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# FCC TEST REPORT (15.247) (WLAN)

**REPORT NO.:** RF111017D14-2

**MODEL NO.:** ICEFIRE-T10A

**FCC ID:** RFHICEFIRE-T10A

**RECEIVED:** Feb. 1, 2012

**TESTED:** Feb. 2 ~ 29, 2012

**ISSUED:** Mar. 7, 2012

**APPLICANT:** ICP Electronics, Inc.

**ADDRESS:** 3F., No.22, Zhongxing Rd., Xizhi Dist., New Taipei  
City 221, Taiwan

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

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

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF111017D14-2	Original release	Mar. 7, 2012



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## 1. CERTIFICATION

**PRODUCT:** TABLET PC  
**BRAND NAME:** iEi  
**MODEL NO.:** ICEFIRE-T10A  
**APPLICANT:** ICP Electronics, Inc.  
**TESTED:** Feb. 2 ~ 29, 2012  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
ANSI C63.10-2009

The above equipment 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 :** Annie Chang , **DATE:** Mar. 7, 2012  
( Annie Chang / Senior Specialist )

**APPROVED BY :** Ken Liu , **DATE:** Mar. 7, 2012  
( Ken Liu / Manager )



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## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -17.82dB at 0.150MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -5.0dB at 2390.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	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:

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz ~ 30MHz	2.41 dB
Radiated emissions	30MHz ~ 1GHz	3.87 dB
	Above 1GHz	3.36 dB



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	TABLET PC
<b>MODEL NO.</b>	ICEFIRE-T10A
<b>FCC ID</b>	RFHICEFIRE-T10A
<b>POWER SUPPLY</b>	DC 11.1V (from battery) or DC 12V (from AC Adapter)
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>TRANSFER RATE</b>	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 135.0Mbps
<b>OPERATING FREQUENCY</b>	<b>2.4GHz:</b> 2412 ~ 2462MHz <b>5.0GHz:</b> 5745 ~ 5825MHz
<b>NUMBER OF CHANNEL</b>	<b>2.4GHz:</b> 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) <b>5.0GHz:</b> 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>OUTPUT POWER</b>	323.6mW for 2412 ~ 2462MHz 213.8mW for 5745 ~ 5825MHz
<b>ANTENNA TYPE</b>	Dipole antenna with 2dBi gain
<b>ANTENNA CONNECTOR</b>	NA
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	Adapter, Battery, Docking





**NOTE:**

1. The EUT has following function:

Function		Test Standard	Reference Report
WiFi Module (Brand: AzureWave, Model: AW-NE773)	WLAN 802.11an (5180~5320MHz, 5500~5700MHz)	FCC Part 15, Subpart E (Section 15.407)	RF111017D14-3
	WLAN 802.11a (For DFS report) (5260~5320MHz, 5500~5700MHz)		RF111017D14-4
	WLAN 802.11an (5745~5825 MHz)	FCC Part 15, Subpart C (Section 15.247)	RF111017D14-2
	WLAN 802.11bgn		
Bluetooth Module (Brand: AzureWave, Model: AW-BT270)		FCC Part 15, Subpart C (Section 15.247)	RF111017D14-1
RFID (Brand: ICP, Model: ICEFIRE-RFID-TI)		FCC Part 15, Subpart C (Section 15.225)	RF111017D14

2. The EUT consumes power from an AC adapter, docking or battery, as follows:

Item	Brand	Model No.	Spec.
Adapter	PROTEK POWER	PMP60-12-B2	AC I/P: 100-240, 47-63Hz, 1.22-0.68A DC O/P: 11-13V, 5.46A Non-shielded AC 3-pin (1.8m) Non-shielded DC (1.3m) with one ferrite core
Adapter of docking	PROTEK POWER	PMP90-13-2	AC I/P: 100-240, 47-63Hz, 1.06-0.45A DC O/P: 19V, 4.74A Non-shielded AC 3-pin (1.8m) Non-shielded DC (1.3m) with one ferrite core
Battery	-	-	11.1Vdc

3. For Spurious Emissions test, following modes were pre-tested:

- ☐ EUT + Adapter
- ☐ EUT + Docking + Adapter
- ☐ EUT only

The worst emission level was found when the EUT was tested under **EUT + Docking + Adapter** mode, therefore, only its test data was recorded in this report.

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

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



5. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

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

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



### 3.2 DESCRIPTION OF TEST MODES

#### FOR 2.4GHz:

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
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):

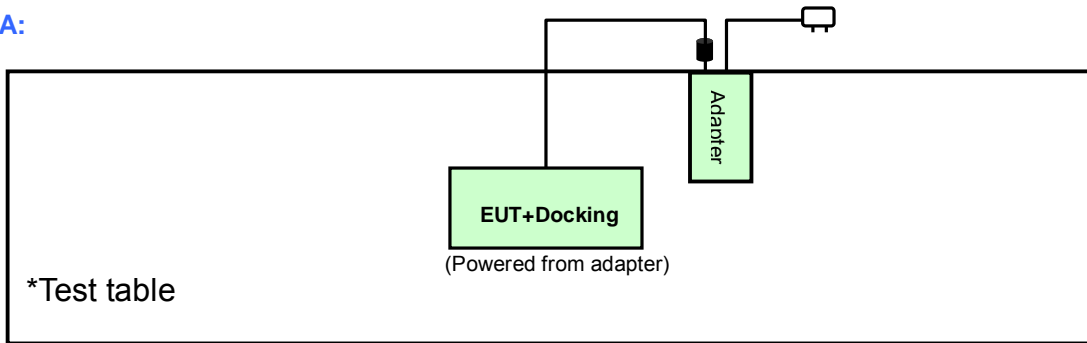
CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

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

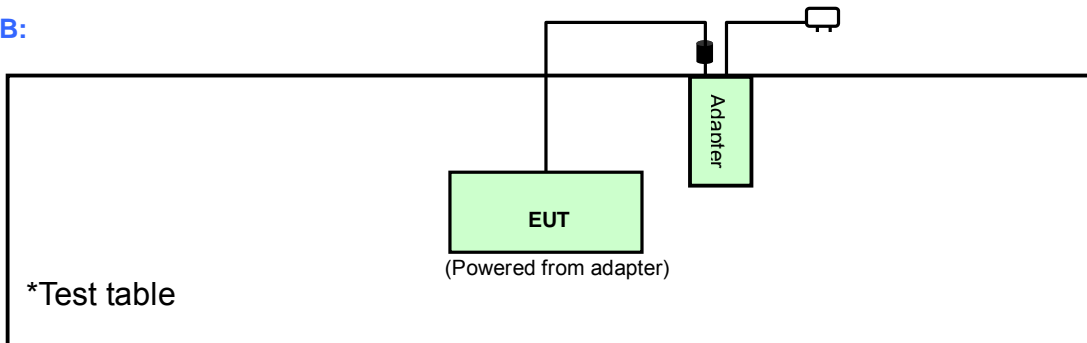
CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Mode A:



Mode B:





### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

**FOR 2.4GHz:**

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE <sup>3</sup> 1G	RE<1G	PLC	APCM	
A	√	√	√	√	EUT + Docking + Adapter
B	-	-	√	-	EUT + Adapter

Where **RE<sup>3</sup>1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

**RADIATED EMISSION TEST (ABOVE 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, 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)	AXIS
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	Z
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0	Z
A	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	Z
A	802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	13.5	Z

**RADIATED EMISSION TEST (BELOW 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, 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)	AXIS
A	802.11b	1 to 11	1	DSSS	DBPSK	1.0	Z

**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)
A & B	802.11b	1 to 11	1	DSSS	DBPSK	1.0

**BANDEDGE MEASUREMENT:**

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
A	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	6.5
A	802.11n (40MHz)	1 to 7	1, 7	OFDM	BPSK	13.5

**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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (40MHz)	1 to 7	1, 4, 7	OFDM	BPSK	13.5



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**TEST CONDITION:**

APPLICABLE TO	EUT CONFIGURE MODE	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	A & B	18deg. C, 75% RH	120Vac, 60Hz	Chad Lee
RE <sup>3</sup> 1G	A	18deg. C, 71% RH	120Vac, 60Hz	Nick Chen
RE<1G	A	18deg. C, 71% RH	120Vac, 60Hz	Nick Chen
APCM	A	14deg. C, 78% RH	120Vac, 60Hz	Jun Wu



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**FOR 5.745 ~ 5.825GHz:**

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE <sup>3</sup> 1G	RE<1G	PLC	APCM	
A	√	√	√	√	EUT + Docking + Adapter
B	-	-	√	-	EUT + Adapter

Where **PLC**: Power Line Conducted Emission      **RE<1G**: Radiated Emission below 1GHz  
**RE<sup>3</sup>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, 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)	AXIS
A	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0	Z
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	6.5	Z
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5	Z

**RADIATED EMISSION TEST (BELOW 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, 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)	AXIS
A	802.11a	149 to 165	149	OFDM	BPSK	6.0	Z

**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)
A & B	802.11a	149 to 165	149	OFDM	BPSK	6.0





**BANDEDGE MEASUREMENT:**

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	6.5
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5

**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)
A	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
A	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5

**TEST CONDITION:**

APPLICABLE TO	EUT CONFIGURE MODE	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	A & B	18deg. C, 75% RH	120Vac, 60Hz	Chad Lee
RE <sup>3</sup> 1G	A	18deg. C, 71% RH	120Vac, 60Hz	Nick Chen
RE<1G	A	18deg. C, 71% RH	120Vac, 60Hz	Nick Chen
APCM	A	14deg. C, 78% RH	120Vac, 60Hz	Jun Wu



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### **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 C63.10-2009

All test items have been performed and recorded as per the above standards.

**NOTE:** The product 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 without other necessary accessories or support units.



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

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	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 0.50 MHz.
  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.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100276	Jan. 04, 2012	Jan. 03, 2013
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100219	Nov. 24, 2011	Nov. 23, 2012
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 24, 2011	Nov. 23, 2012
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Dec. 08, 2011	Dec. 07, 2012
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Feb. 20, 2012	Feb. 19, 2013
SUHNTER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 22, 2012	Feb. 21, 2013

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in Shielded Room No. 10.
  3. The VCCI Site Registration No. C-1852.



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### 4.1.3 TEST PROCEDURES

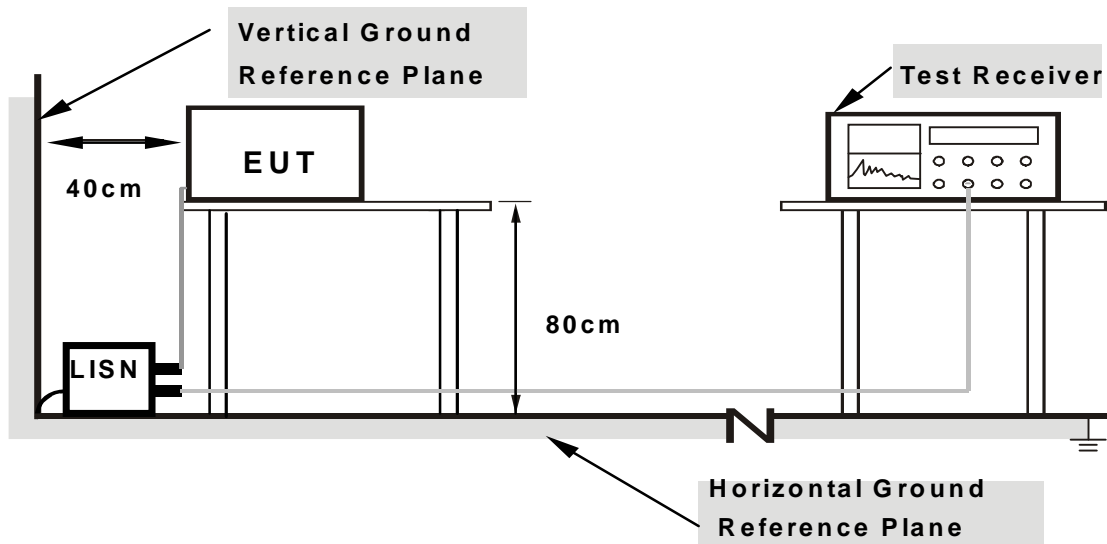
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

## 4.1.5 TEST SETUP



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

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

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

## 4.1.6 EUT OPERATING CONDITIONS

- a. Turn on the power of all equipment.
- b. Connected the EUT with AC adapter or docking placed on testing table.
- c. EUT ran a test program (provided by manufacture) to enable.
- d. Set the EUT under transmission condition continuously at specific channel frequency.

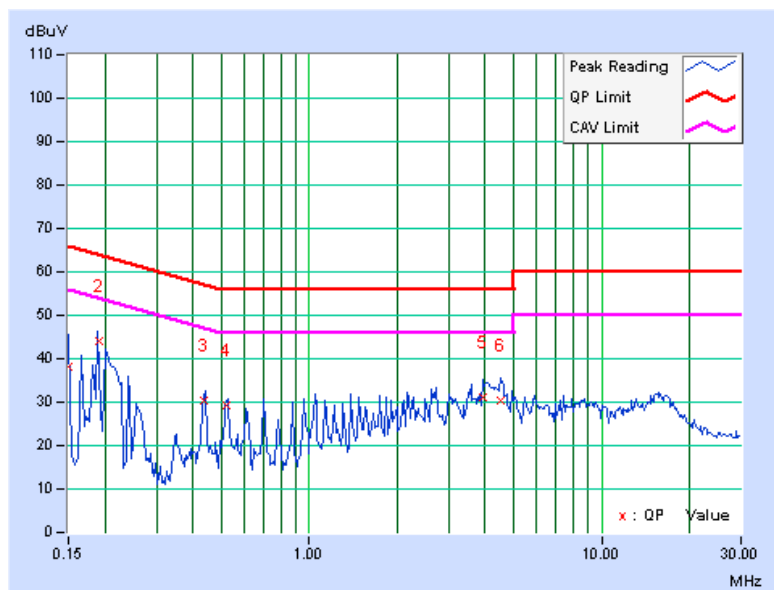
### 4.1.7 TEST RESULTS

**CONDUCTED WORST CASE DATA: 802.11b**

PHASE	Line 1	6dB BANDWIDTH	9kHz
CHANNEL	1	TEST MODE	A

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.13	38.01	-	38.14	-	66.00	56.00	-27.86	-
2	0.191	0.13	44.05	-	44.18	-	64.00	54.00	-19.82	-
3	0.438	0.21	30.22	-	30.43	-	57.09	47.09	-26.66	-
4	0.522	0.22	29.15	-	29.37	-	56.00	46.00	-26.63	-
5	3.926	0.44	30.58	-	31.02	-	56.00	46.00	-24.98	-
6	4.533	0.47	29.77	-	30.24	-	56.00	46.00	-25.76	-

- 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.



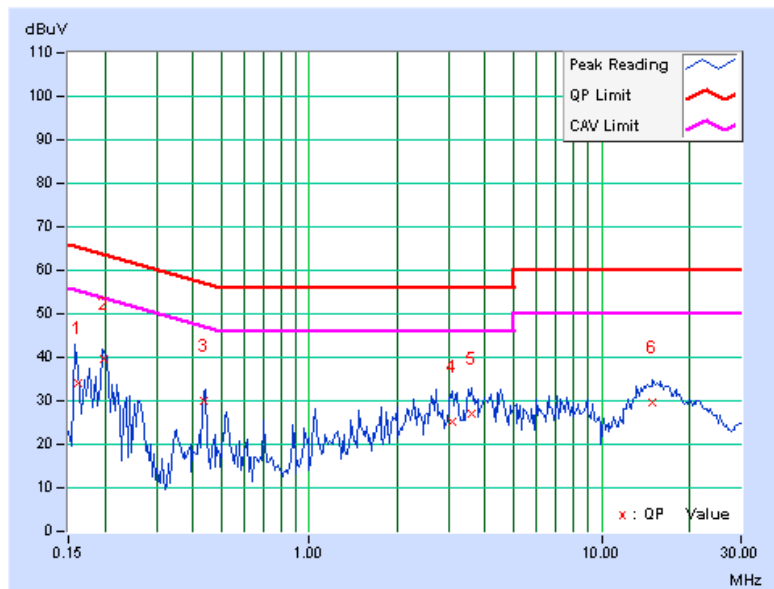


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PHASE	Line 2	6dB BANDWIDTH	9kHz
CHANNEL	1	TEST MODE	A

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.162	0.13	33.77	-	33.90	-	65.38	55.38	-31.48	-
2	0.198	0.13	39.55	-	39.68	-	63.69	53.69	-24.01	-
3	0.438	0.21	29.72	-	29.93	-	57.09	47.09	-27.16	-
4	3.089	0.36	24.89	-	25.25	-	56.00	46.00	-30.75	-
5	3.589	0.39	26.66	-	27.05	-	56.00	46.00	-28.95	-
6	14.908	0.78	28.79	-	29.57	-	60.00	50.00	-30.43	-

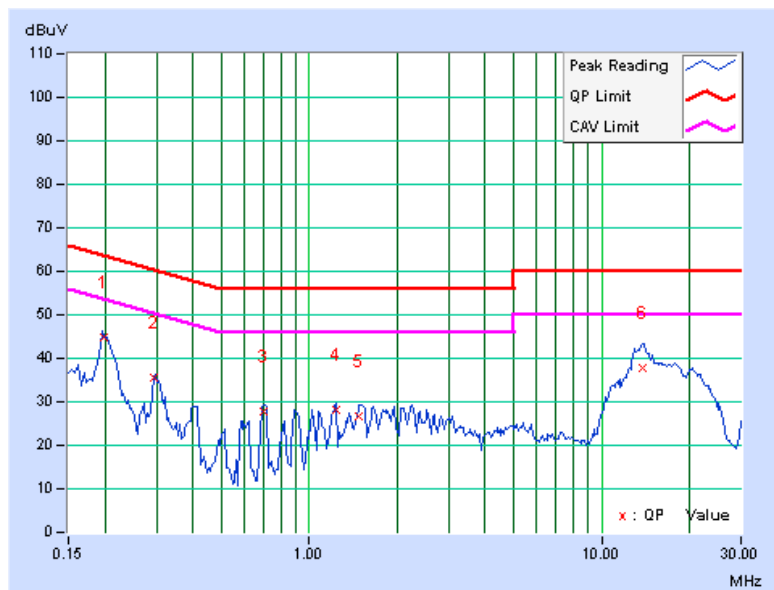
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
<b>CHANNEL</b>	1	<b>TEST MODE</b>	B

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.199	0.13	44.62	-	44.75	-	63.67	53.67	-18.92	-
2	0.296	0.17	35.51	-	35.68	-	60.36	50.36	-24.68	-
3	0.695	0.22	27.62	-	27.84	-	56.00	46.00	-28.16	-
4	1.240	0.25	27.79	-	28.04	-	56.00	46.00	-27.96	-
5	1.486	0.27	26.57	-	26.84	-	56.00	46.00	-29.16	-
6	13.875	0.94	36.85	-	37.79	-	60.00	50.00	-22.21	-

- 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.





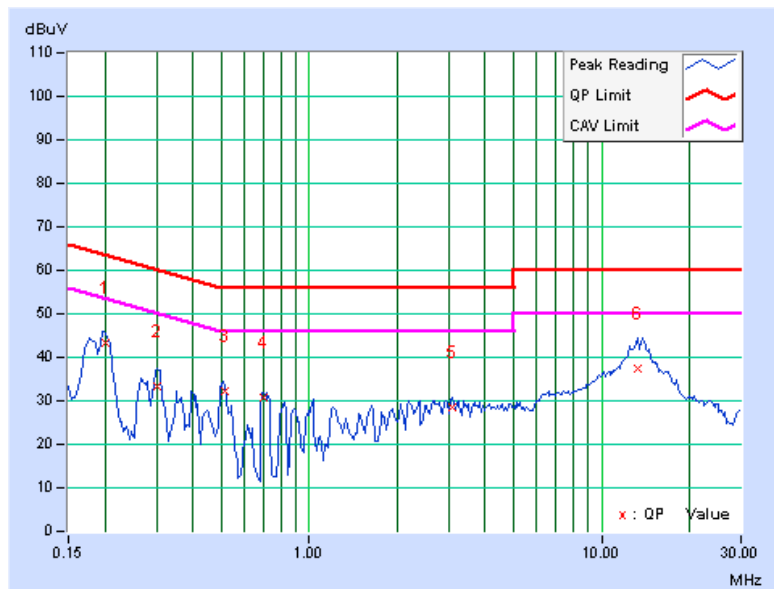


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PHASE	Line 2	6dB BANDWIDTH	9kHz
CHANNEL	1	TEST MODE	B

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.13	43.37	-	43.50	-	63.58	53.58	-20.08	-
2	0.302	0.17	33.16	-	33.33	-	60.18	50.18	-26.85	-
3	0.513	0.22	32.08	-	32.30	-	56.00	46.00	-23.70	-
4	0.697	0.22	30.59	-	30.81	-	56.00	46.00	-25.19	-
5	3.096	0.36	27.99	-	28.35	-	56.00	46.00	-27.65	-
6	13.244	0.72	36.78	-	37.50	-	60.00	50.00	-22.50	-

- 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.





## 4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 4.2.1 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.



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## 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Mar. 04, 2011	Mar. 03, 2012
HP Preamplifier	8449B	3008A01201	Mar. 04, 2011	Mar. 03, 2012
Agilent Spectrum Analyzer	E4446A	MY46180403	Jun. 22, 2011	Jun. 21, 2012
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Oct. 14, 2011	Oct. 13, 2012
Schwarzbeck Antenna	VULB 9168	137	Apr. 12, 2011	Apr. 11, 2012
Schwarzbeck Antenna	VHBA 9123	480	May 06, 2011	May 05, 2012
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF102	CABLE-CH6	Aug. 19, 2011	Aug. 18, 2012
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	May 16, 2011	May 15, 2012
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
Anritsu Power Sensor	MA2411B	0738404	Apr. 26, 2011	Apr. 25, 2012
Anritsu Power Meter	ML2495A	0842014	Apr. 26, 2011	Apr. 25, 2012

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.



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### 4.2.3 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.

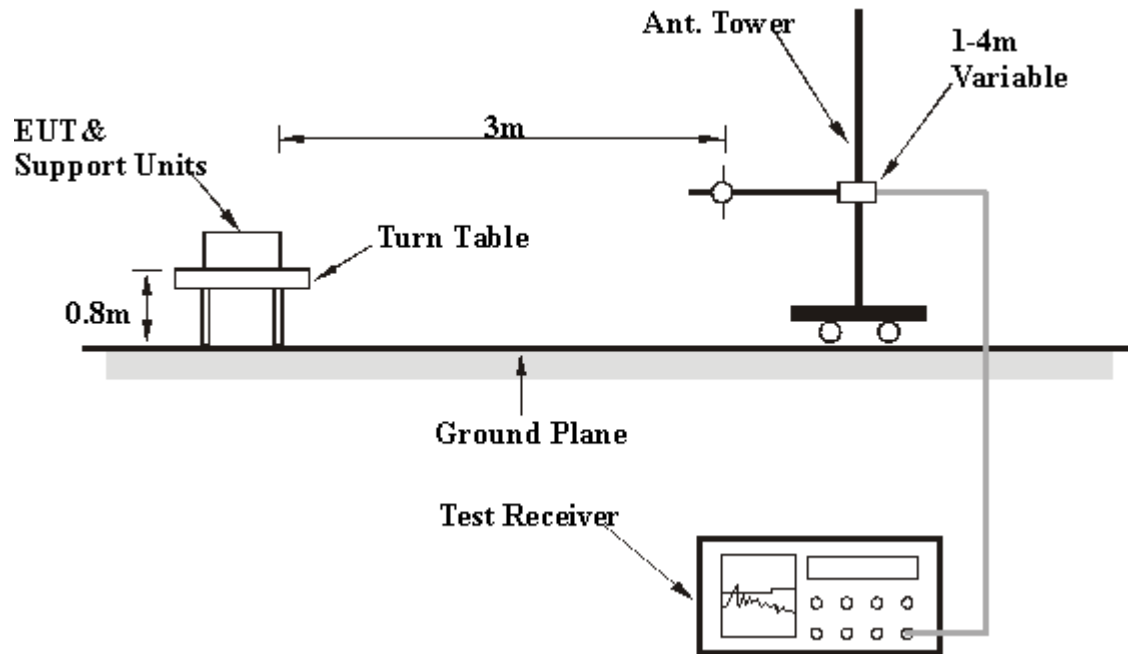
**NOTE:**

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.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

## 4.2.5 TEST SETUP



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

## 4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



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## 4.2.7 TEST RESULTS

### 802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	59.6 PK	74.0	-14.4	1.04 H	190	29.39	30.24
2	2390.00	49.0 AV	54.0	-5.0	1.04 H	190	18.72	30.24
3	*2412.00	99.3 PK			1.04 H	190	68.93	30.33
4	*2412.00	95.0 AV			1.04 H	190	64.66	30.33
5	4824.00	45.3 PK	74.0	-28.7	1.00 H	184	8.70	36.64
6	4824.00	32.6 AV	54.0	-21.4	1.00 H	184	-4.06	36.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.1 PK	74.0	-14.9	1.00 V	130	28.88	30.24
2	2390.00	48.8 AV	54.0	-5.2	1.00 V	130	18.57	30.24
3	*2412.00	96.8 PK			1.00 V	130	66.50	30.33
4	*2412.00	93.5 AV			1.00 V	130	63.15	30.33
5	4824.00	45.2 PK	74.0	-28.8	1.02 V	145	8.56	36.64
6	4824.00	32.4 AV	54.0	-21.7	1.02 V	145	-4.29	36.64

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	99.4 PK			1.00 H	193	68.97	30.42
2	*2437.00	94.8 AV			1.00 H	193	64.41	30.42
3	4874.00	45.4 PK	74.0	-28.6	1.00 H	197	8.64	36.77
4	4874.00	32.7 AV	54.0	-21.3	1.00 H	197	-4.10	36.77
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	99.0 PK			1.00 V	129	68.54	30.42
2	*2437.00	93.9 AV			1.00 V	129	63.45	30.42
3	4874.00	45.2 PK	74.0	-28.8	1.00 V	158	8.39	36.77
4	4874.00	32.2 AV	54.0	-21.8	1.00 V	158	-4.59	36.77

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	98.7 PK			1.00 H	189	68.23	30.50
2	*2462.00	94.6 AV			1.00 H	189	64.05	30.50
3	2483.50	60.6 PK	74.0	-13.4	1.00 H	189	29.99	30.57
4	2483.50	48.3 AV	54.0	-5.7	1.00 H	189	17.76	30.57
5	4924.00	45.5 PK	74.0	-28.5	1.00 H	264	8.61	36.90
6	4924.00	32.7 AV	54.0	-21.3	1.00 H	264	-4.23	36.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	97.7 PK			1.00 V	127	67.22	30.50
2	*2462.00	93.9 AV			1.00 V	127	63.38	30.50
3	2483.50	59.9 PK	74.0	-14.1	1.00 V	127	29.36	30.57
4	2483.50	48.0 AV	54.0	-6.0	1.00 V	127	17.39	30.57
5	4924.00	45.3 PK	74.0	-28.7	1.01 V	174	8.36	36.90
6	4924.00	32.4 AV	54.0	-21.6	1.01 V	174	-4.49	36.90

- 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.





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802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	59.7 PK	74.0	-14.3	1.02 H	196	29.49	30.24
2	2390.00	47.1 AV	54.0	-6.9	1.02 H	196	16.87	30.24
3	*2412.00	103.2 PK			1.02 H	196	72.88	30.33
4	*2412.00	92.7 AV			1.02 H	196	62.35	30.33
5	4824.00	45.8 PK	74.0	-28.2	1.00 H	219	9.17	36.64
6	4824.00	32.5 AV	54.0	-21.5	1.00 H	219	-4.13	36.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.8 PK	74.0	-15.2	1.22 V	123	28.59	30.24
2	2390.00	47.0 AV	54.0	-7.0	1.22 V	123	16.75	30.24
3	*2412.00	102.9 PK			1.22 V	123	72.60	30.33
4	*2412.00	91.4 AV			1.22 V	123	61.09	30.33
5	4824.00	45.8 PK	74.0	-28.2	1.02 V	225	9.13	36.64
6	4824.00	32.2 AV	54.0	-21.8	1.02 V	225	-4.40	36.64

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.5 PK			1.04 H	187	72.11	30.42
2	*2437.00	92.3 AV			1.04 H	187	61.85	30.42
3	4874.00	45.3 PK	74.0	-28.7	1.00 H	185	8.56	36.77
4	4874.00	32.2 AV	54.0	-21.9	1.00 H	185	-4.62	36.77
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.0 PK			1.21 V	127	71.55	30.42
2	*2437.00	91.6 AV			1.21 V	127	61.20	30.42
3	4874.00	45.3 PK	74.0	-28.7	1.06 V	228	8.50	36.77
4	4874.00	31.8 AV	54.0	-22.2	1.06 V	228	-4.93	36.77

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	102.1 PK			1.02 H	191	71.61	30.50
2	*2462.00	91.2 AV			1.02 H	191	60.72	30.50
3	2483.50	60.2 PK	74.0	-13.8	1.02 H	191	29.61	30.57
4	2483.50	48.4 AV	54.0	-5.6	1.02 H	191	17.82	30.57
5	4924.00	45.4 PK	74.0	-28.6	1.00 H	199	8.52	36.90
6	4924.00	32.2 AV	54.0	-21.8	1.00 H	199	-4.71	36.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	101.9 PK			1.20 V	125	71.36	30.50
2	*2462.00	90.9 AV			1.20 V	125	60.38	30.50
3	2483.50	60.1 PK	74.0	-14.0	1.20 V	125	29.48	30.57
4	2483.50	47.9 AV	54.0	-6.2	1.20 V	125	17.28	30.57
5	4924.00	45.3 PK	74.0	-28.7	1.08 V	251	8.42	36.90
6	4924.00	32.0 AV	54.0	-22.0	1.08 V	251	-4.94	36.90

- 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 (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.3 PK	74.0	-13.7	1.05 H	195	30.10	30.24
2	2390.00	47.6 AV	54.0	-6.4	1.05 H	195	17.38	30.24
3	*2412.00	101.3 PK			1.05 H	195	70.95	30.33
4	*2412.00	91.2 AV			1.05 H	195	60.86	30.33
5	4824.00	45.7 PK	74.0	-28.3	1.02 H	214	9.06	36.64
6	4824.00	33.5 AV	54.0	-20.5	1.02 H	214	-3.11	36.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.7 PK	74.0	-14.3	1.24 V	117	29.48	30.24
2	2390.00	46.9 AV	54.0	-7.2	1.24 V	117	16.61	30.24
3	*2412.00	100.9 PK			1.24 V	117	70.55	30.33
4	*2412.00	91.0 AV			1.24 V	117	60.62	30.33
5	4824.00	45.6 PK	74.0	-28.4	1.06 V	199	8.99	36.64
6	4824.00	33.4 AV	54.0	-20.6	1.06 V	199	-3.23	36.64

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	101.4 PK			1.00 H	190	70.95	30.42
2	*2437.00	91.3 AV			1.00 H	190	60.86	30.42
3	4874.00	45.7 PK	74.0	-28.3	1.00 H	211	8.96	36.77
4	4874.00	33.6 AV	54.0	-20.4	1.00 H	211	-3.16	36.77
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	100.6 PK			1.22 V	125	70.21	30.42
2	*2437.00	90.5 AV			1.22 V	125	60.10	30.42
3	4874.00	45.6 PK	74.0	-28.4	1.05 V	204	8.81	36.77
4	4874.00	33.4 AV	54.0	-20.6	1.05 V	204	-3.40	36.77

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	101.1 PK			1.00 H	191	70.59	30.50
2	*2462.00	90.9 AV			1.00 H	191	60.43	30.50
3	2483.50	60.2 PK	74.0	-13.8	1.00 H	191	29.65	30.57
4	2483.50	48.4 AV	54.0	-5.6	1.00 H	191	17.85	30.57
5	4924.00	45.8 PK	74.0	-28.2	1.01 H	199	8.91	36.90
6	4924.00	33.6 AV	54.0	-20.4	1.01 H	199	-3.28	36.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	100.0 PK			1.19 V	124	69.46	30.50
2	*2462.00	89.8 AV			1.19 V	124	59.33	30.50
3	2483.50	59.3 PK	74.0	-14.7	1.19 V	124	28.75	30.57
4	2483.50	47.8 AV	54.0	-6.2	1.19 V	124	17.24	30.57
5	4924.00	45.4 PK	74.0	-28.6	1.05 V	184	8.52	36.90
6	4924.00	33.3 AV	54.0	-20.7	1.05 V	184	-3.63	36.90

- 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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.3 PK	74.0	-13.7	1.05 H	190	30.10	30.24
2	2390.00	46.1 AV	54.0	-7.9	1.05 H	190	15.90	30.24
3	*2422.00	96.0 PK			1.05 H	190	65.67	30.36
4	*2422.00	84.7 AV			1.05 H	190	54.30	30.36
5	4844.00	46.1 PK	74.0	-27.9	1.07 H	221	9.39	36.69
6	4844.00	34.2 AV	54.0	-19.8	1.07 H	221	-2.53	36.69
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.2 PK	74.0	-13.8	1.06 V	124	29.97	30.24
2	2390.00	46.0 AV	54.0	-8.0	1.06 V	124	15.78	30.24
3	*2422.00	95.7 PK			1.06 V	124	65.34	30.36
4	*2422.00	84.6 AV			1.06 V	124	54.21	30.36
5	4844.00	45.7 PK	74.0	-28.3	1.03 V	174	8.97	36.69
6	4844.00	33.3 AV	54.0	-20.7	1.03 V	174	-3.43	36.69

- 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 4	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	95.5 PK			1.00 H	183	65.12	30.42
2	*2437.00	84.7 AV			1.00 H	183	54.23	30.42
3	4874.00	46.0 PK	74.0	-28.0	1.05 H	211	9.24	36.77
4	4874.00	34.1 AV	54.0	-19.9	1.05 H	211	-2.66	36.77
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	95.0 PK			1.00 V	126	64.54	30.42
2	*2437.00	84.1 AV			1.00 V	126	53.65	30.42
3	4874.00	45.5 PK	74.0	-28.5	1.00 V	161	8.74	36.77
4	4874.00	33.2 AV	54.0	-20.8	1.00 V	161	-3.61	36.77

- 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 7	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	94.0 PK			1.00 H	189	63.55	30.47
2	*2452.00	84.0 AV			1.00 H	189	53.54	30.47
3	2483.50	61.0 PK	74.0	-13.0	1.00 H	189	30.42	30.57
4	2483.50	46.0 AV	54.0	-8.0	1.00 H	189	15.39	30.57
5	4904.00	46.2 PK	74.0	-27.8	1.02 H	197	9.36	36.85
6	4904.00	34.2 AV	54.0	-19.8	1.02 H	197	-2.63	36.85
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	93.7 PK			1.19 V	128	63.27	30.47
2	*2452.00	83.6 AV			1.19 V	128	53.09	30.47
3	2483.50	60.8 PK	74.0	-13.2	1.19 V	128	30.24	30.57
4	2483.50	45.6 AV	54.0	-8.4	1.19 V	128	15.00	30.57
5	4904.00	45.4 PK	74.0	-28.6	1.02 V	117	8.56	36.85
6	4904.00	33.2 AV	54.0	-20.8	1.02 V	117	-3.69	36.85

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



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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	210.33	33.3 QP	43.5	-10.2	1.12 H	178	21.48	11.80
2	243.78	34.5 QP	46.0	-11.5	1.24 H	205	21.24	13.28
3	299.04	33.6 QP	46.0	-12.4	1.23 H	208	18.08	15.55
4	345.09	36.1 QP	46.0	-9.9	1.24 H	217	19.06	17.06
5	368.85	35.0 QP	46.0	-11.0	1.02 H	184	17.24	17.76
6	445.44	32.6 QP	46.0	-13.5	1.24 H	184	12.75	19.80
7	457.56	33.2 QP	46.0	-12.8	1.00 H	184	13.10	20.11
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	62.48	34.2 QP	40.0	-5.8	1.13 V	352	21.03	13.13
2	344.61	31.1 QP	46.0	-14.9	1.24 V	130	14.09	17.04
3	387.27	37.1 QP	46.0	-8.9	1.28 V	7	18.85	18.28
4	469.68	31.5 QP	46.0	-14.5	1.02 V	223	11.12	20.42
5	586.02	31.0 QP	46.0	-15.0	1.00 V	211	7.87	23.13
6	650.97	34.1 QP	46.0	-11.9	1.22 V	355	10.26	23.81
7	872.99	31.1 QP	46.0	-15.0	1.32 V	10	3.56	27.49
8	911.77	31.5 QP	46.0	-14.5	1.00 V	325	3.58	27.94

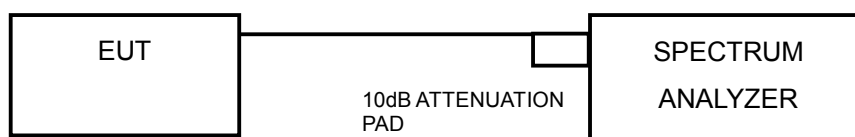
- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

## 4.3 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 4.2.2 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.



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## 4.3.7 TEST RESULTS

### MODE A:

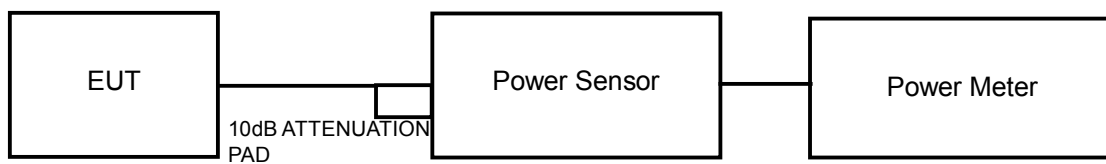
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
<b>802.11b</b>				
1	2412	12.27	0.5	PASS
6	2437	12.31	0.5	PASS
11	2462	12.29	0.5	PASS
<b>802.11g</b>				
1	2412	16.65	0.5	PASS
6	2437	16.66	0.5	PASS
11	2462	16.67	0.5	PASS
<b>802.11n (20MHz)</b>				
1	2412	17.89	0.5	PASS
6	2437	17.77	0.5	PASS
11	2462	17.91	0.5	PASS
<b>802.11n (40MHz)</b>				
1	2422	36.62	0.5	PASS
4	2437	36.71	0.5	PASS
7	2452	37.11	0.5	PASS

## 4.4 CONDUCTED OUTPUT POWER

### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

### 4.4.2 TEST SETUP



### 4.4.3 TEST INSTRUMENTS

Refer to section 4.2.2 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.



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## 4.4.7 TEST RESULTS

### MODE A:

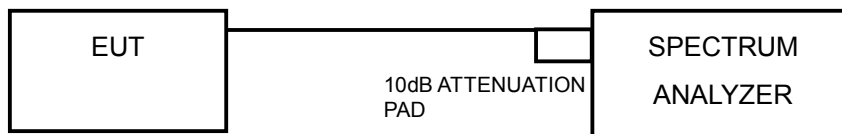
CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	POWER LIMIT (dBm)	PASS / FAIL
<b>802.11b</b>					
1	2412	20.0	100.0	30	PASS
6	2437	19.6	91.2	30	PASS
11	2462	19.6	91.2	30	PASS
<b>802.11g</b>					
1	2412	25.1	323.6	30	PASS
6	2437	24.9	<b>309.0</b>	30	PASS
11	2462	24.9	<b>309.0</b>	30	PASS
<b>802.11n (20MHz)</b>					
1	2412	24.4	275.4	30	PASS
6	2437	24.5	281.8	30	PASS
11	2462	24.5	281.8	30	PASS
<b>802.11n (40MHz)</b>					
1	2422	22.3	169.8	30	PASS
4	2437	22.6	182.0	30	PASS
7	2452	22.3	169.8	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 4.2.2 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



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## 4.5.7 TEST RESULTS

### MODE A:

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
<b>802.11b</b>					
1	2412	5.43	-9.77	8	PASS
6	2437	4.50	-10.70	8	PASS
11	2462	5.33	-9.87	8	PASS
<b>802.11g</b>					
1	2412	3.44	-11.76	8	PASS
6	2437	3.92	-11.28	8	PASS
11	2462	3.79	-11.41	8	PASS
<b>802.11n (20MHz)</b>					
1	2412	1.04	-14.16	8	PASS
6	2437	1.72	-13.48	8	PASS
11	2462	1.87	-13.33	8	PASS
<b>802.11n (40MHz)</b>					
1	2422	-3.47	-18.67	8	PASS
4	2437	-3.67	-18.87	8	PASS
7	2452	-3.34	-18.54	8	PASS

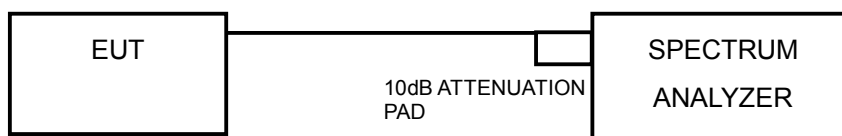


## 4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF BAND EDGES MEASUREMENT

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

### 4.6.2 TEST SETUP



### 4.6.3 TEST INSTRUMENTS

Refer to section 4.2.2 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.



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## **MEASUREMENT PROCEDURE OOB**

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

### **4.6.5 DEVIATION FROM TEST STANDARD**

No deviation.

### **4.6.6 EUT OPERATING CONDITION**

Same as Item 4.3.6

### **4.6.7 TEST RESULTS**

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



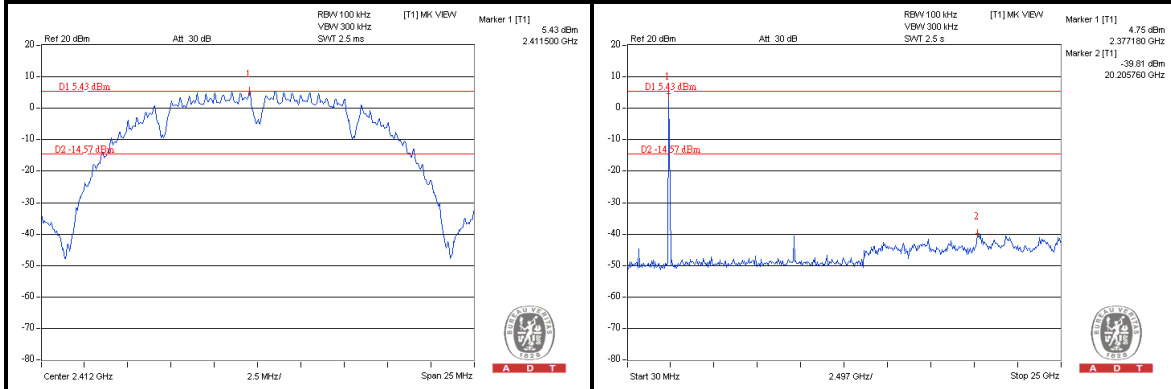
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## 4.6.8 TEST RESULTS

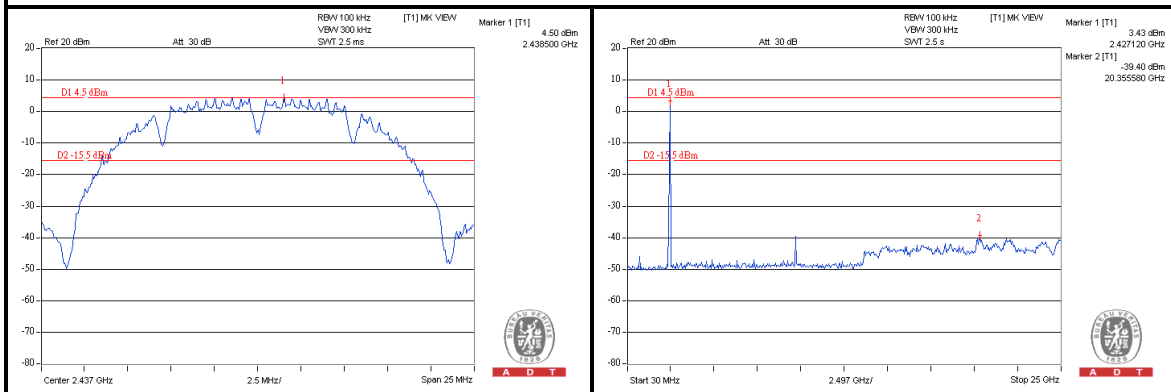
MODE A:

802.11b

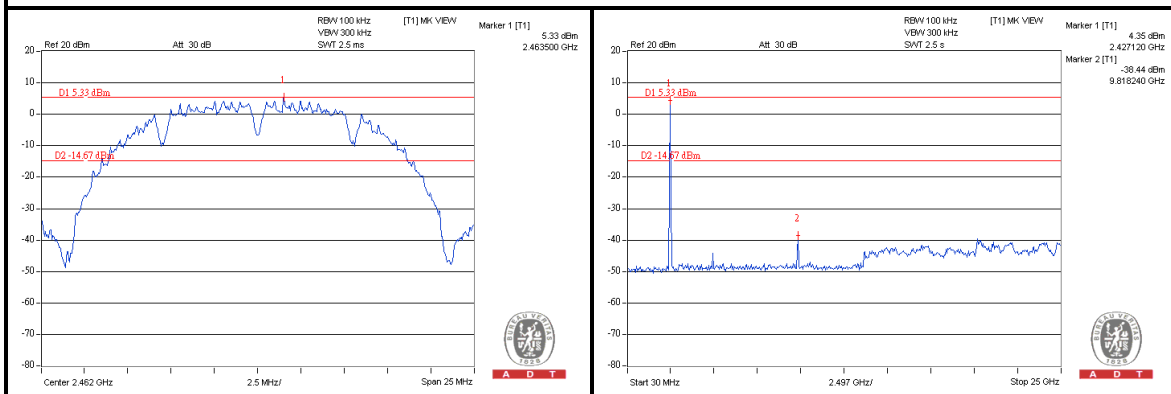
### CH 1



### CH 6



### CH 11

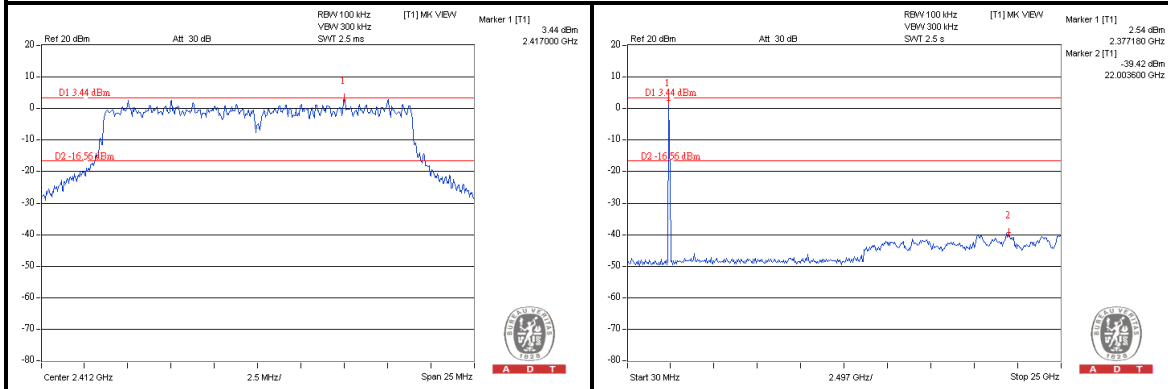




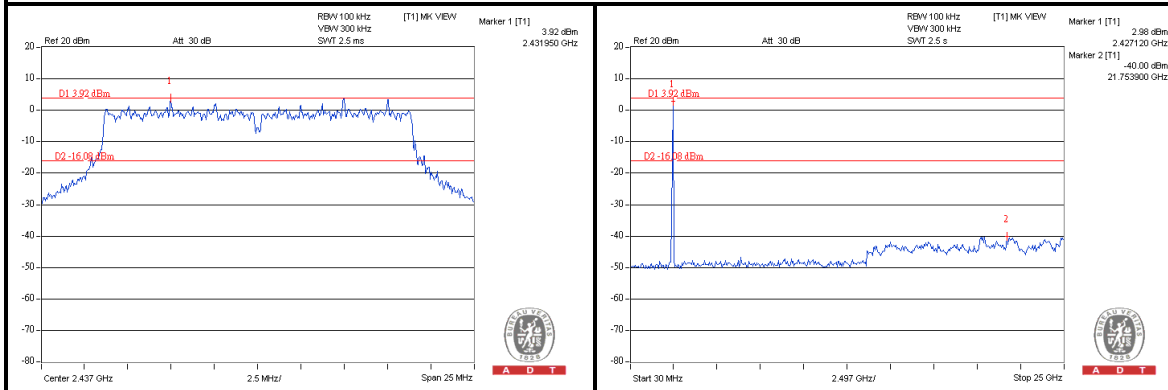
A D T

### 802.11g

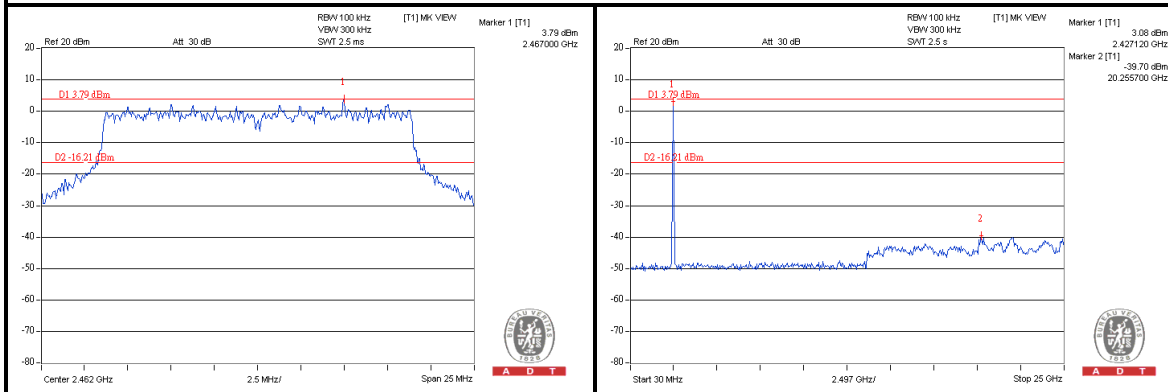
#### CH 1



#### CH 6



#### CH 11

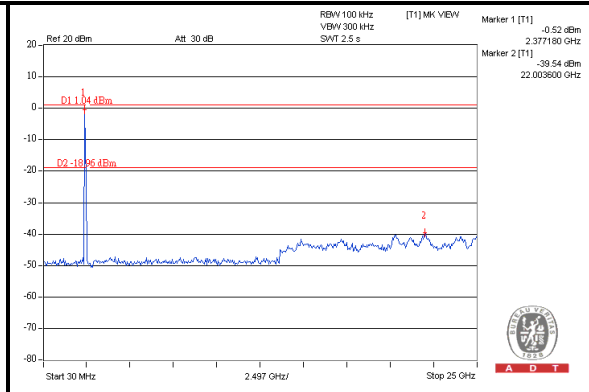
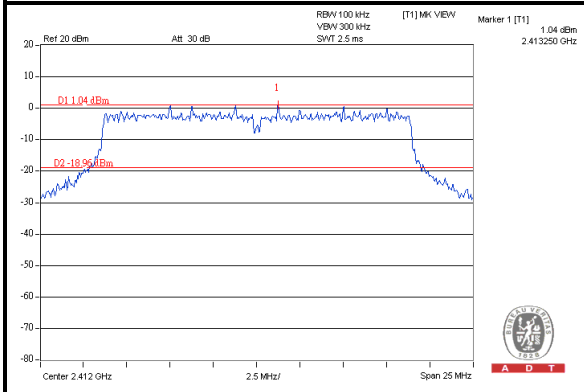




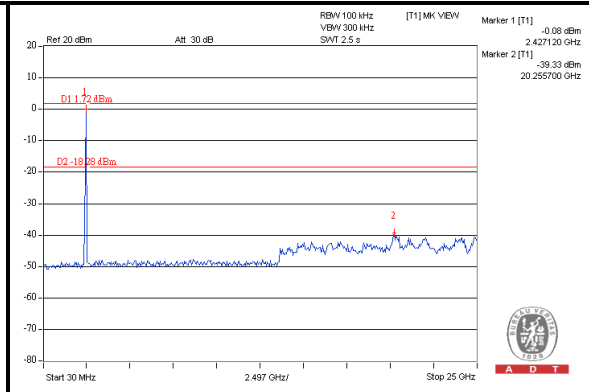
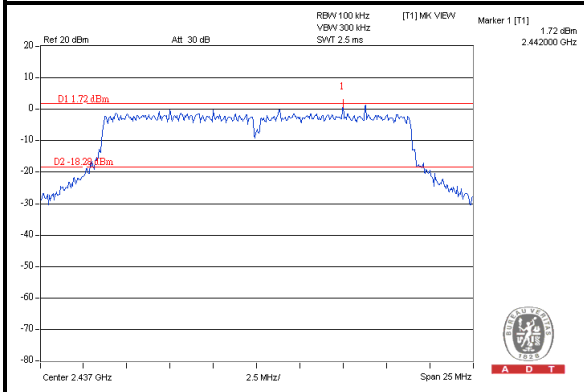
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# 802.11n (20MHz)

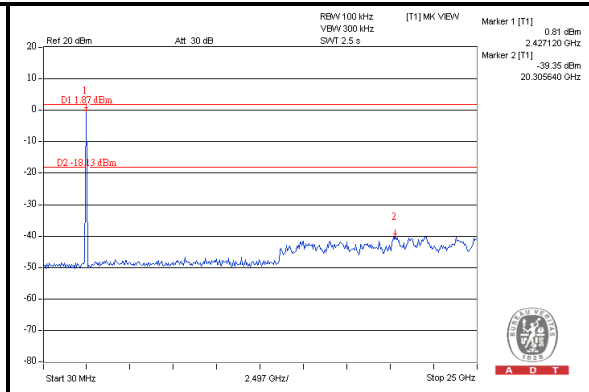
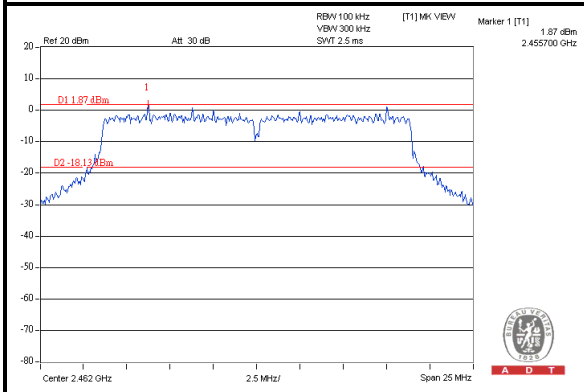
## CH 1



## CH 6



## CH 11

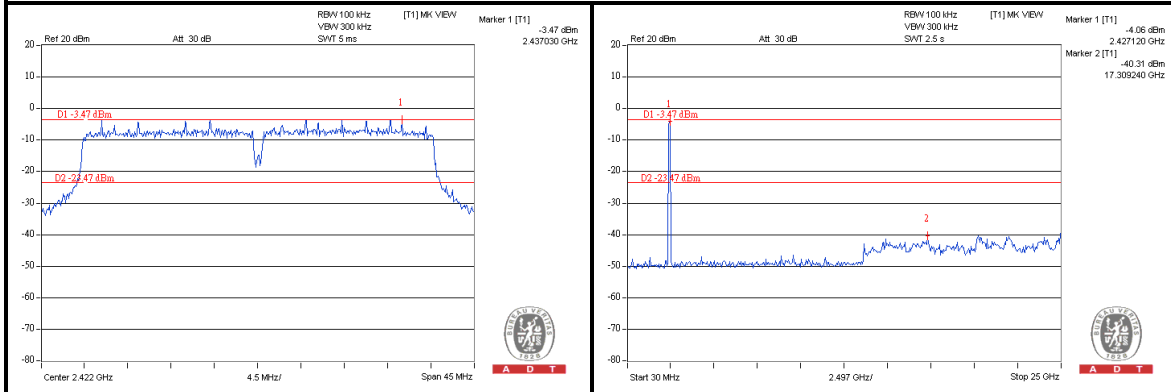




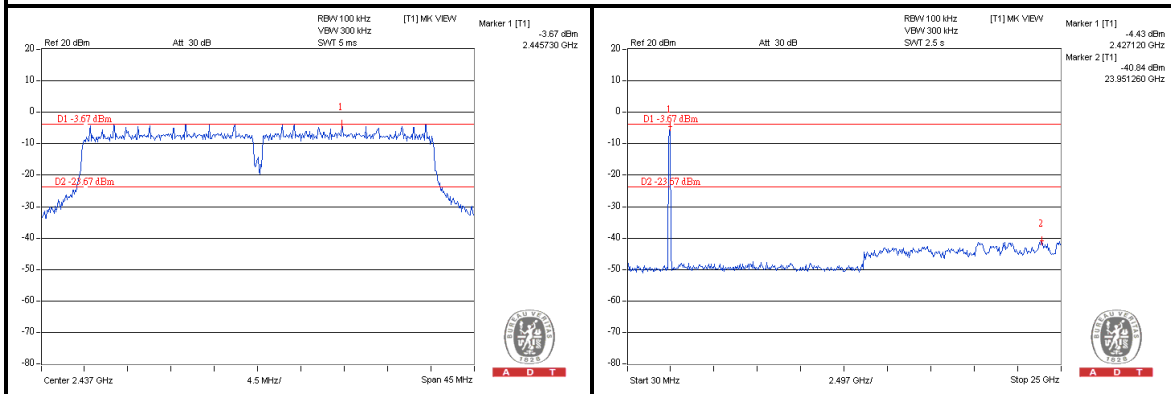
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### 802.11n (40MHz)

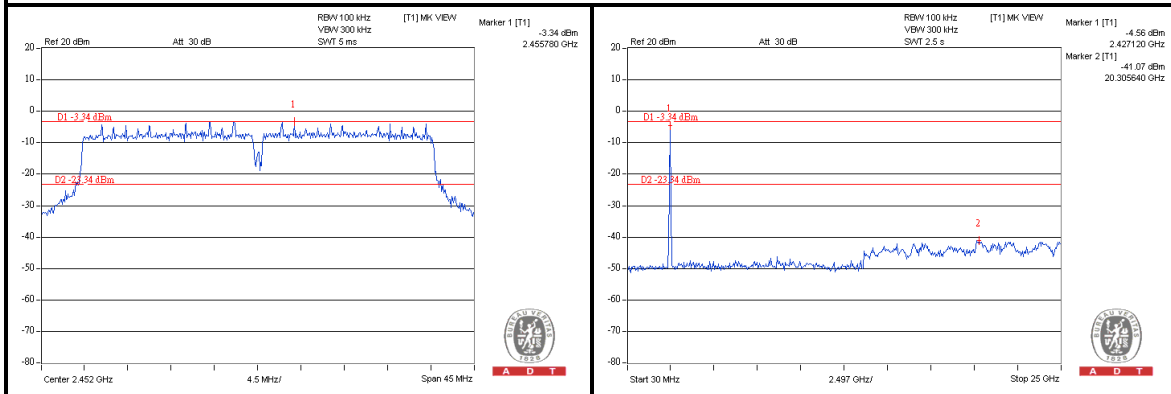
#### CH 1



#### CH 4



#### CH 7





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

### 5.1 CONDUCTED EMISSION MEASUREMENT

#### 5.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  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.

#### 5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100276	Jan. 04, 2012	Jan. 03, 2013
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100219	Nov. 24, 2011	Nov. 23, 2012
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 24, 2011	Nov. 23, 2012
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Dec. 08, 2011	Dec. 07, 2012
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Feb. 20, 2012	Feb. 19, 2013
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 22, 2012	Feb. 21, 2013

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in Shielded Room No. 10.
  3. The VCCI Site Registration No. C-1852.



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### 5.1.3 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.

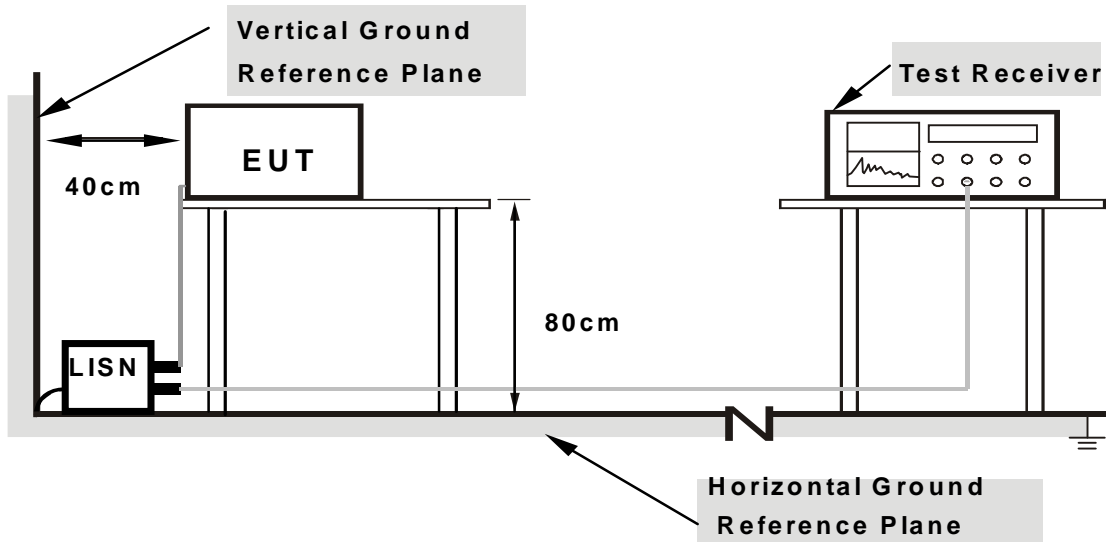
**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation.



## 5.1.5 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).

## 5.1.6 EUT OPERATING CONDITIONS

- a. Turn on the power of all equipment.
- b. Connected the EUT with AC adapter or docking placed on testing table.
- c. EUT ran a test program (provided by manufacture) to enable.
- d. Set the EUT under transmission condition continuously at specific channel frequency.

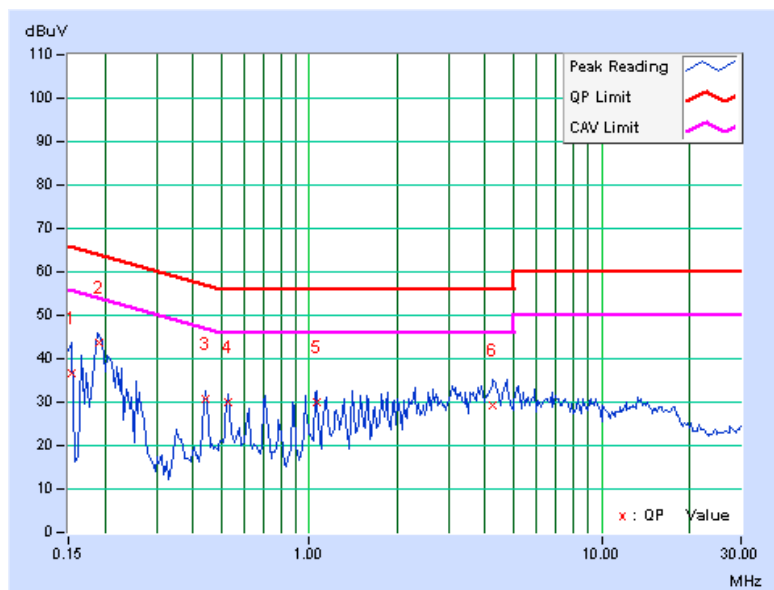
### 5.1.7 TEST RESULTS

**CONDUCTED WORST CASE DATA: 802.11a**

PHASE	Line 1	6dB BANDWIDTH	9kHz
CHANNEL	149	TEST MODE	A

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.13	36.60	-	36.73	-	65.79	55.79	-29.05	-
2	0.192	0.13	43.45	-	43.58	-	63.96	53.96	-20.38	-
3	0.440	0.21	30.63	-	30.84	-	57.06	47.06	-26.21	-
4	0.526	0.22	29.83	-	30.05	-	56.00	46.00	-25.95	-
5	1.057	0.24	29.84	-	30.08	-	56.00	46.00	-25.92	-
6	4.228	0.46	28.81	-	29.27	-	56.00	46.00	-26.73	-

- 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.



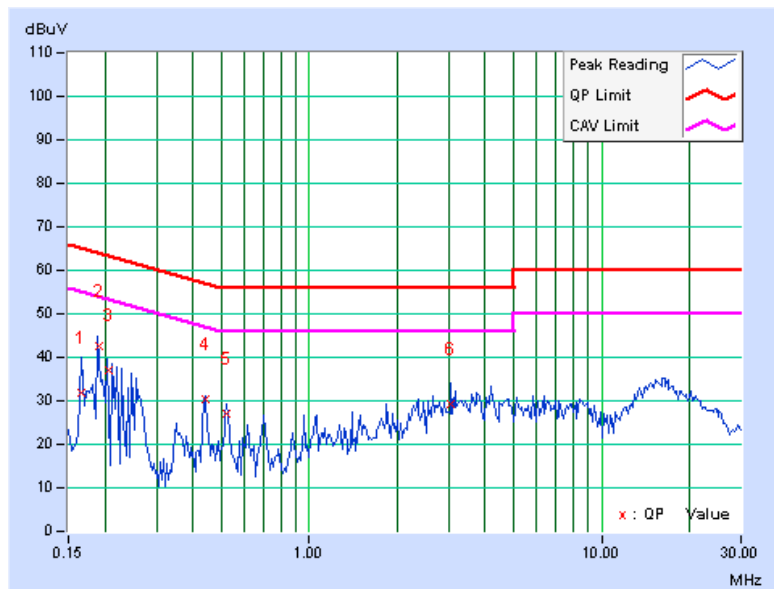


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<b>PHASE</b>	Line 2	<b>6dB BANDWIDTH</b>	9kHz
<b>CHANNEL</b>	149	<b>TEST MODE</b>	A

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.166	0.13	31.80	-	31.93	-	65.16	55.16	-33.24	-
2	0.192	0.13	42.46	-	42.59	-	63.94	53.94	-21.36	-
3	0.206	0.13	36.99	-	37.12	-	63.35	53.35	-26.22	-
4	0.439	0.21	30.12	-	30.33	-	57.08	47.08	-26.75	-
5	0.524	0.22	26.88	-	27.10	-	56.00	46.00	-28.90	-
6	3.060	0.36	29.07	-	29.43	-	56.00	46.00	-26.57	-

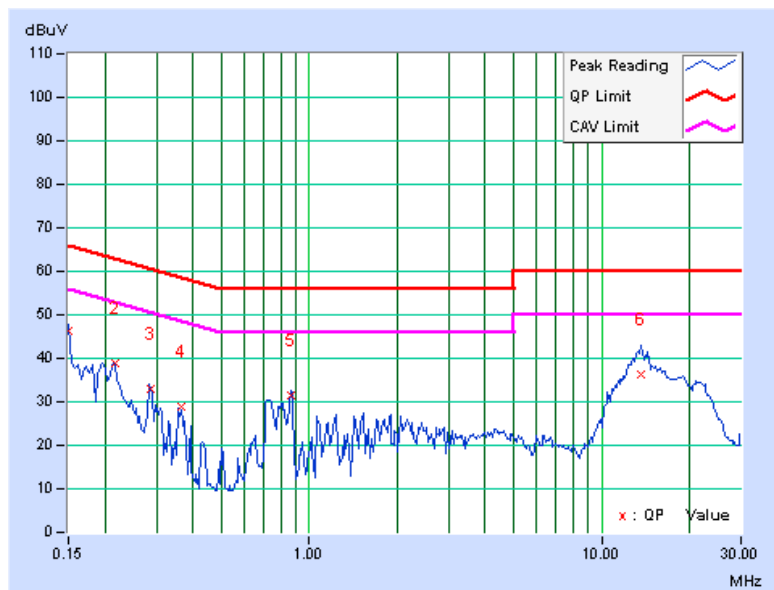
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



<b>PHASE</b>	Line 1	<b>6dB BANDWIDTH</b>	9kHz
<b>CHANNEL</b>	149	<b>TEST MODE</b>	B

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.13	46.16	-	46.29	-	66.00	56.00	-19.71	-
2	0.218	0.14	38.61	-	38.75	-	62.91	52.91	-24.16	-
3	0.286	0.16	32.95	-	33.11	-	60.63	50.63	-27.52	-
4	0.363	0.20	28.55	-	28.75	-	58.65	48.65	-29.91	-
5	0.863	0.23	31.23	-	31.46	-	56.00	46.00	-24.54	-
6	13.700	0.93	35.51	-	36.44	-	60.00	50.00	-23.56	-

- 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.



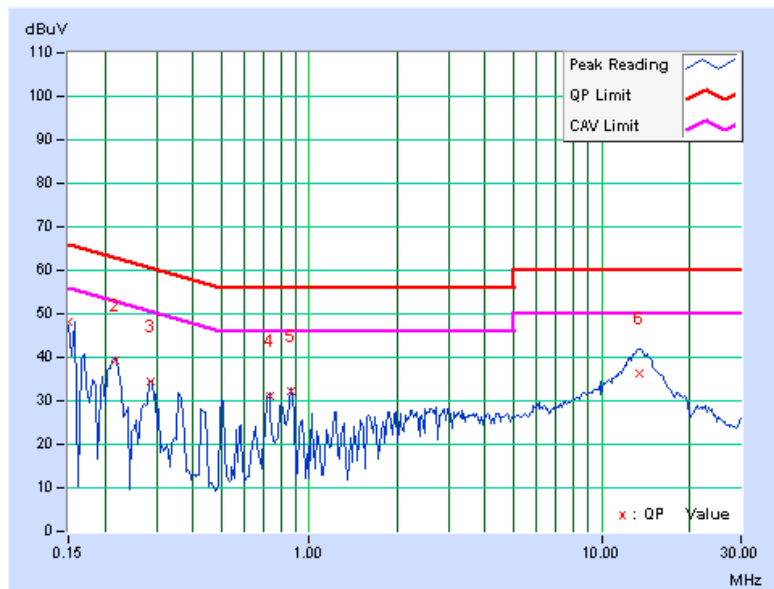


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PHASE	Line 2	6dB BANDWIDTH	9kHz
CHANNEL	149	TEST MODE	B

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	(dB)	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	(dB)	(dB)
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.13	48.05	-	48.18	-	66.00	56.00	-17.82	-
2	0.218	0.14	39.19	-	39.33	-	62.91	52.91	-23.58	-
3	0.288	0.17	34.30	-	34.47	-	60.58	50.58	-26.11	-
4	0.732	0.23	30.77	-	31.00	-	56.00	46.00	-25.00	-
5	0.864	0.23	31.96	-	32.19	-	56.00	46.00	-23.81	-
6	13.419	0.73	35.62	-	36.35	-	60.00	50.00	-23.65	-

- 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.





## 5.2 RADIATED EMISSION MEASUREMENT

### 5.2.1 LIMITS OF RADIATED EMISSION 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.



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## 5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Mar. 04, 2011	Mar. 03, 2012
HP Preamplifier	8449B	3008A01201	Mar. 04, 2011	Mar. 03, 2012
Agilent Spectrum Analyzer	E4446A	MY46180403	Jun. 22, 2011	Jun. 21, 2012
ROHDE & SCHWARZ Test Receiver	ESCS 30	838251/021	Oct. 14, 2011	Oct. 13, 2012
Schwarzbeck Antenna	VULB 9168	137	Apr. 12, 2011	Apr. 11, 2012
Schwarzbeck Antenna	VHBA 9123	480	May 06, 2011	May 05, 2012
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF102	CABLE-CH6	Aug. 19, 2011	Aug. 18, 2012
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	May 16, 2011	May 15, 2012
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
Anritsu Power Sensor	MA2411B	0738404	Apr. 26, 2011	Apr. 25, 2012
Anritsu Power Meter	ML2495A	0842014	Apr. 26, 2011	Apr. 25, 2012

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.



### 5.2.3 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:**

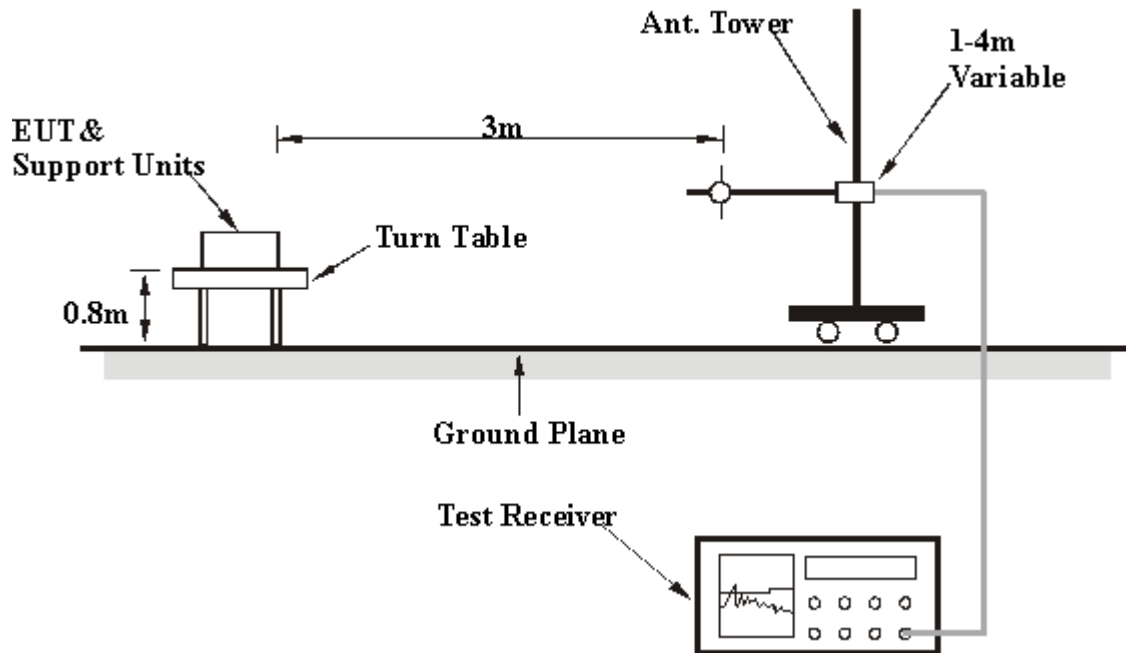
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 100kHz and video bandwidth is 300kHz for Peak detection at frequency above 1GHz.
3. The resolution 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.

### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation.



## 5.2.5 TEST SETUP



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

## 5.2.6 EUT OPERATING CONDITIONS

Same as 5.1.6.



## 5.2.7 TEST RESULTS

### 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	49.5 PK	68.1	-18.6	1.00 H	228	11.22	38.31
2	#5725.00	37.2 AV	58.3	-21.0	1.00 H	228	-1.08	38.31
3	*5745.00	88.1 PK			1.00 H	228	49.80	38.33
4	*5745.00	78.3 AV			1.00 H	228	39.92	38.33
5	11490.00	56.5 PK	74.0	-17.5	1.01 H	187	8.29	48.22
6	11490.00	42.7 AV	54.0	-11.3	1.01 H	187	-5.50	48.22
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	48.4 PK	68.0	-19.6	1.05 V	197	10.07	38.31
2	#5725.00	36.0 AV	57.3	-21.3	1.05 V	197	-2.30	38.31
3	*5745.00	88.0 PK			1.05 V	197	49.63	38.33
4	*5745.00	77.3 AV			1.05 V	197	38.93	38.33
5	11490.00	56.3 PK	74.0	-17.7	1.00 V	194	8.12	48.22
6	11490.00	42.6 AV	54.0	-11.4	1.00 V	194	-5.65	48.22

- 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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	88.4 PK			1.00 H	241	50.00	38.39
2	*5785.00	78.2 AV			1.00 H	241	39.83	38.39
3	11570.00	56.6 PK	74.0	-17.4	1.00 H	69	8.38	48.21
4	11570.00	42.6 AV	54.0	-11.4	1.00 H	69	-5.63	48.21
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	87.8 PK			1.01 V	169	49.43	38.39
2	*5785.00	77.5 AV			1.01 V	169	39.14	38.39
3	11570.00	56.3 PK	74.0	-17.7	1.00 V	209	8.12	48.21
4	11570.00	42.2 AV	54.0	-11.8	1.00 V	209	-6.02	48.21

- 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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	88.6 PK			1.02 H	214	50.17	38.45
2	*5825.00	78.2 AV			1.02 H	214	39.79	38.45
3	#5850.00	52.1 PK	68.6	-16.5	1.02 H	214	13.63	38.48
4	#5850.00	38.1 AV	58.2	-20.2	1.02 H	214	-0.41	38.48
5	11650.00	56.8 PK	74.0	-17.2	1.04 H	87	8.65	48.16
6	11650.00	42.6 AV	54.0	-11.4	1.04 H	87	-5.60	48.16
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	87.9 PK			1.03 V	199	49.49	38.45
2	*5825.00	77.2 AV			1.03 V	199	38.70	38.45
3	#5850.00	51.2 PK	67.9	-16.8	1.03 V	199	12.70	38.48
4	#5850.00	37.0 AV	57.2	-20.1	1.03 V	199	-1.46	38.48
5	11650.00	56.5 PK	74.0	-17.5	1.00 V	63	8.35	48.16
6	11650.00	42.3 AV	54.0	-11.7	1.00 V	63	-5.82	48.16

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



A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	54.7 PK	67.8	-13.2	1.22 H	178	16.35	38.31
2	#5725.00	40.0 AV	57.5	-17.5	1.22 H	178	1.71	38.31
3	*5745.00	87.8 PK			1.22 H	178	49.50	38.33
4	*5745.00	77.5 AV			1.22 H	178	39.21	38.33
5	11490.00	56.6 PK	74.0	-17.4	1.00 H	218	8.36	48.22
6	11490.00	45.3 AV	54.0	-8.7	1.00 H	218	-2.94	48.22
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	54.0 PK	67.7	-13.7	1.10 V	184	15.65	38.31
2	#5725.00	40.0 AV	56.6	-16.6	1.10 V	184	1.67	38.31
3	*5745.00	87.7 PK			1.10 V	184	49.36	38.33
4	*5745.00	76.6 AV			1.10 V	184	38.25	38.33
5	11490.00	55.9 PK	74.0	-18.1	1.05 V	218	7.65	48.22
6	11490.00	45.0 AV	54.0	-9.0	1.05 V	218	-3.24	48.22

- 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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	87.9 PK			1.25 H	171	49.46	38.39
2	*5785.00	77.7 AV			1.25 H	171	39.33	38.39
3	11570.00	56.3 PK	74.0	-17.7	1.01 H	207	8.13	48.21
4	11570.00	45.0 AV	54.0	-9.0	1.01 H	207	-3.18	48.21
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	87.1 PK			1.13 V	184	48.73	38.39
2	*5785.00	76.9 AV			1.13 V	184	38.50	38.39
3	11570.00	55.8 PK	74.0	-18.2	1.05 V	255	7.60	48.21
4	11570.00	45.0 AV	54.0	-9.0	1.05 V	255	-3.20	48.21

- 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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	87.6 PK			1.26 H	164	49.17	38.45
2	*5825.00	77.8 AV			1.26 H	164	39.33	38.45
3	#5850.00	54.1 PK	67.6	-13.5	1.26 H	164	15.64	38.48
4	#5850.00	40.0 AV	57.8	-17.8	1.26 H	164	1.49	38.48
5	11650.00	56.4 PK	74.0	-17.6	1.05 H	197	8.24	48.16
6	11650.00	45.1 AV	54.0	-8.9	1.05 H	197	-3.06	48.16
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	87.0 PK			1.14 V	177	48.56	38.45
2	*5825.00	76.9 AV			1.14 V	177	38.48	38.45
3	#5850.00	53.1 PK	67.0	-13.9	1.14 V	177	14.64	38.48
4	#5850.00	39.0 AV	56.9	-18.0	1.14 V	177	0.48	38.48
5	11650.00	55.7 PK	74.0	-18.3	1.07 V	261	7.51	48.16
6	11650.00	44.9 AV	54.0	-9.1	1.07 V	261	-3.23	48.16

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



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	54.3 PK	67.7	-13.4	1.00 H	234	16.03	38.31
2	#5725.00	42.9 AV	57.3	-14.5	1.00 H	234	4.54	38.31
3	*5755.00	87.7 PK			1.00 H	234	49.34	38.35
4	*5755.00	77.3 AV			1.00 H	234	38.95	38.35
5	11510.00	56.7 PK	74.0	-17.3	1.00 H	138	8.51	48.21
6	11510.00	44.1 AV	54.0	-9.9	1.00 H	138	-4.12	48.21
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	53.8 PK	67.1	-13.3	1.03 V	201	15.50	38.31
2	#5725.00	40.6 AV	56.7	-16.1	1.03 V	201	2.31	38.31
3	*5755.00	87.1 PK			1.03 V	201	48.74	38.35
4	*5755.00	76.7 AV			1.03 V	201	38.39	38.35
5	11510.00	55.8 PK	74.0	-18.2	1.00 V	219	7.63	48.21
6	11510.00	42.7 AV	54.0	-11.3	1.00 V	219	-5.52	48.21

- 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	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	87.5 PK			1.02 H	256	49.12	38.40
2	*5795.00	77.9 AV			1.02 H	256	39.45	38.40
3	#5850.00	55.0 PK	67.5	-12.6	1.02 H	256	16.51	38.45
4	#5850.00	44.2 AV	57.9	-13.7	1.02 H	256	5.71	38.45
5	11590.00	56.7 PK	74.0	-17.3	1.01 H	155	8.48	48.21
6	11590.00	44.2 AV	54.0	-9.8	1.01 H	155	-4.02	48.21
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	87.0 PK			1.06 V	217	48.61	38.40
2	*5795.00	76.3 AV			1.06 V	217	37.92	38.40
3	#5850.00	53.7 PK	67.0	-13.3	1.06 V	217	15.26	38.45
4	#5850.00	42.9 AV	56.3	-13.4	1.06 V	217	4.46	38.45
5	11590.00	55.9 PK	74.0	-18.1	1.07 V	228	7.70	48.21
6	11590.00	43.1 AV	54.0	-10.9	1.07 V	228	-5.12	48.21

- 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 : 802.11a**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	18deg. C, 71%RH	TESTED BY	Nick Chen
TEST MODE	A		

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	205.97	32.4 QP	43.5	-11.1	1.11 H	208	20.79	11.60
2	299.04	33.2 QP	46.0	-12.8	1.02 H	208	17.66	15.55
3	445.44	32.3 QP	46.0	-13.7	1.26 H	184	12.49	19.80
4	457.56	33.3 QP	46.0	-12.7	1.07 H	187	13.22	20.11
5	716.42	34.3 QP	46.0	-11.7	1.28 H	148	9.65	24.61
6	781.37	32.6 QP	46.0	-13.4	1.26 H	55	6.41	26.17
7	911.77	32.5 QP	46.0	-13.5	1.00 H	133	4.56	27.94

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	62.48	32.4 QP	40.0	-7.6	1.00 V	10	19.29	13.13
2	390.66	35.6 QP	46.0	-10.4	1.00 V	19	17.25	18.37
3	457.56	32.2 QP	46.0	-13.8	1.02 V	325	12.12	20.11
4	500.21	33.4 QP	46.0	-12.6	1.17 V	241	12.17	21.19
5	517.18	32.6 QP	46.0	-13.4	1.24 V	331	11.05	21.59
6	586.02	32.7 QP	46.0	-13.3	1.32 V	10	9.60	23.13
7	650.97	35.1 QP	46.0	-10.9	1.00 V	10	11.33	23.81

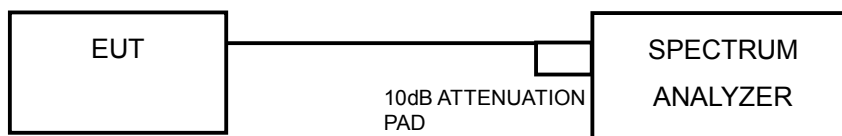
- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

## 5.3 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 5.2.2 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.



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## 5.3.7 TEST RESULTS

### MODE A:

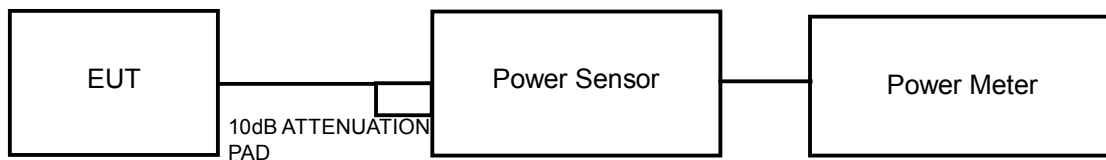
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
<b>802.11a</b>				
149	5745	16.61	0.5	PASS
157	5785	16.59	0.5	PASS
165	5825	16.57	0.5	PASS
<b>802.11n (20MHz)</b>				
149	5745	17.80	0.5	PASS
157	5785	17.77	0.5	PASS
165	5825	17.88	0.5	PASS
<b>802.11n (40MHz)</b>				
151	5755	36.89	0.5	PASS
159	5795	36.82	0.5	PASS

## 5.4 CONDUCTED OUTPUT POWER

### 5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

### 5.4.2 TEST SETUP



### 5.4.3 INSTRUMENTS

Refer to section 5.2.2 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

**MODE A:**

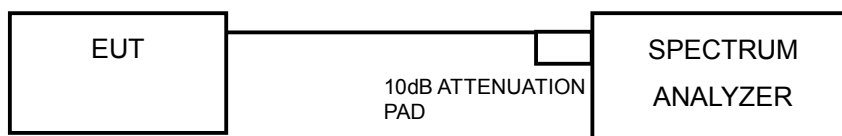
CHAN.	CHAN. FREQ. (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	POWER LIMIT (dBm)	PASS / FAIL
<b>802.11a</b>					
149	5745	23.3	<b>213.8</b>	30	PASS
157	5785	23.2	208.9	30	PASS
165	5825	23.3	<b>213.8</b>	30	PASS
<b>802.11n (20MHz)</b>					
149	5745	23.3	<b>213.8</b>	30	PASS
157	5785	23.2	208.9	30	PASS
165	5825	23.2	208.9	30	PASS
<b>802.11n (40MHz)</b>					
151	5755	22.9	195.0	30	PASS
159	5795	23.0	199.5	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 5.2.2 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

**MODE A:**

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
<b>802.11a</b>					
149	5745	4.32	-10.88	8	PASS
157	5785	4.07	-11.13	8	PASS
165	5825	4.55	-10.65	8	PASS
<b>802.11n (20MHz)</b>					
149	5745	4.73	-10.47	8	PASS
157	5785	3.95	-11.25	8	PASS
165	5825	3.69	-11.51	8	PASS
<b>802.11n (40MHz)</b>					
151	5755	0.23	-14.97	8	PASS
159	5795	0.43	-14.77	8	PASS

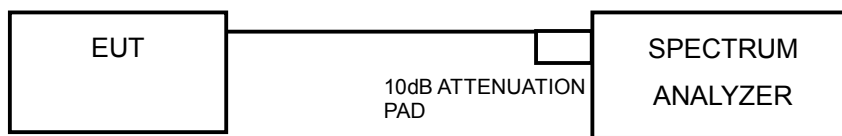


## 5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

### 5.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below  $-20\text{dB}$  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 4.2.2 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.



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## **MEASUREMENT PROCEDURE OOB**

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

### **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**

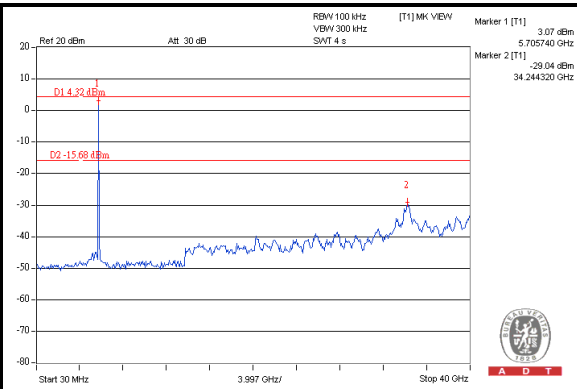
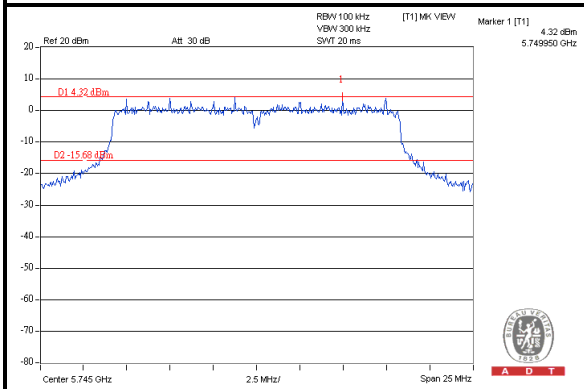
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).



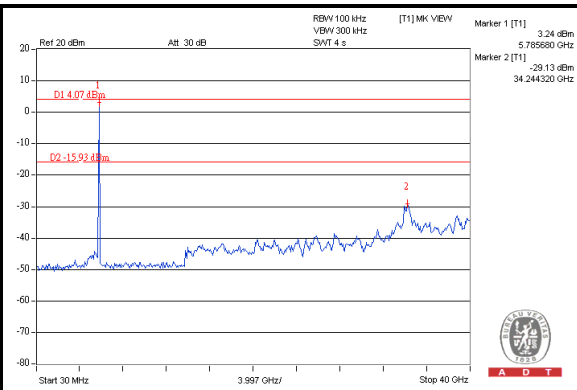
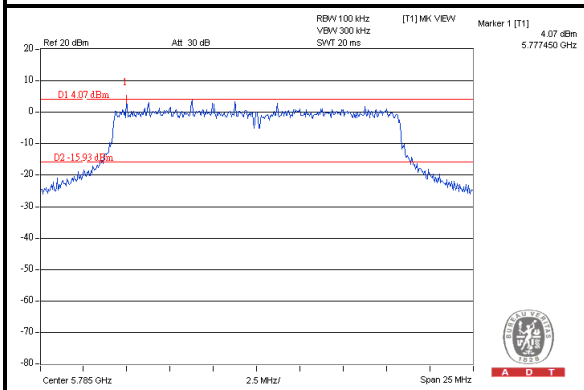
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# MODE A: 802.11a

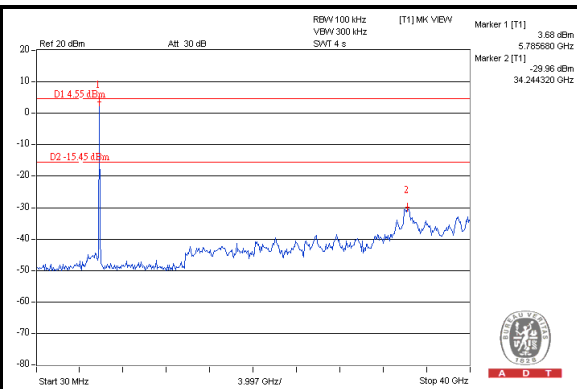
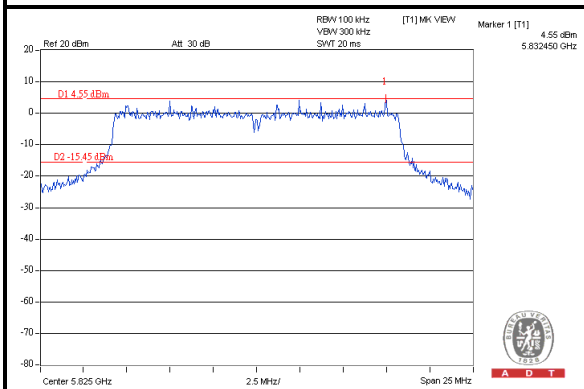
## CH 149



## CH 157



## CH 165

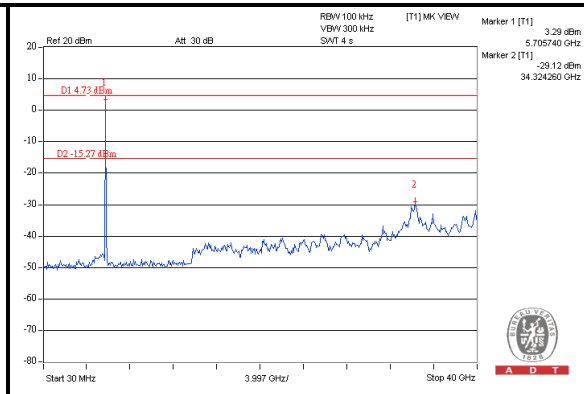
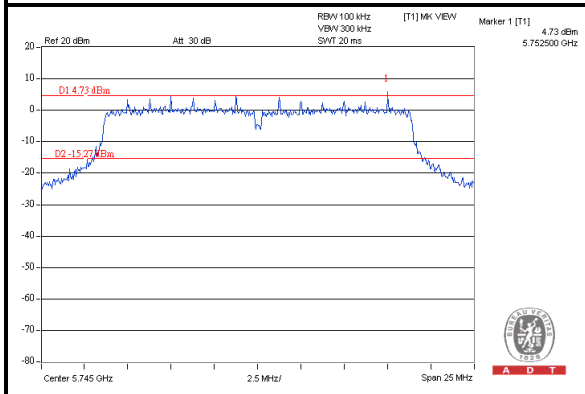




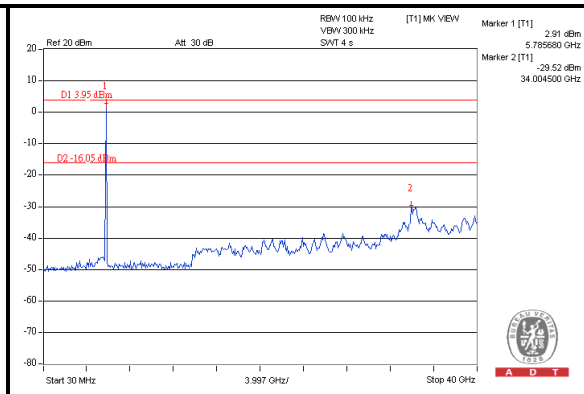
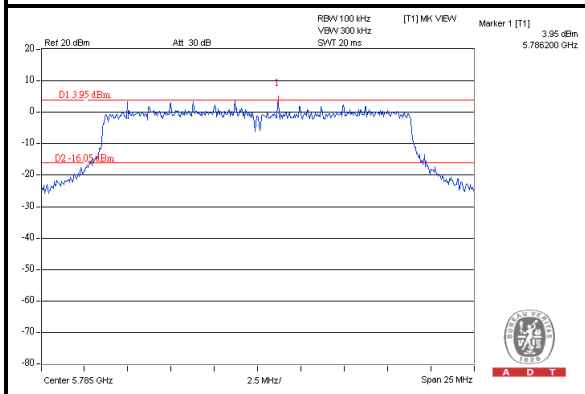
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### 802.11n(20MHz)

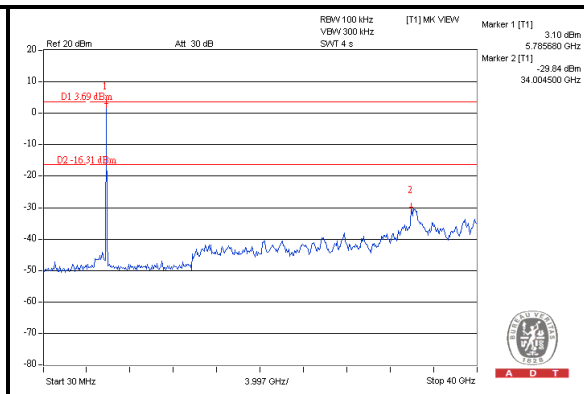
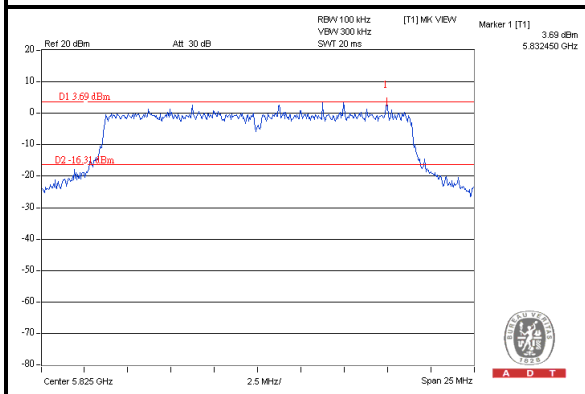
#### CH 149



#### CH 157



#### CH 165

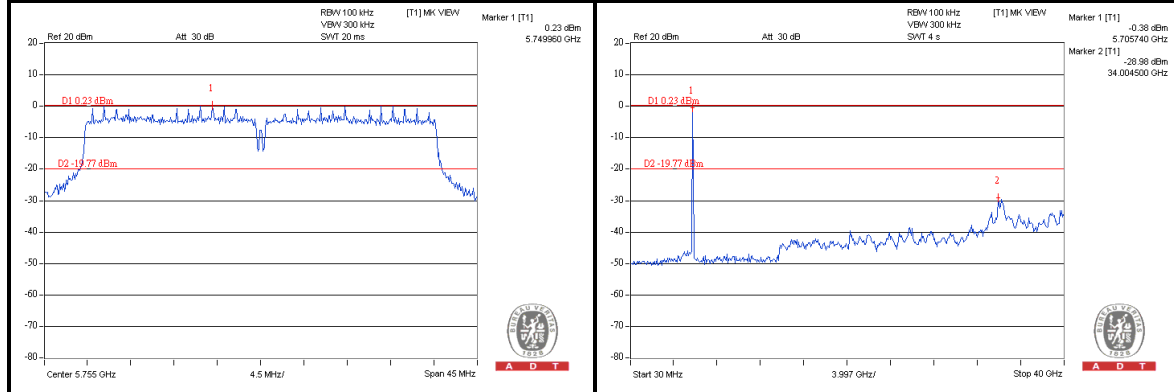




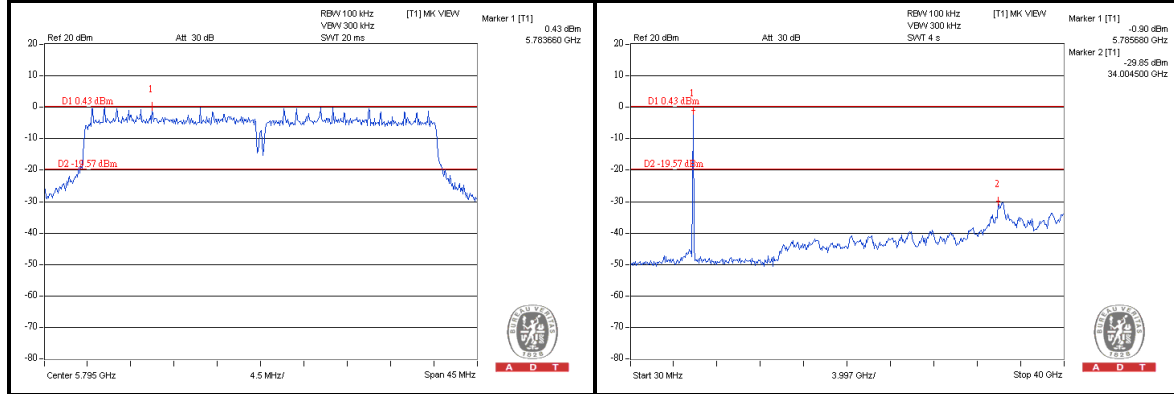
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# 802.11n(40MHz)

## CH 151



## CH 159





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## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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## 7. INFORMATION ON THE TESTING LABORATORIES

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

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml). If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

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



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

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

**---END---**