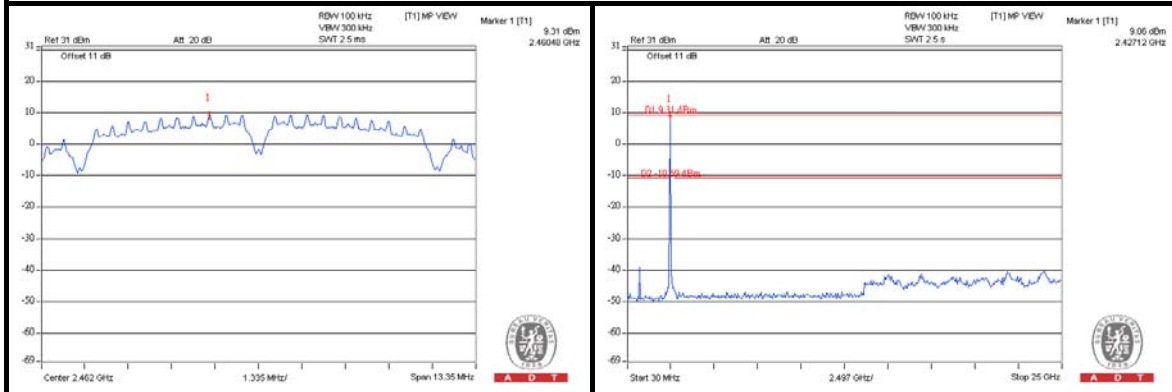
CH 1



CH 6

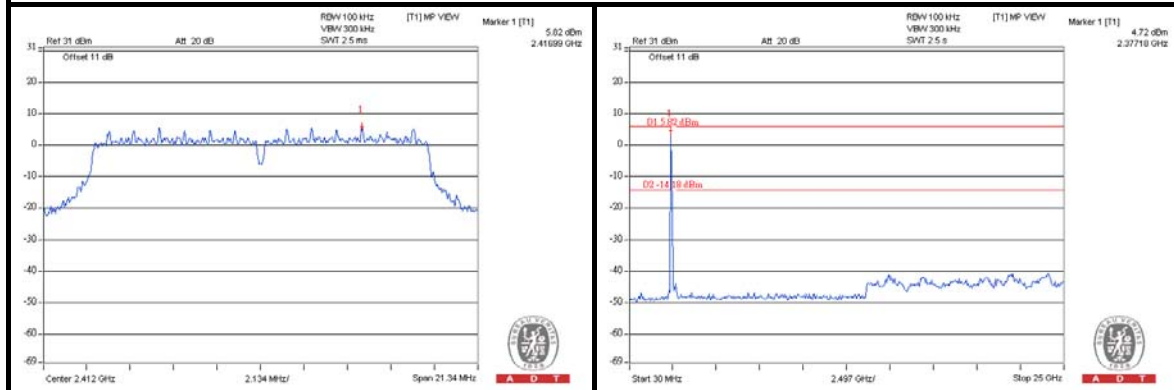


CH 11

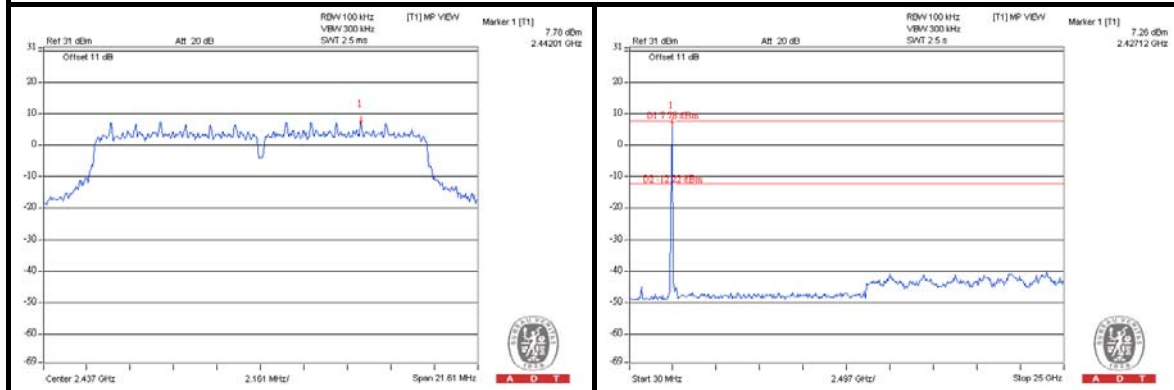


802.11g

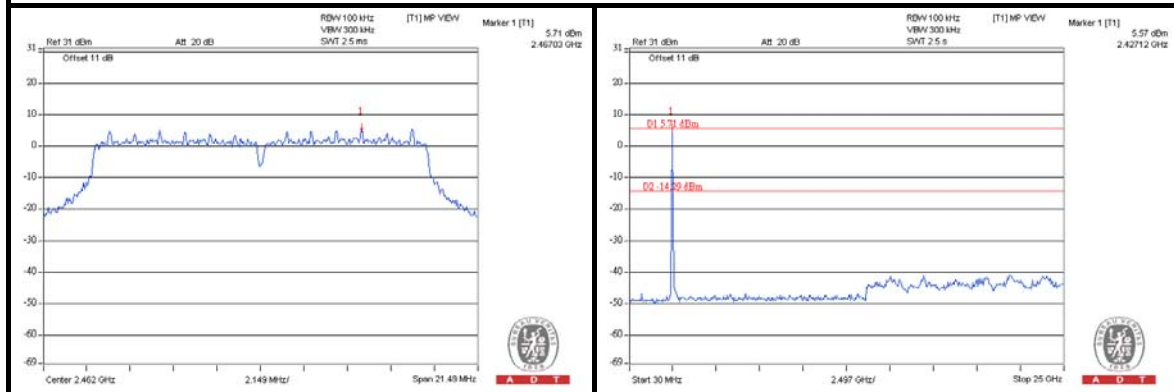
CH 1



CH 6

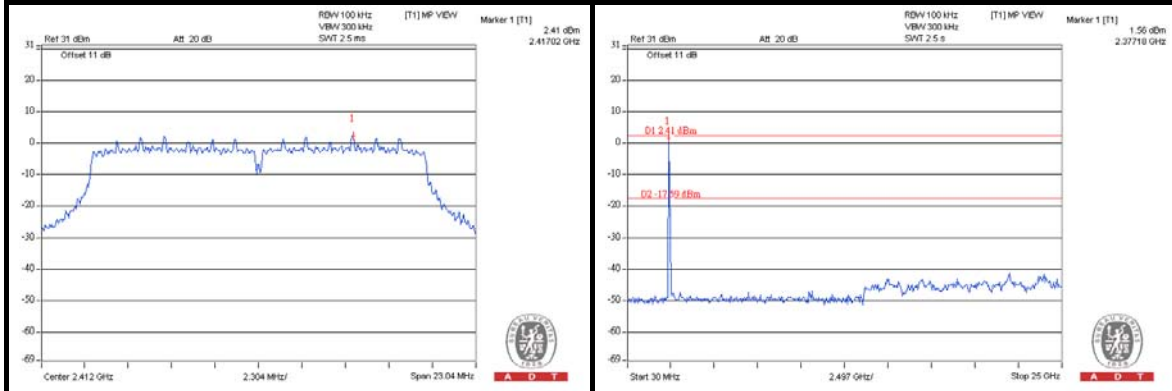


CH 11

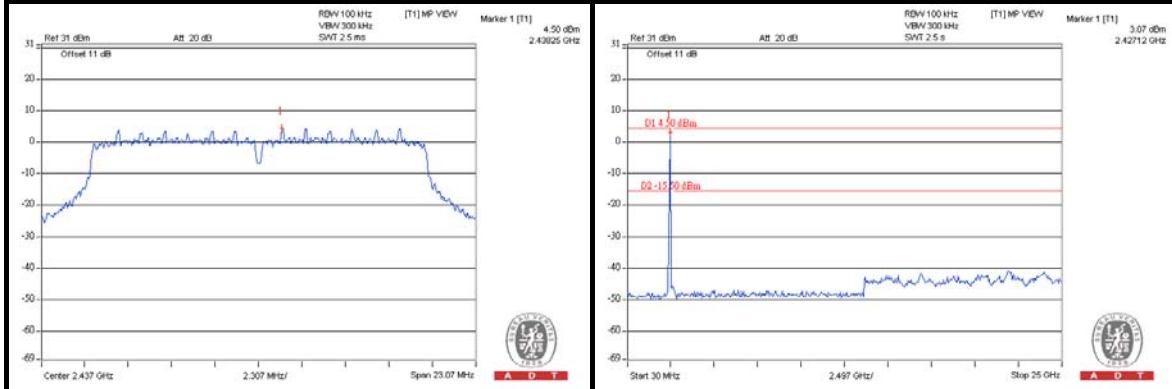


802.11n (20MHz)

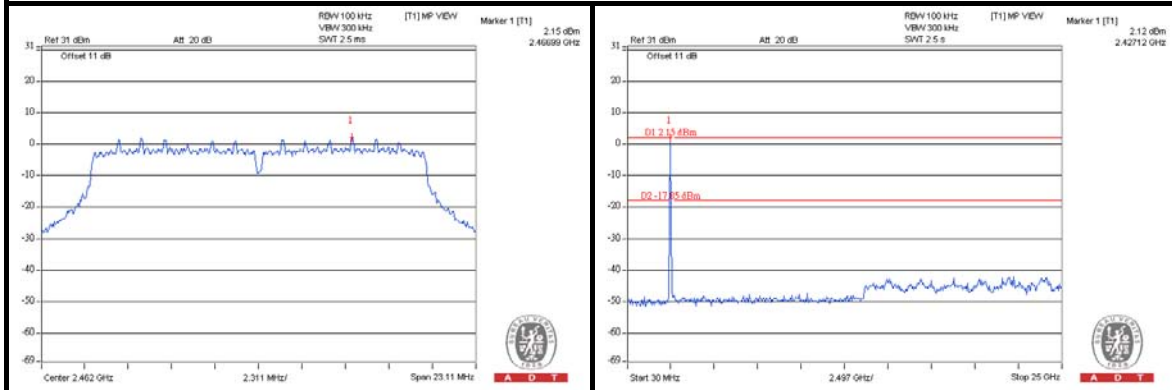
CH 1



CH 6

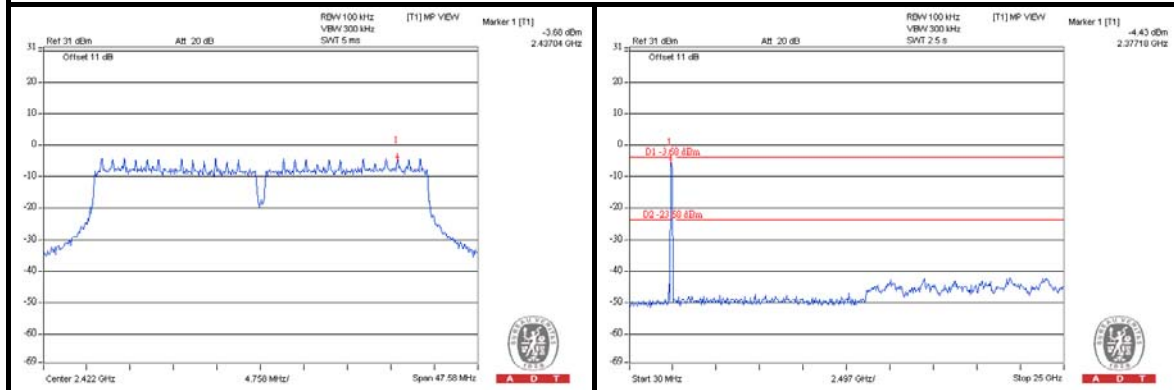


CH 11

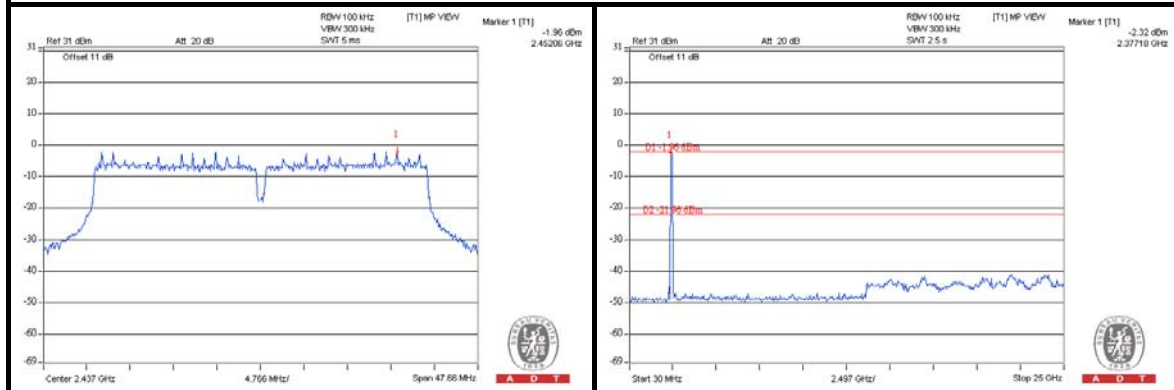


802.11n (40MHz)

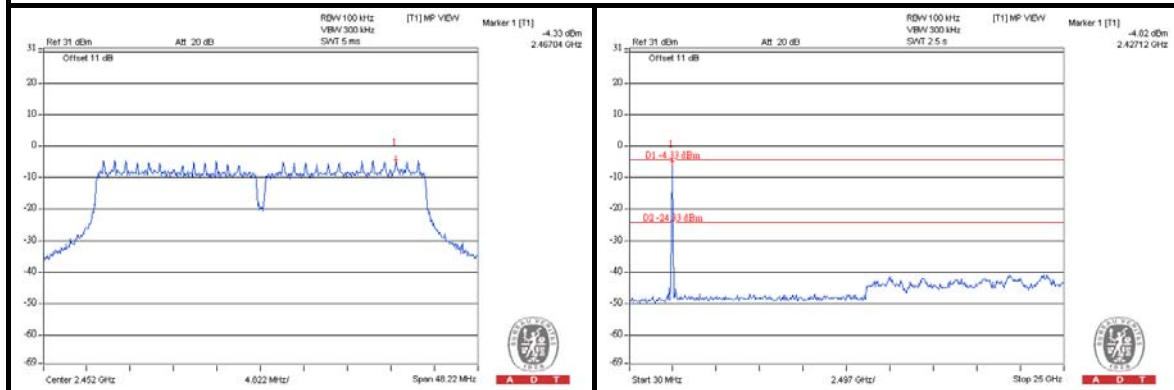
CH 1



CH 4



CH 7



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

5.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

5.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). 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. As shown in 15.35(b), 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.

5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 19, 2011	Apr. 18, 2012
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 04, 2011	Aug. 03, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Sep. 06, 2011	Sep. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 20, 2011	Jul. 19, 2012
Preamplifier Agilent	8449B	3008A01911	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10638	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Aug. 19, 2011	Aug. 18, 2012
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 13, 2011	Aug. 12, 2012
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 29, 2011	Oct. 28, 2012
High Speed Peak Power Meter	ML2495A	0842014	Apr. 26, 2011	Apr. 25, 2012
Power Sensor	MA2411B	0738404	Apr. 26, 2011	Apr. 25, 2012

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 460141.
5. The IC Site Registration No. is IC 7450F-4.

5.1.3 TEST PROCEDURES

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

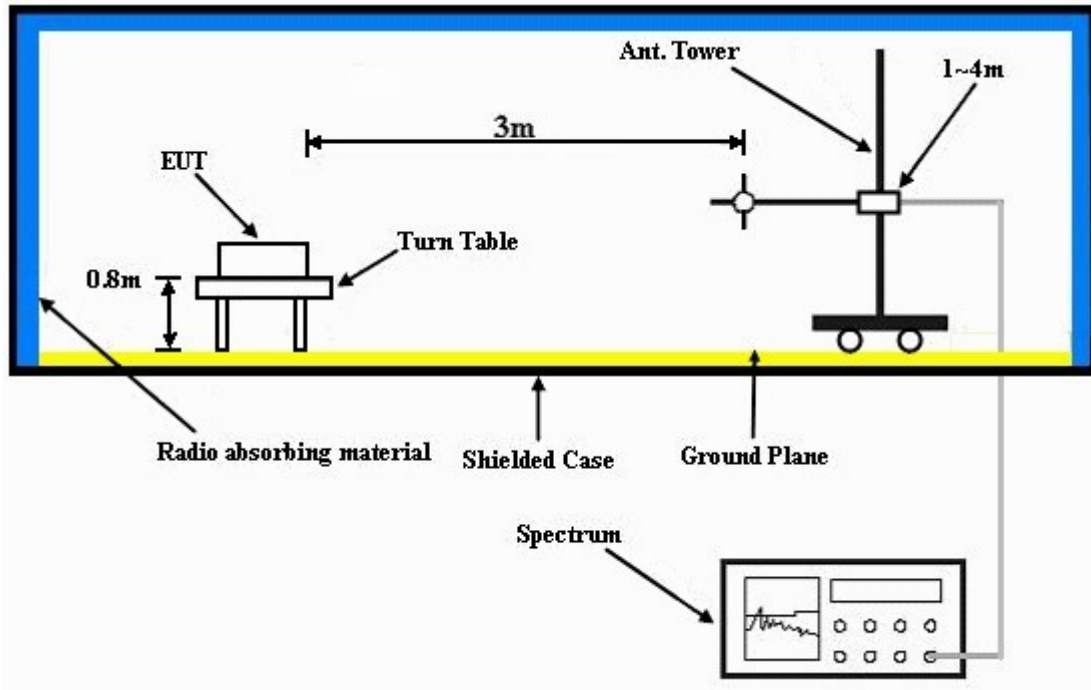
NOTE:

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

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

5.1.5 TEST SETUP



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

5.1.6 EUT OPERATING CONDITIONS

Same as 4.1.6.



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5.1.7 TEST RESULTS

802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	David Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	81.9 PK	89.4	-7.5	1.73 H	157	43.10	38.80
2	#5725.00	62.2 AV	77.2	-15.0	1.73 H	157	23.40	38.80
3	*5745.00	109.4 PK			1.73 H	157	70.60	38.80
4	*5745.00	97.2 AV			1.73 H	157	58.40	38.80
5	11490.00	60.7 PK	74.0	-13.3	1.00 H	197	10.60	50.10
6	11490.00	46.5 AV	54.0	-7.5	1.00 H	197	-3.60	50.10
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	#5725.00	70.8 PK	80.8	-10.0	1.00 V	332	32.00	38.80
2	#5725.00	52.8 AV	69.4	-16.6	1.00 V	332	14.00	38.80
3	*5745.00	100.8 PK			1.00 V	332	62.00	38.80
4	*5745.00	89.4 AV			1.00 V	332	50.60	38.80
5	11490.00	59.4 PK	74.0	-14.6	1.10 V	241	9.30	50.10
6	11490.00	45.5 AV	54.0	-8.5	1.10 V	241	-4.60	50.10

- REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	David Huang

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	*5785.00	109.6 PK			1.74 H	165	70.70	38.90
2	*5785.00	97.4 AV			1.74 H	165	58.50	38.90
3	11570.00	60.2 PK	74.0	-13.8	1.10 H	219	10.20	50.00
4	11570.00	46.4 AV	54.0	-7.6	1.10 H	219	-3.60	50.00
5	#17355.00	63.1 PK	89.6	-26.5	1.00 H	145	9.90	53.20
6	#17355.00	49.0 AV	77.4	-28.4	1.00 H	145	-4.20	53.20
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	*5785.00	101.2 PK			1.00 V	323	62.30	38.90
2	*5785.00	89.6 AV			1.00 V	323	50.70	38.90
3	11570.00	58.2 PK	74.0	-15.8	1.00 V	236	8.20	50.00
4	11570.00	45.4 AV	54.0	-8.6	1.00 V	236	-4.60	50.00
5	#17355.00	61.1 PK	81.2	-20.1	1.00 V	342	7.90	53.20
6	#17355.00	47.8 AV	69.6	-21.8	1.00 V	342	-5.40	53.20

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”: The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	David Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	108.1 PK			1.73 H	153	69.10	39.00
2	*5825.00	96.4 AV			1.73 H	153	57.40	39.00
3	#5850.00	67.4 PK	88.1	-20.7	1.73 H	153	28.40	39.00
4	#5850.00	50.1 AV	76.4	-26.3	1.73 H	153	11.10	39.00
5	11650.00	60.0 PK	74.0	-14.0	1.10 H	236	10.00	50.00
6	11650.00	46.3 AV	54.0	-7.7	1.10 H	236	-3.70	50.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	100.8 PK			1.00 V	6	61.80	39.00
2	*5825.00	88.3 AV			1.00 V	6	49.30	39.00
3	#5850.00	56.3 PK	80.8	-24.5	1.00 V	6	17.30	39.00
4	#5850.00	41.4 AV	68.3	-26.9	1.00 V	6	2.40	39.00
5	11650.00	59.1 PK	74.0	-14.9	1.00 V	135	9.10	50.00
6	11650.00	45.0 AV	54.0	-9.0	1.00 V	135	-5.00	50.00

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”: The radiated frequency is out the restricted band.

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	93.9 PK	96.3	-2.4	1.85 H	340	54.50	39.40
2	#5725.00	73.0 AV	84.7	-11.7	1.85 H	340	33.60	39.40
3	*5745.00	116.3 PK			1.83 H	354	76.80	39.50
4	*5745.00	104.7 AV			1.83 H	354	65.20	39.50
5	11490.00	59.7 PK	74.0	-14.3	1.70 H	168	10.00	49.70
6	11490.00	47.2 AV	54.0	-6.8	1.70 H	168	-2.50	49.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	89.9 PK	92.5	-2.6	1.80 V	271	50.50	39.40
2	#5725.00	70.6 AV	79.8	-9.2	1.80 V	271	31.20	39.40
3	*5745.00	112.5 PK			1.80 V	272	73.00	39.50
4	*5745.00	99.8 AV			1.80 V	272	60.30	39.50
5	11490.00	63.2 PK	74.0	-10.8	1.00 V	304	13.50	49.70
6	11490.00	50.6 AV	54.0	-3.4	1.00 V	304	0.90	49.70

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. " * ": Fundamental frequency.
 6. The limit value is defined as per 15.247.
 7. "#": The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5000.00	52.7 PK	74.0	-21.3	1.08 H	302	14.60	38.10
2	5000.00	42.3 AV	54.0	-11.7	1.08 H	302	4.20	38.10
3	*5785.00	115.8 PK			1.82 H	324	76.20	39.60
4	*5785.00	104.1 AV			1.82 H	324	64.50	39.60
5	11570.00	58.9 PK	74.0	-15.1	1.32 H	262	9.40	49.50
6	11570.00	46.5 AV	54.0	-7.5	1.32 H	262	-3.00	49.50
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	5000.00	46.3 PK	74.0	-27.7	1.32 V	89	8.20	38.10
2	5000.00	35.1 AV	54.0	-18.9	1.32 V	89	-3.00	38.10
3	*5785.00	112.1 PK			1.68 V	257	72.50	39.60
4	*5785.00	99.3 AV			1.68 V	257	59.70	39.60
5	11570.00	63.5 PK	74.0	-10.5	1.62 V	356	14.00	49.50
6	11570.00	50.3 AV	54.0	-3.7	1.62 V	356	0.80	49.50

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ”: Fundamental frequency.
 6. The limit value is defined as per 15.247.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	115.1 PK			1.35 H	358	75.40	39.70
2	*5825.00	103.5 AV			1.35 H	358	63.80	39.70
3	#5850.00	83.2 PK	95.1	-11.9	1.70 H	303	43.50	39.70
4	#5850.00	65.7 AV	83.5	-17.8	1.70 H	303	26.00	39.70
5	11650.00	60.2 PK	74.0	-13.8	1.69 H	112	10.80	49.40
6	11650.00	47.5 AV	54.0	-6.5	1.69 H	112	-1.90	49.40
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	*5825.00	111.3 PK			1.47 V	235	71.60	39.70
2	*5825.00	98.3 AV			1.47 V	235	58.60	39.70
3	#5850.00	77.8 PK	91.3	-13.5	1.52 V	221	38.10	39.70
4	#5850.00	60.2 AV	78.3	-18.1	1.52 V	221	20.50	39.70
5	11650.00	63.2 PK	74.0	-10.8	1.64 V	7	13.80	49.40
6	11650.00	50.1 AV	54.0	-3.9	1.64 V	7	0.70	49.40

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”: The radiated frequency is out the restricted band.

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	88.8 PK	90.2	-1.4	1.86 H	350	49.40	39.40
2	#5725.00	68.4 AV	77.9	-9.5	1.86 H	350	29.00	39.40
3	*5755.00	110.2 PK			1.89 H	354	70.70	39.50
4	*5755.00	97.9 AV			1.89 H	354	58.40	39.50
5	11510.00	57.1 PK	74.0	-16.9	1.38 H	212	7.50	49.60
6	11510.00	45.6 AV	54.0	-8.4	1.38 H	212	-4.00	49.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	82.0 PK	86.7	-4.7	1.79 V	297	42.60	39.40
2	#5725.00	64.8 AV	74.2	-9.4	1.79 V	297	25.40	39.40
3	*5755.00	106.7 PK			1.78 V	228	67.20	39.50
4	*5755.00	94.2 AV			1.78 V	228	54.70	39.50
5	11510.00	60.1 PK	74.0	-13.9	1.08 V	318	10.50	49.60
6	11510.00	47.2 AV	54.0	-6.8	1.08 V	318	-2.40	49.60

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The limit value is defined as per 15.247.
 7. “#”:The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	113.4 PK			1.77 H	353	73.80	39.60
2	*5795.00	100.6 AV			1.77 H	353	61.00	39.60
3	#5850.00	79.1 PK	93.4	-14.3	1.75 H	331	39.40	39.70
4	#5850.00	61.8 AV	80.6	-18.8	1.75 H	331	22.10	39.70
5	11590.00	60.2 PK	74.0	-13.8	1.02 H	48	10.70	49.50
6	11590.00	47.1 AV	54.0	-6.9	1.02 H	48	-2.40	49.50
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	*5795.00	109.8 PK			1.77 V	217	70.20	39.60
2	*5795.00	97.5 AV			1.77 V	217	57.90	39.60
3	#5850.00	75.2 PK	89.8	-14.6	1.68 V	228	35.50	39.70
4	#5850.00	57.8 AV	77.5	-19.7	1.68 V	228	18.10	39.70
5	11590.00	61.4 PK	74.0	-12.6	1.68 V	8	11.90	49.50
6	11590.00	48.8 AV	54.0	-5.2	1.68 V	8	-0.70	49.50

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. The limit value is defined as per 15.247.
 7. “#”: The radiated frequency is out the restricted band.



A D T

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Aska Huang

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	125.17	35.0 QP	43.5	-8.5	1.50 H	64	22.00	13.00
2	374.04	41.9 QP	46.0	-4.1	1.00 H	208	24.90	17.00
3	500.42	36.9 QP	46.0	-9.1	1.50 H	142	16.30	20.60
4	624.85	39.0 QP	46.0	-7.0	1.50 H	322	15.60	23.40
5	848.45	38.6 QP	46.0	-7.4	1.00 H	187	11.70	26.90
6	990.38	35.5 QP	54.0	-18.5	1.50 H	49	6.80	28.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	55.18	36.6 QP	40.0	-3.4	1.00 V	343	22.80	13.80
2	125.17	38.0 QP	43.5	-5.5	1.00 V	10	25.00	13.00
3	374.04	34.9 QP	46.0	-11.1	1.50 V	307	17.90	17.00
4	500.42	36.4 QP	46.0	-9.6	1.00 V	226	15.80	20.60
5	624.85	38.7 QP	46.0	-7.3	1.00 V	331	15.30	23.40
6	825.11	35.5 QP	46.0	-10.5	1.50 V	25	9.00	26.50

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

5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 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.

5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Nov. 23, 2011	Nov. 22, 2012
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 22, 2011	Dec. 21, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jul. 07, 2011	Jul. 06, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	835239/001	Feb. 22, 2011	Feb. 21, 2012
Software ADT	ADT_Conc_ V7.3.7	NA	NA	NA

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

5.2.3 TEST PROCEDURES

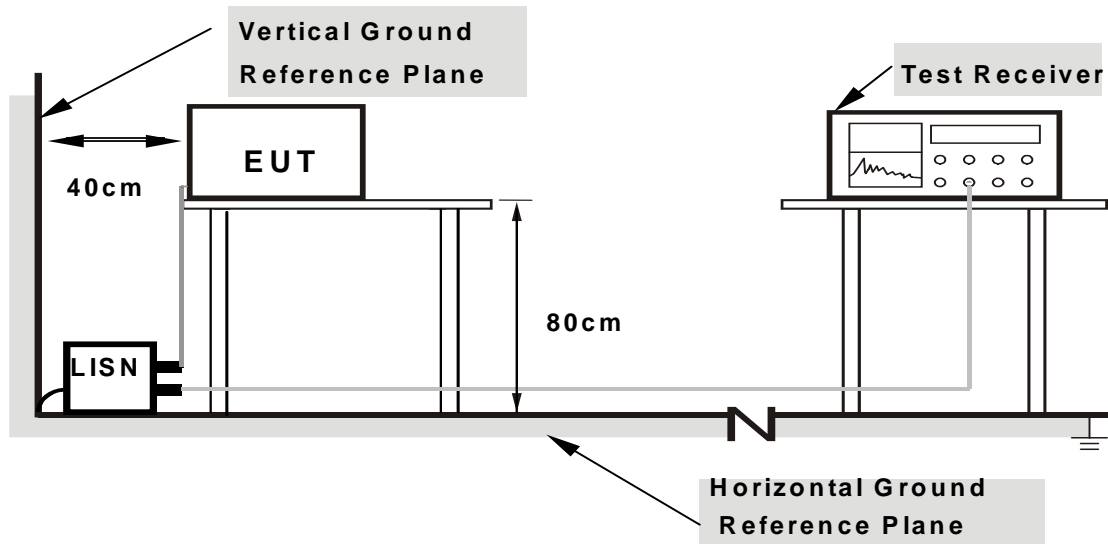
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 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).

5.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

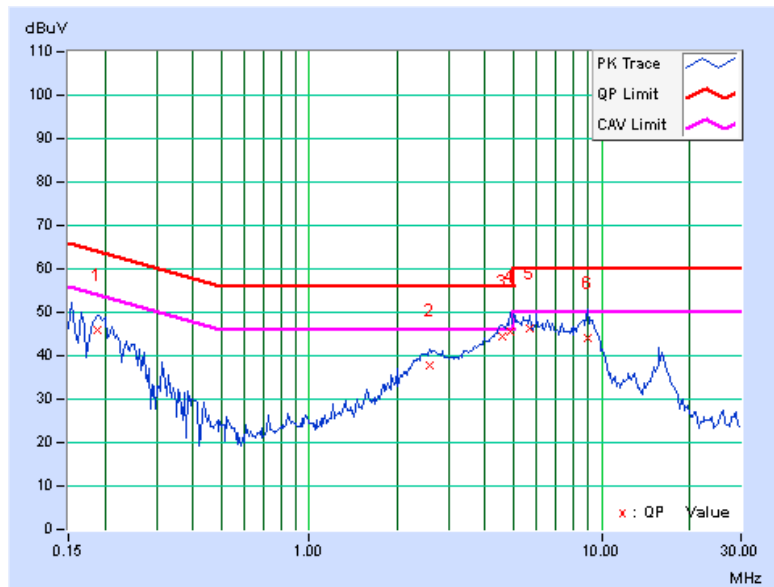
5.2.7 TEST RESULTS

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

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.189	0.15	45.83	30.98	45.98	31.13	64.08	54.08	-18.10	-22.95
2	2.570	0.28	37.57	30.23	37.85	30.51	56.00	46.00	-18.15	-15.49
3	4.570	0.42	43.91	38.79	44.33	39.21	56.00	46.00	-11.67	-6.79
4	4.855	0.44	44.96	39.73	45.40	40.17	56.00	46.00	-10.60	-5.83
5	5.715	0.48	45.84	42.30	46.32	42.78	60.00	50.00	-13.68	-7.22
6	8.926	0.65	43.44	36.65	44.09	37.30	60.00	50.00	-15.91	-12.70

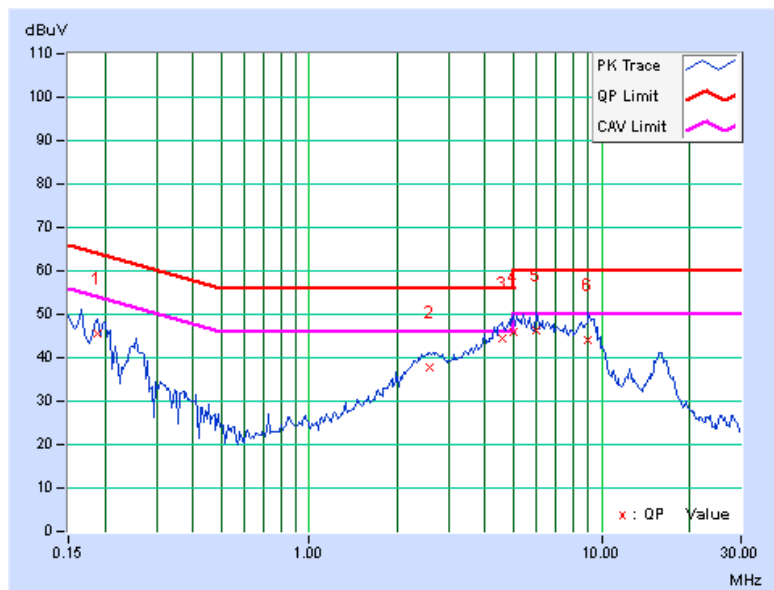
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = 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.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.189	0.21	45.37	30.42	45.58	30.63	64.08	54.08	-18.49	-23.44
2	2.572	0.34	37.45	30.29	37.79	30.63	56.00	46.00	-18.21	-15.37
3	4.570	0.45	44.08	39.03	44.53	39.48	56.00	46.00	-11.47	-6.52
4	4.974	0.47	45.54	40.23	46.01	40.70	56.00	46.00	-9.99	-5.30
5	6.000	0.52	45.78	42.26	46.30	42.78	60.00	50.00	-13.70	-7.22
6	8.996	0.65	43.51	36.84	44.16	37.49	60.00	50.00	-15.84	-12.51

- 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.

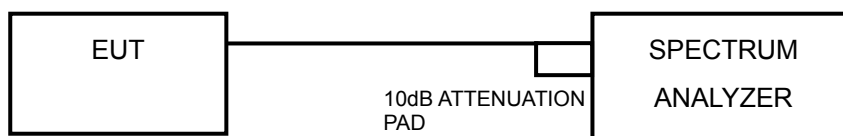


5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

5.3.2 TEST SETUP



5.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.3.4 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. 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

5.3.5 DEVIATION FROM TEST STANDARD

No deviation.

5.3.6 EUT OPERATING CONDITIONS

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

5.3.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.60	0.5	PASS
157	5785	16.59	0.5	PASS
165	5825	16.57	0.5	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.84	17.86	17.89	0.5	PASS
157	5785	17.76	17.86	17.87	0.5	PASS
165	5825	17.93	17.85	17.87	0.5	PASS

802.11n (40MHz)

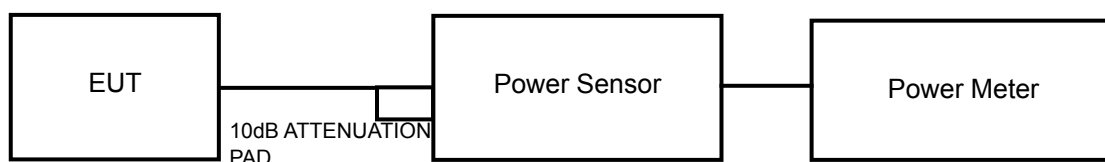
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	37.61	37.11	37.13	0.5	PASS
159	5795	36.64	36.91	37.11	0.5	PASS

5.4 MAXIMUM OUTPUT POWER

5.4.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

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

5.4.2 TEST SETUP



5.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.4 TEST PROCEDURES

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

5.4.5 DEVIATION FROM TEST STANDARD

No deviation.

5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

5.4.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (mW)	POWER OUTPUT (dBm)	POWER LIMIT (dBm)	PASS/FAIL
149	5745	212.32	23.27	30	PASS
157	5785	209.41	23.21	30	PASS
165	5825	197.70	22.96	30	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	POWER OUTPUT (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	23.12	22.83	23.15	603.52	27.81	30	PASS
157	5785	22.68	22.72	22.87	566.06	27.53	30	PASS
165	5825	22.53	22.82	23.01	570.47	27.56	30	PASS

802.11n (40MHz)

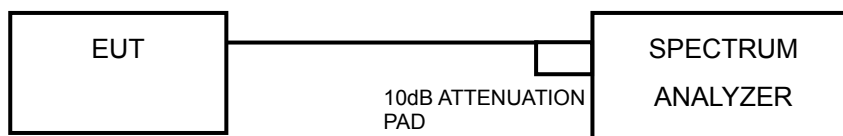
CHAN.	CHAN. FREQ. (MHz)	POWER OUTPUT (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	22.27	22.32	22.68	524.62	27.20	30	PASS
159	5795	22.77	22.89	23.34	599.54	27.78	30	PASS

5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST SETUP



5.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.5.4 TEST PROCEDURE.

1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

5.5.5 DEVIATION FROM TEST STANDARD

No deviation.

5.5.6 EUT OPERATING CONDITION

Same as Item 5.3.6.

5.5.7 TEST RESULTS

802.11a

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
149	5745	5.54	-9.69	8	PASS
157	5785	5.48	-9.75	8	PASS
165	5825	5.15	-10.08	8	PASS

802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	7.99	-7.24	4.77	-2.47	8	PASS
	157	5785	7.54	-7.69	4.77	-2.92	8	PASS
	165	5825	7.58	-7.65	4.77	-2.88	8	PASS
1	149	5745	7.20	-8.03	4.77	-3.26	8	PASS
	157	5785	7.29	-7.94	4.77	-3.17	8	PASS
	165	5825	7.24	-7.99	4.77	-3.22	8	PASS
2	149	5745	7.40	-7.83	4.77	-3.06	8	PASS
	157	5785	7.25	-7.98	4.77	-3.21	8	PASS
	165	5825	7.45	-7.78	4.77	-3.01	8	PASS

802.11n (40MHz)

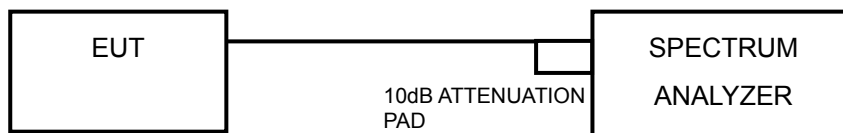
TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	1.65	-13.58	4.77	-8.81	8	PASS
	159	5795	2.17	-13.06	4.77	-8.29	8	PASS
1	151	5755	1.71	-13.52	4.77	-8.75	8	PASS
	159	5795	2.21	-13.02	4.77	-8.25	8	PASS
2	151	5755	1.61	-13.62	4.77	-8.85	8	PASS
	159	5795	2.40	-12.83	4.77	-8.06	8	PASS

5.6 CONDUCTED EMISSION MEASUREMENT

5.6.1 LIMITS OF BAND EDGES MEASUREMENT

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

5.6.2 TEST SETUP



5.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.6.4 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 OOBE

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.

5.6.5 DEVIATION FROM TEST STANDARD

No deviation.

5.6.6 EUT OPERATING CONDITION

Same as Item 5.3.6

5.6.7 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. Only worst data of each operating mode is presented.

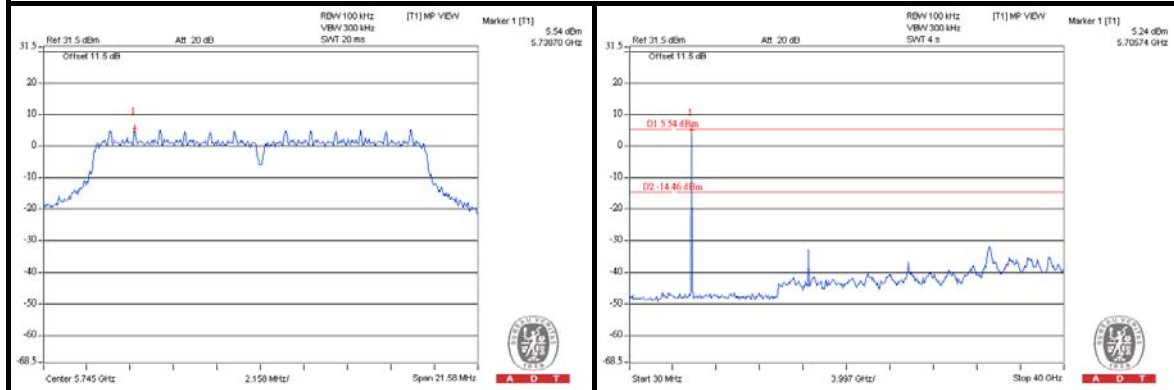
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).



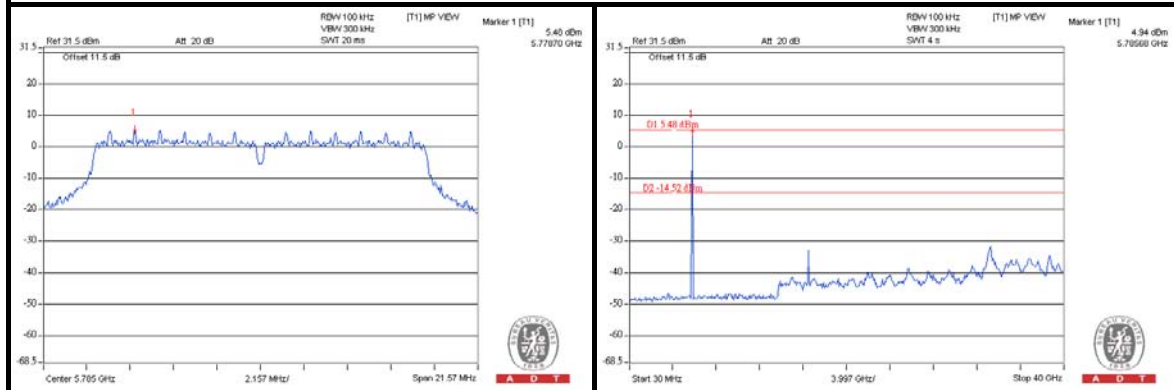
A D T

802.11a

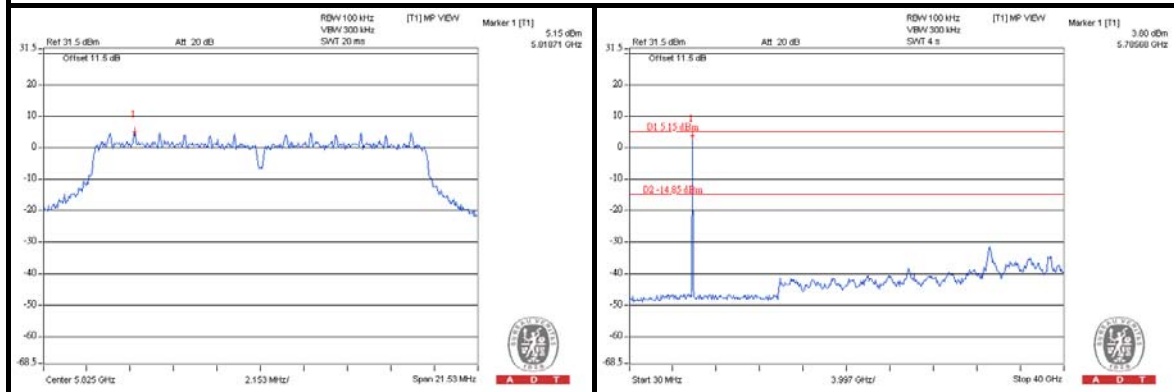
CH 149



CH 157

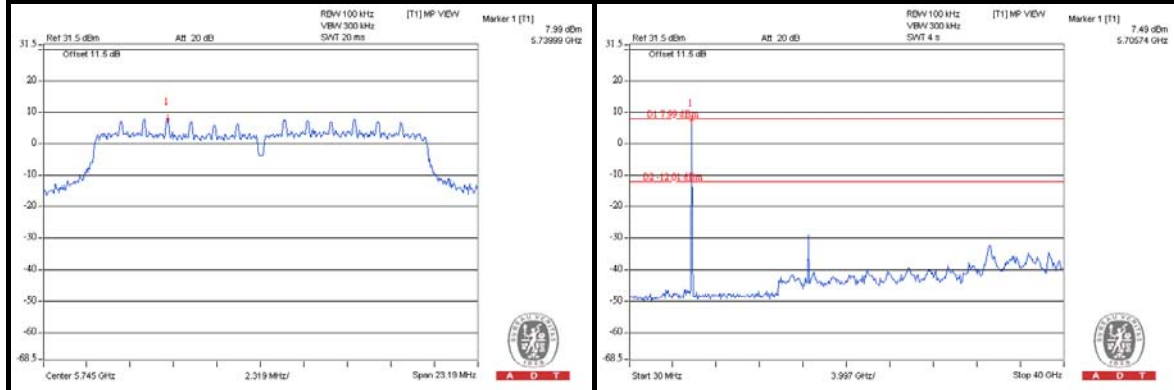


CH 165

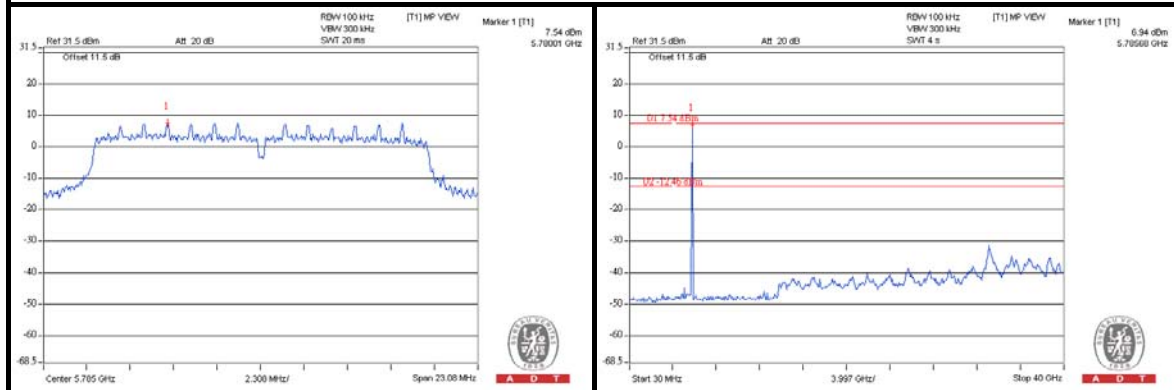


802.11n (20MHz)

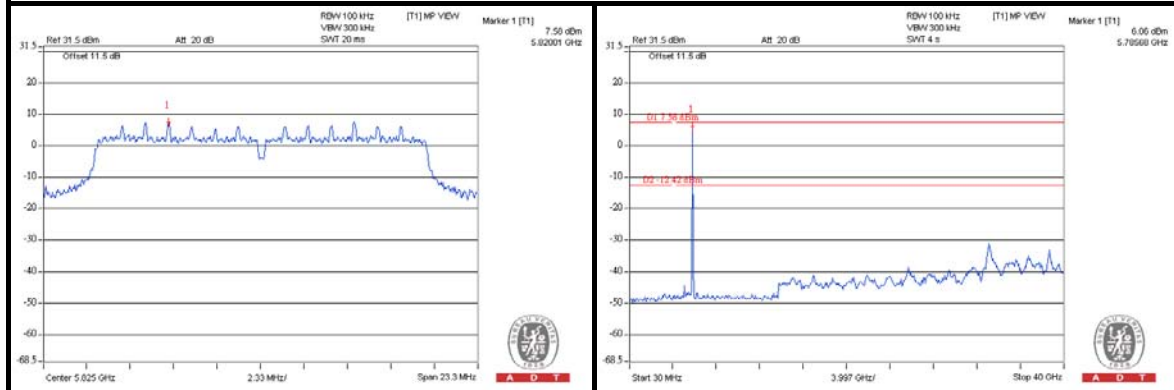
CH 149



CH 157

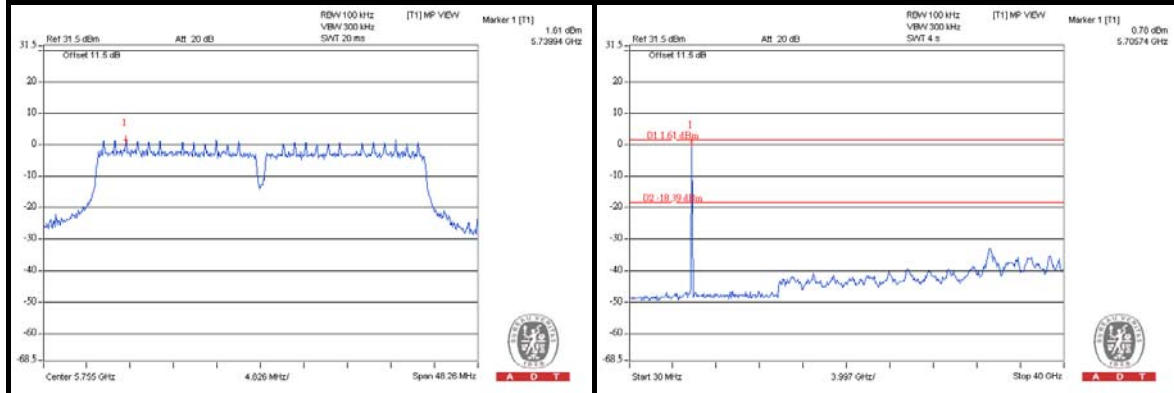


CH 165

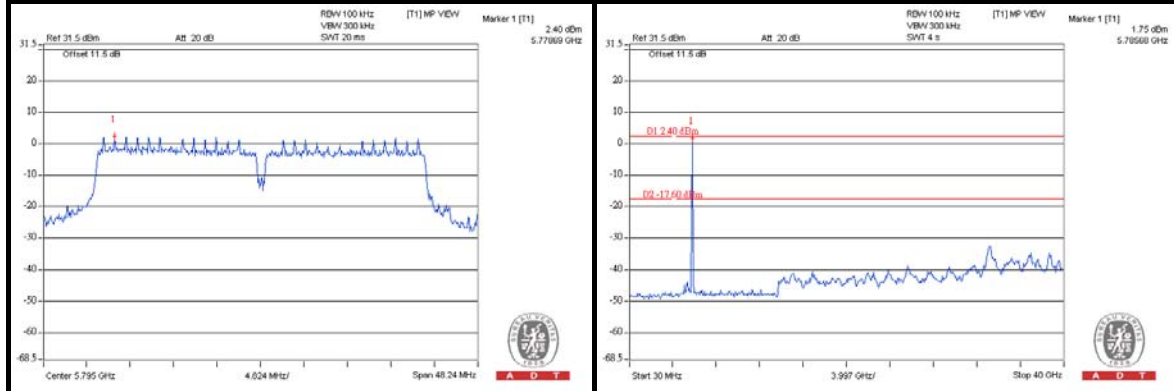


802.11n (40MHz)

CH 151



CH 159





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6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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7. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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

Tel: 886-3-5935343

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Hwa Ya EMC/RF/Safety/Telecom Lab

Tel: 886-3-3183232

Fax: 886-3-3185050

Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

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



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

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

---END---