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# FCC TEST REPORT

**REPORT NO.:** RF120326E06

**MODEL NO.:** T77H298

**FCC ID:** B3QT77H298

**RECEIVED:** Mar. 26, 2012

**TESTED:** Apr. 06 to 30, 2012

**ISSUED:** May 08, 2012

**APPLICANT:** BROTHER INDUSTRIES, LTD.

**ADDRESS:** 15-1, Naeshiro-cho, Mizuho-ku, Nagoya,  
Aichi, Japan.

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

**LAB ADDRESS :** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung  
Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

**TEST LOCATION (1):** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung  
Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

**TEST LOCATION (2):** No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung  
Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120326E06	Original release	May 08, 2012

## 1. CERTIFICATION

**PRODUCT:** WiFi Module  
**BRAND NAME:** Brother  
**MODEL NO.:** T77H298  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**APPLICANT:** BROTHER INDUSTRIES, LTD.  
**TESTED:** Apr. 06 to 30, 2012  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.247)**  
ANSI C63.10-2009

The above equipment (Model: T77H298) 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** : Phoenix Huang , **DATE:** May 08, 2012  
( Phoenix Huang, Specialist )

**APPROVED BY** : May Chen , **DATE:** May 08, 2012  
( May Chen, Deputy Manager )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)</b>			
<b>STANDARD SECTION</b>	<b>TEST TYPE</b>	<b>RESULT</b>	<b>REMARK</b>
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.78dB at 0.16325MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB 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.



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## 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	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	3.81 dB
Radiated emissions (1GHz -6GHz)	5.12 dB
Radiated emissions (6GHz -18GHz)	5.32 dB
Radiated emissions (18GHz -40GHz)	5.37 dB

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	WiFi Module
<b>MODEL NO.</b>	T77H298
<b>POWER SUPPLY</b>	DC 3.3V from host equipment
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>TRANSFER RATE</b>	802.11b: Up to 11Mbps 802.11g: Up to 54Mbps 802.11n (20MHz, 800ns GI): Up to 65Mbps 802.11n (20MHz, 400ns GI): Up to 72.2Mbps
<b>OPERATING FREQUENCY</b>	2.412 ~ 2.462GHz
<b>NUMBER OF CHANNEL</b>	11 for 802.11b, 802.11g, 802.11n (20MHz)
<b>MAXIMUM OUTPUT POWER</b>	802.11b: 112.202mW 802.11g: 181.970mW 802.11n (20MHz): 151.356mW
<b>ANTENNA TYPE</b>	Please see NOTE
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ASSOCIATED DEVICES</b>	NA

#### NOTE:

1. The antennas provided to the EUT, please refer to the following table:

No.	Type	Connector	Gain (dBi)	Diversity Function	Frequency range From MHz to MHz
1	PCB	NA	2	NA	2412~2483.5
2	PCB	NA	2	NA	2412~2483.5

There are two antennas on EUT, one is for Tx only, and another one is for Rx only.

2. The EUT is 1 \* 1 spatial SISO (1Tx & 1Rx) without beam forming function.
3. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7.
4. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.





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### 3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided for 802.11b, 802.11g, 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		

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

NOTE: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane** (Below 1GHz) & **X-plane** (Above 1GHz).

#### **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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

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

- 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6

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

- 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5



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**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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

**CONDUCTED OUT-BAND EMISSION 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	26deg. C, 66%RH	120Vac, 60Hz	Gavin Peng
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Evan Huang
RE <sup>3</sup> 1G	27deg. C, 75%RH	120Vac, 60Hz	Evan Huang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Amos Chuang
OB	25deg. C, 60%RH	120Vac, 60Hz	Amos Chuang

### **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.



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### 3.4 DESCRIPTION OF SUPPORT UNITS

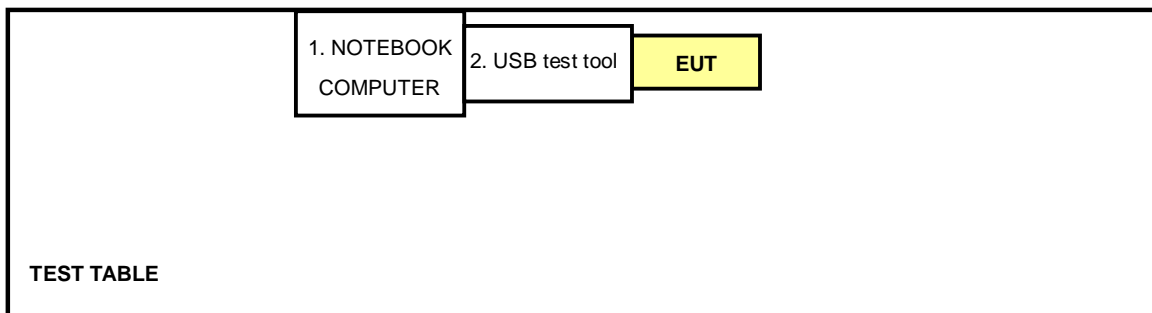
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	IBM	2382	NA	NA
2	USB test tool	Brother	NA	NA	NA

No.	Signal cable description
1	NA
2	NA

**NOTE:** The power cords of the above support units were unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST



## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 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.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Feb. 29, 2012	Feb. 28, 2013
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 20, 2011	Sep. 19, 2012
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 10, 2011	June 09, 2012
RF Cable (JYBAO)	5DFB	COACAB-002	Aug. 06, 2011	Aug. 05, 2012
50 ohms Terminator	50	3	Nov. 02, 2011	Nov. 01, 2012
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Apr. 30, 2012

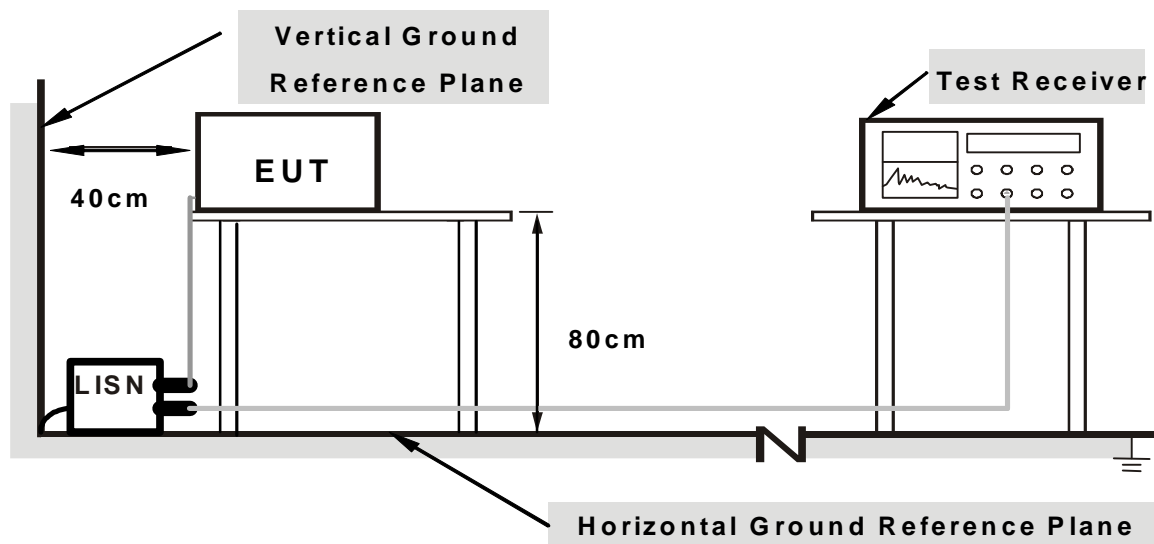
#### 4.1.3 TEST PROCEDURES

- a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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) were not recorded.

#### 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 from other units and other metal planes**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared computer system (support unit 1) to act as communication partner.
3. The communication partner ran test program “DOS paste WL Command” to enable EUT under transmission/receiving condition continuously.



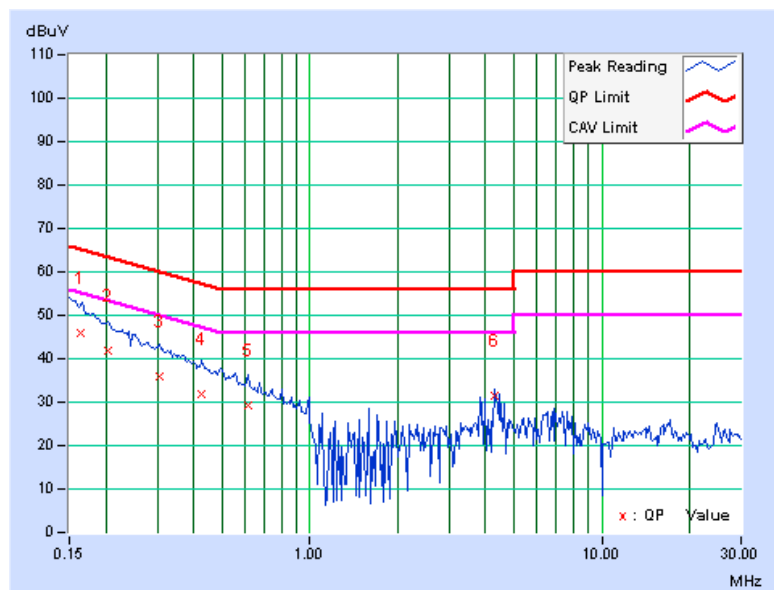
#### 4.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>6dB BANDWIDTH</b>	9 kHz
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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	0.16325	0.06	45.70	41.46	45.76	41.52	65.30	55.30	-19.54
2	0.20469	0.06	41.80	27.29	41.86	27.35	63.42	53.42	-21.56	-26.07
3	0.30625	0.07	35.73	27.45	35.80	27.52	60.07	50.07	-24.28	-22.56
4	0.42734	0.07	31.84	26.14	31.91	26.21	57.30	47.30	-25.39	-21.09
5	0.61484	0.09	29.21	23.08	29.30	23.17	56.00	46.00	-26.70	-22.83
6	4.32031	0.28	31.02	17.58	31.30	17.86	56.00	46.00	-24.70	-28.14

#### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

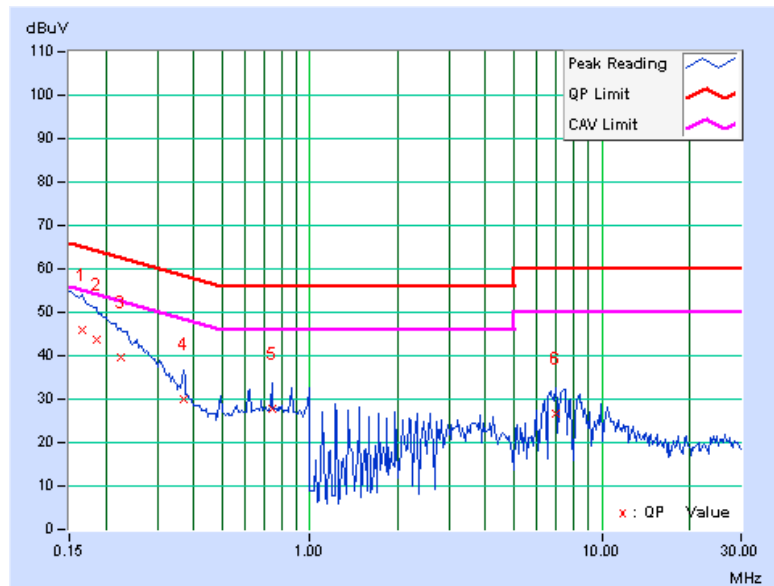


<b>PHASE</b>	Neutral (N)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.16587	0.07	45.82	40.13	45.89	40.20	65.16	55.16	-19.27
2	0.18516	0.07	43.46	30.17	43.53	30.24	64.25	54.25	-20.72	-24.01
3	0.22422	0.07	39.41	13.84	39.48	13.91	62.66	52.66	-23.18	-38.75
4	0.36875	0.08	29.92	28.24	30.00	28.32	58.53	48.53	-28.53	-20.21
5	0.74375	0.10	27.69	21.52	27.79	21.62	56.00	46.00	-28.21	-24.38
6	6.92969	0.31	26.50	9.69	26.81	10.00	60.00	50.00	-33.19	-40.00

**REMARKS:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**NOTE:**

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



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## 4.2.2 TEST INSTRUMENTS

### For below 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012
Agilent Pre-Selector	N9039A	MY46520311	July 12, 2011	July 11, 2012
Agilent Signal Generator	N5181A	MY49060517	July 12, 2011	July 11, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 15, 2011	Nov. 14, 2012
Agilent Pre-Amplifier	8449B	3008A02578	July 04, 2011	July 03, 2012
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 14, 2011	Apr. 13, 2012
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 14, 2011	Nov. 13, 2012
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 26, 2011	Dec. 25, 2012
RF Cable	NA	CHGCAB_001	Oct. 07, 2011	Oct. 06, 2012
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. G.

4. The FCC Site Registration No. is 966073.

5. The VCCI Site Registration No. is G-137.

6. The CANADA Site Registration No. is IC 7450H-2.

7. Tested Date: Apr. 06, 2012



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**For above 1GHz:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Agilent Pre-Selector	N9039A	MY46520310	Aug. 29, 2011	Aug. 28, 2012
Agilent Signal Generator	N5181A	MY49060347	July 25, 2011	July 24, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-04	Nov. 15, 2011	Nov. 14, 2012
Agilent Pre-Amplifier	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
AISI Horn_Antenna	AIH.8018	0000220091110	Nov. 23, 2011	Nov. 22, 2012
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
RF CABLE	NA	RF104-205 RF104-207 RF104-202	Dec. 27, 2011	Dec. 26, 2012
RF Cable	NA	CHHCAB_001	Oct. 08, 2011	Oct. 07, 2012
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Apr. 16, 2012

#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room. 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 height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

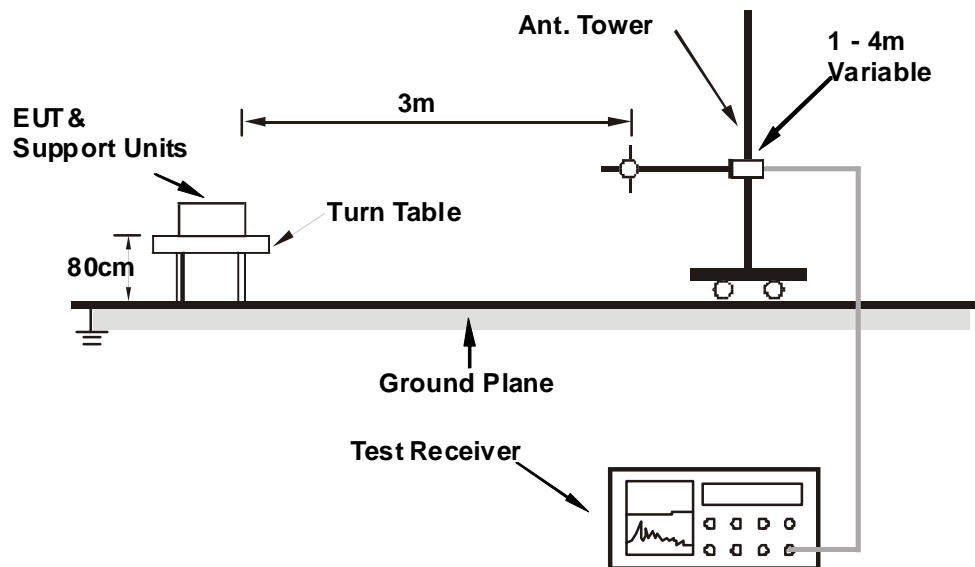
#### NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz 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 related item – Photographs of the Test Configuration.

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### 802.11g

<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	Below 1GHz		

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	282.60	42.9 QP	46.0	-3.1	1.00 H	218	28.27	14.63
2	333.16	39.8 QP	46.0	-6.2	1.00 H	193	23.60	16.19
3	364.43	38.7 QP	46.0	-7.4	1.00 H	194	21.64	17.01
4	381.00	40.3 QP	46.0	-5.8	1.00 H	306	22.81	17.44
5	498.12	42.3 QP	46.0	-3.7	1.50 H	0	22.03	20.27
6	616.55	41.5 QP	46.0	-4.5	1.25 H	236	18.85	22.65
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	33.20	32.1 QP	40.0	-7.9	1.00 V	93	18.91	13.19
2	314.69	40.3 QP	46.0	-5.7	1.00 V	248	24.56	15.70
3	349.86	40.2 QP	46.0	-5.8	1.00 V	296	23.58	16.63
4	508.19	39.5 QP	46.0	-6.5	1.25 V	0	19.04	20.50
5	599.97	32.8 QP	46.0	-13.2	1.25 V	301	10.19	22.58
6	899.10	39.2 QP	46.0	-6.8	1.25 V	0	11.83	27.35

#### REMARKS:

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





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ABOVE 1GHz DATA

802.11b

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.8 PK	74.0	-16.2	1.00 H	283	25.61	32.19
2	2390.00	48.0 AV	54.0	-6.0	1.00 H	283	15.81	32.19
3	*2412.00	106.0 PK			1.00 H	283	73.75	32.25
4	*2412.00	103.5 AV			1.00 H	283	71.25	32.25
5	4824.00	48.2 PK	74.0	-25.8	1.16 H	310	6.63	41.57
6	4824.00	37.5 AV	54.0	-16.5	1.16 H	310	-4.07	41.57

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.3 PK	74.0	-17.7	1.08 V	255	24.11	32.19
2	2390.00	45.1 AV	54.0	-8.9	1.08 V	255	12.91	32.19
3	*2412.00	98.9 PK			1.08 V	243	66.65	32.25
4	*2412.00	96.2 AV			1.08 V	243	63.95	32.25
5	4824.00	48.9 PK	74.0	-25.1	1.00 V	218	7.33	41.57
6	4824.00	37.4 AV	54.0	-16.6	1.00 V	218	-4.17	41.57

**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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<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.3 PK			1.00 H	289	72.99	32.31
2	*2437.00	102.9 AV			1.00 H	289	70.59	32.31
3	4874.00	50.9 PK	74.0	-23.1	1.12 H	222	9.24	41.66
4	4874.00	42.1 AV	54.0	-11.9	1.12 H	222	0.44	41.66
5	7311.00	55.9 PK	74.0	-18.1	1.08 H	141	9.76	46.14
6	7311.00	45.3 AV	54.0	-8.7	1.08 H	141	-0.84	46.14

**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	97.4 PK			1.10 V	257	65.09	32.31
2	*2437.00	95.1 AV			1.10 V	257	62.79	32.31
3	4874.00	49.2 PK	74.0	-24.8	1.00 V	219	7.54	41.66
4	4874.00	42.4 AV	54.0	-11.6	1.00 V	219	0.74	41.66
5	7311.00	56.8 PK	74.0	-17.2	1.07 V	177	10.66	46.14
6	7311.00	46.2 AV	54.0	-7.8	1.07 V	177	0.06	46.14

**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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<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.9 PK			1.00 H	280	71.53	32.37
2	*2462.00	101.6 AV			1.00 H	280	69.23	32.37
3	2483.50	57.6 PK	74.0	-16.4	1.00 H	280	25.17	32.43
4	2483.50	45.0 AV	54.0	-9.0	1.00 H	280	12.57	32.43
5	3693.00	51.5 PK	74.0	-22.5	1.27 H	284	15.38	36.12
6	3693.00	48.1 AV	54.0	-5.9	1.27 H	284	11.98	36.12
7	4924.00	51.6 PK	74.0	-22.4	1.51 H	260	9.90	41.70
8	4924.00	45.1 AV	54.0	-8.9	1.51 H	260	3.40	41.70
9	7386.00	55.7 PK	74.0	-18.3	1.20 H	291	9.37	46.33
10	7386.00	46.3 AV	54.0	-7.7	1.20 H	291	-0.03	46.33

**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	97.1 PK			1.09 V	260	64.73	32.37
2	*2462.00	94.9 AV			1.09 V	260	62.53	32.37
3	2483.50	56.7 PK	74.0	-17.3	1.09 V	261	24.27	32.43
4	2483.50	43.8 AV	54.0	-10.2	1.09 V	261	11.37	32.43
5	3693.00	50.6 PK	74.0	-23.4	1.11 V	161	14.48	36.12
6	3693.00	46.7 AV	54.0	-7.3	1.11 V	161	10.58	36.12
7	4924.00	50.3 PK	74.0	-23.7	1.00 V	217	8.60	41.70
8	4924.00	42.1 AV	54.0	-11.9	1.00 V	217	0.40	41.70
9	7386.00	56.9 PK	74.0	-17.1	1.08 V	161	10.57	46.33
10	7386.00	46.1 AV	54.0	-7.9	1.08 V	161	-0.23	46.33

**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

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.3 PK	74.0	-7.7	1.00 H	274	34.11	32.19
2	2390.00	53.5 AV	54.0	-0.5	1.00 H	274	21.31	32.19
3	*2412.00	103.3 PK			1.00 H	281	71.05	32.25
4	*2412.00	92.5 AV			1.00 H	281	60.25	32.25
5	4824.00	47.3 PK	74.0	-26.7	1.50 H	270	5.73	41.57
6	4824.00	35.8 AV	54.0	-18.2	1.50 H	270	-5.77	41.57
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.3 PK	74.0	-13.7	1.07 V	255	28.11	32.19
2	2390.00	48.3 AV	54.0	-5.7	1.07 V	255	16.11	32.19
3	*2412.00	96.2 PK			1.07 V	255	63.95	32.25
4	*2412.00	85.6 AV			1.07 V	255	53.35	32.25
5	4824.00	47.4 PK	74.0	-26.6	1.00 V	253	5.83	41.57
6	4824.00	36.4 AV	54.0	-17.6	1.00 V	253	-5.17	41.57

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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<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**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	103.2 PK			1.00 H	276	70.89	32.31
2	*2437.00	92.1 AV			1.00 H	276	59.79	32.31
3	3655.50	50.5 PK	74.0	-23.5	1.30 H	293	14.50	36.00
4	3655.50	47.4 AV	54.0	-6.6	1.30 H	293	11.40	36.00
5	4874.00	46.6 PK	74.0	-27.4	1.49 H	264	4.94	41.66
6	4874.00	35.6 AV	54.0	-18.4	1.49 H	264	-6.06	41.66
7	7311.00	54.6 PK	74.0	-19.4	1.20 H	279	8.46	46.14
8	7311.00	42.8 AV	54.0	-11.2	1.20 H	279	-3.34	46.14

**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	95.8 PK			1.07 V	257	63.49	32.31
2	*2437.00	86.1 AV			1.07 V	257	53.79	32.31
3	4874.00	46.7 PK	74.0	-27.3	1.01 V	245	5.04	41.66
4	4874.00	36.0 AV	54.0	-18.0	1.01 V	245	-5.66	41.66
5	7311.00	54.4 PK	74.0	-19.6	1.09 V	162	8.26	46.14
6	7311.00	43.0 AV	54.0	-11.0	1.09 V	162	-3.14	46.14

**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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<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.2 PK			1.00 H	288	71.83	32.37
2	*2462.00	91.5 AV			1.00 H	288	59.13	32.37
3	2483.50	61.4 PK	74.0	-12.6	1.00 H	278	28.97	32.43
4	2483.50	47.7 AV	54.0	-6.3	1.00 H	278	15.27	32.43
5	4924.00	47.2 PK	74.0	-26.8	1.53 H	266	5.50	41.70
6	4924.00	35.9 AV	54.0	-18.1	1.53 H	266	-5.80	41.70
7	7386.00	54.3 PK	74.0	-19.7	1.20 H	291	7.97	46.33
8	7386.00	42.7 AV	54.0	-11.3	1.20 H	291	-3.63	46.33

**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	95.1 PK			1.08 V	257	62.73	32.37
2	*2462.00	84.7 AV			1.08 V	257	52.33	32.37
3	2483.50	57.0 PK	74.0	-17.0	1.08 V	258	24.57	32.43
4	2483.50	45.9 AV	54.0	-8.1	1.08 V	258	13.47	32.43
5	4924.00	46.3 PK	74.0	-27.7	1.03 V	232	4.60	41.70
6	4924.00	35.8 AV	54.0	-18.2	1.03 V	232	-5.90	41.70
7	7386.00	54.7 PK	74.0	-19.3	1.07 V	166	8.37	46.33
8	7386.00	43.2 AV	54.0	-10.8	1.07 V	166	-3.13	46.33

**REMARKS:**

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



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802.11n (20MHz)

<b>CHANNEL</b>	TX Channel 1	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.6 PK	74.0	-8.4	1.00 H	286	33.41	32.19
2	2390.00	53.5 AV	54.0	-0.5	1.00 H	286	21.31	32.19
3	*2412.00	102.8 PK			1.00 H	286	70.55	32.25
4	*2412.00	92.1 AV			1.00 H	286	59.85	32.25
5	4824.00	47.9 PK	74.0	-26.1	1.53 H	248	6.33	41.57
6	4824.00	36.3 AV	54.0	-17.7	1.53 H	248	-5.27	41.57
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.4 PK	74.0	-13.6	1.08 V	256	28.21	32.19
2	2390.00	48.6 AV	54.0	-5.4	1.08 V	256	16.41	32.19
3	*2412.00	95.9 PK			1.08 V	256	63.65	32.25
4	*2412.00	83.5 AV			1.08 V	256	21.55	32.25
5	4824.00	47.2 PK	74.0	-26.8	1.06 V	223	5.63	41.57
6	4824.00	36.2 AV	54.0	-17.8	1.06 V	223	-5.37	41.57

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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<b>CHANNEL</b>	TX Channel 6	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**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	102.3 PK			1.00 H	287	69.99	32.31
2	*2437.00	91.7 AV			1.00 H	287	59.39	32.31
3	4874.00	47.6 PK	74.0	-26.4	1.49 H	258	5.94	41.66
4	4874.00	36.0 AV	54.0	-18.0	1.49 H	258	-5.66	41.66
5	7311.00	54.3 PK	74.0	-19.7	1.23 H	306	8.16	46.14
6	7311.00	42.5 AV	54.0	-11.5	1.23 H	306	-3.64	46.14

**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	94.6 PK			1.08 V	258	62.29	32.31
2	*2437.00	83.5 AV			1.08 V	258	51.19	32.31
3	4874.00	47.0 PK	74.0	-27.0	1.03 V	228	5.34	41.66
4	4874.00	36.3 AV	54.0	-17.7	1.03 V	228	-5.36	41.66
5	7311.00	54.3 PK	74.0	-19.7	1.09 V	166	8.16	46.14
6	7311.00	42.7 AV	54.0	-11.3	1.09 V	166	-3.44	46.14

**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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<b>CHANNEL</b>	TX Channel 11	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**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	101.7 PK			1.00 H	287	69.33	32.37
2	*2462.00	90.2 AV			1.00 H	287	57.83	32.37
3	2483.50	58.9 PK	74.0	-15.1	1.00 H	288	26.47	32.43
4	2483.50	47.1 AV	54.0	-6.9	1.00 H	288	14.67	32.43
5	4924.00	47.3 PK	74.0	-26.7	1.53 H	267	5.60	41.70
6	4924.00	35.8 AV	54.0	-18.2	1.53 H	267	-5.90	41.70
7	7386.00	54.0 PK	74.0	-20.0	1.24 H	300	7.67	46.33
8	7386.00	42.4 AV	54.0	-11.6	1.24 H	300	-3.93	46.33

**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	94.5 PK			1.08 V	259	62.13	32.37
2	*2462.00	83.6 AV			1.08 V	259	51.23	32.37
3	2483.50	56.5 PK	74.0	-17.5	1.07 V	259	24.07	32.43
4	2483.50	45.1 AV	54.0	-8.9	1.07 V	259	12.67	32.43
5	4924.00	46.7 PK	74.0	-27.3	1.03 V	214	5.00	41.70
6	4924.00	35.9 AV	54.0	-18.1	1.03 V	214	-5.80	41.70
7	7386.00	54.7 PK	74.0	-19.3	1.12 V	172	8.37	46.33
8	7386.00	43.1 AV	54.0	-10.9	1.12 V	172	-3.23	46.33

**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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### 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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Apr. 18, 2012

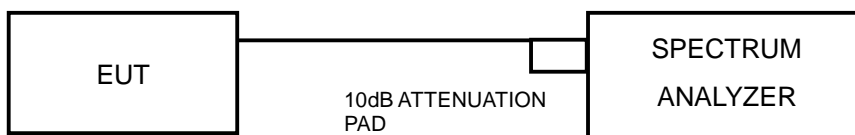
#### 4.3.3 TEST PROCEDURE

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

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 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

#### 802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	7.39	0.5	PASS
6	2437	7.60	0.5	PASS
11	2462	7.49	0.5	PASS

#### 802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.88	0.5	PASS
6	2437	15.52	0.5	PASS
11	2462	16.25	0.5	PASS

#### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.23	0.5	PASS
6	2437	16.76	0.5	PASS
11	2462	17.37	0.5	PASS

#### 4.4 CONDUCTED OUTPUT POWER MEASUREMENT

##### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

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

##### 4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Peak Power Meter	ML2495A	0824006	May 04, 2011	May 03, 2012
Power Sensor	MA2411B	0738172	May 03, 2011	May 02, 2012

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Apr. 18, 2012

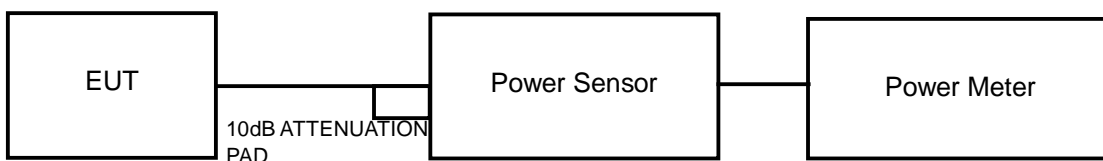
##### 4.4.3 TEST PROCEDURES

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

##### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

##### 4.4.5 TEST SETUP



##### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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#### 4.4.7 TEST RESULTS

##### 802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	109.648	20.40	30	PASS
6	2437	107.152	20.30	30	PASS
11	2462	112.202	20.50	30	PASS

##### 802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	162.181	22.10	30	PASS
6	2437	181.970	22.60	30	PASS
11	2462	173.780	22.40	30	PASS

##### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	151.356	21.80	30	PASS
6	2437	141.254	21.50	30	PASS
11	2462	134.896	21.30	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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Apr. 18, 2012

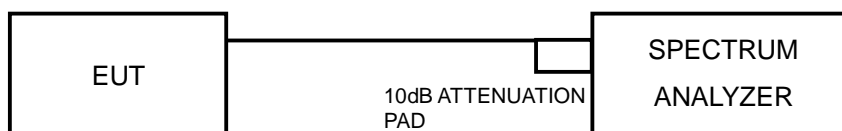
### 4.5.3 TEST PROCEDURE

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  $BWCF = 10\log(3 \text{ kHz}/100\text{kHz})$

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5.5 TEST SETUP



### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



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## 4.5.7 TEST RESULTS

### 802.11b

Channel	FREQUENCY (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	9.37	-5.86	8	PASS
6	2437	9.57	-5.66	8	PASS
11	2462	9.10	-6.13	8	PASS

### 802.11g

Channel	FREQUENCY (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	1.77	-13.46	8	PASS
6	2437	2.17	-13.06	8	PASS
11	2462	2.19	-13.04	8	PASS

### 802.11n (20MHz)

Channel	FREQUENCY (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	1.82	-13.41	8	PASS
6	2437	1.41	-13.82	8	PASS
11	2462	1.42	-13.81	8	PASS

## 4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Apr. 18, 2012

### 4.6.3 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

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



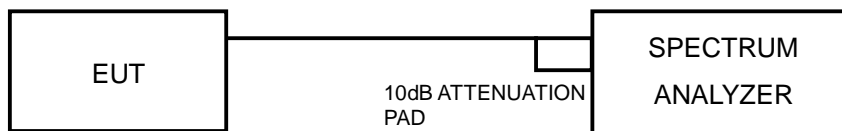
## MEASUREMENT PROCEDURE OOB

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

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 TEST SETUP



### 4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

### 4.6.7 TEST RESULTS

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

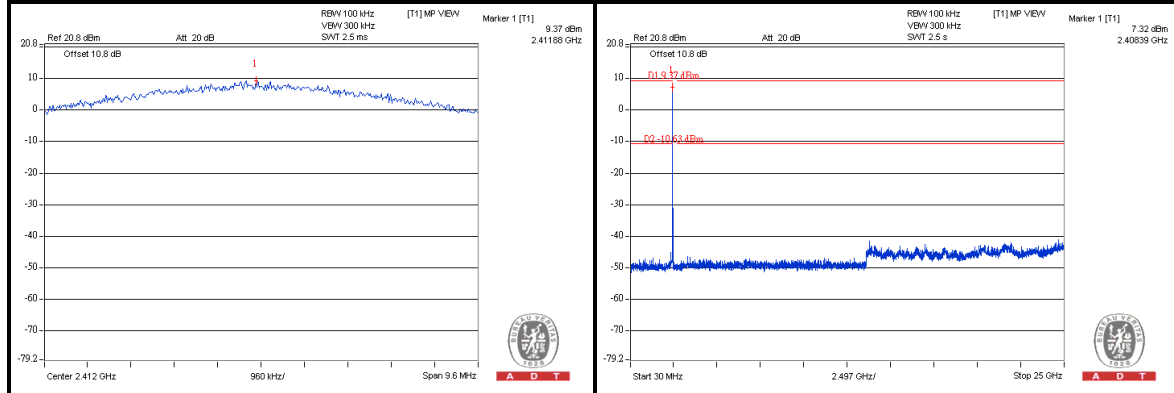
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



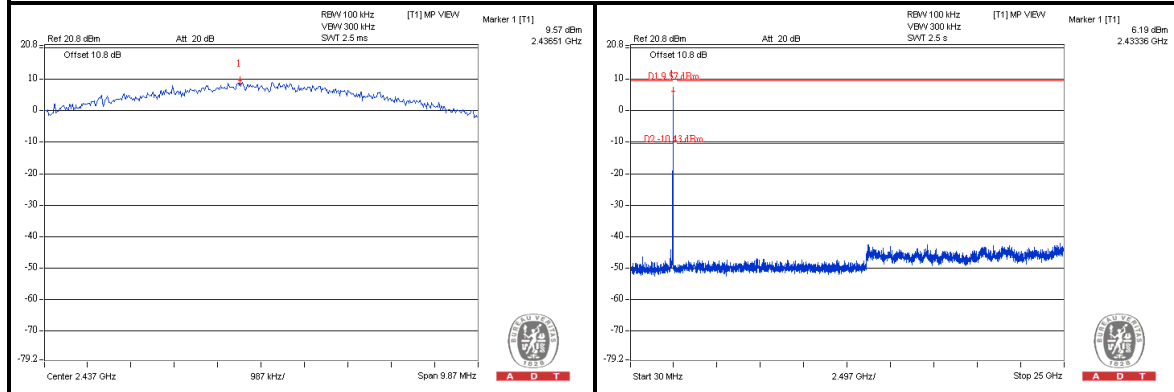
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### 802.11b

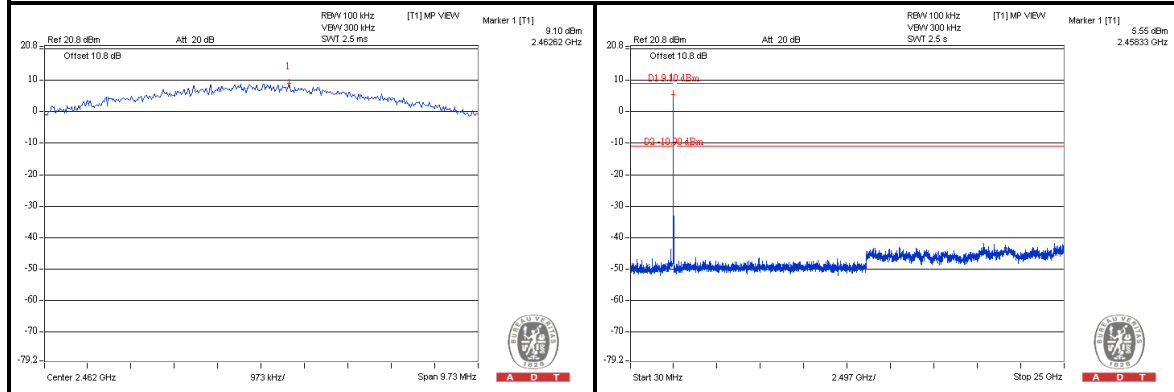
#### CH 1



#### CH 6



#### CH 11

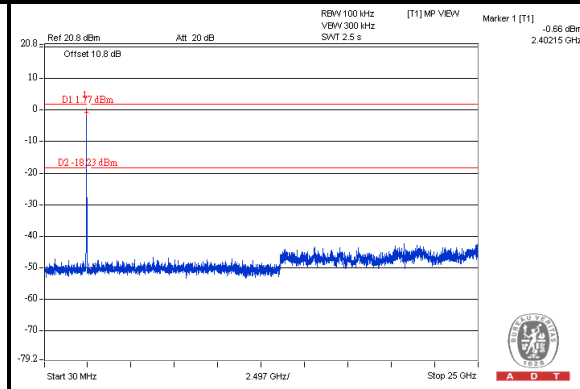
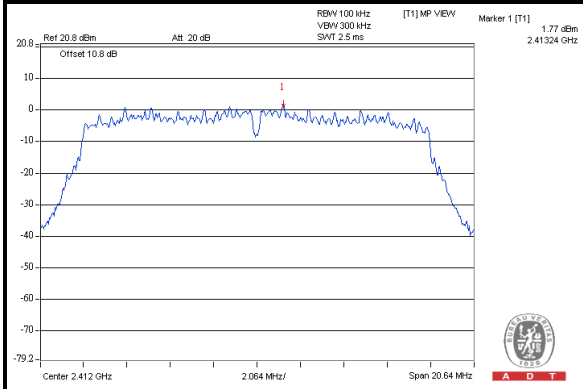




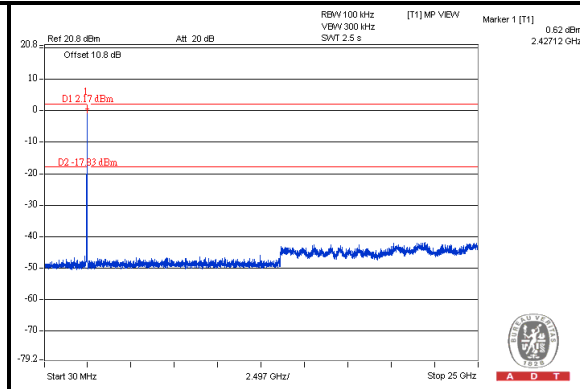
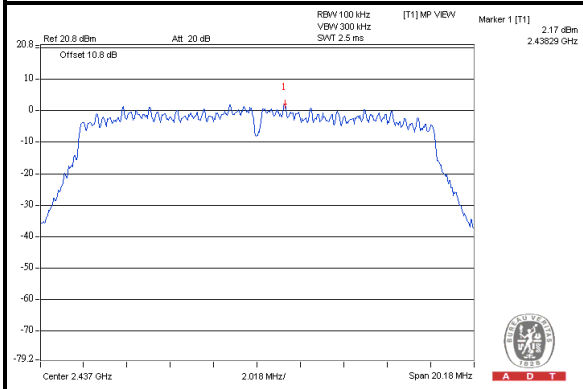
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### 802.11g

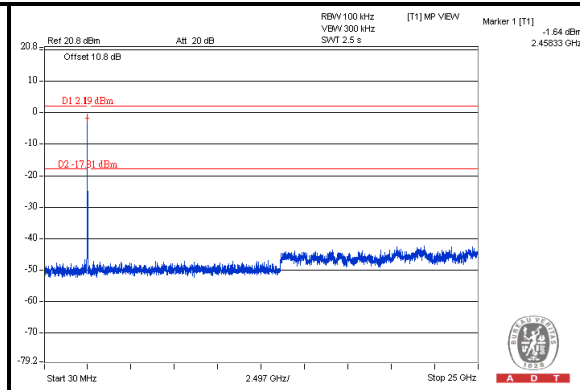
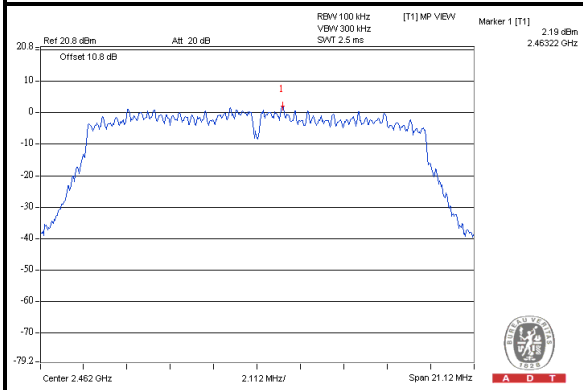
#### CH 1



#### CH 6



#### CH 11

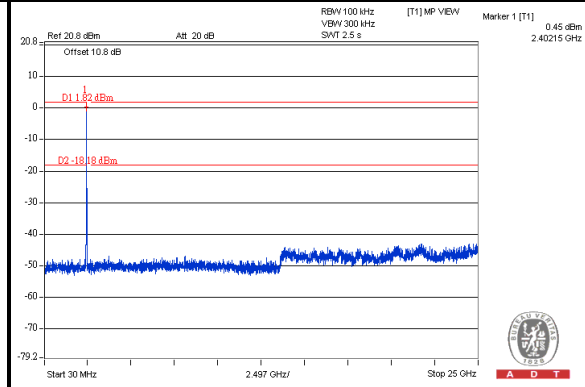
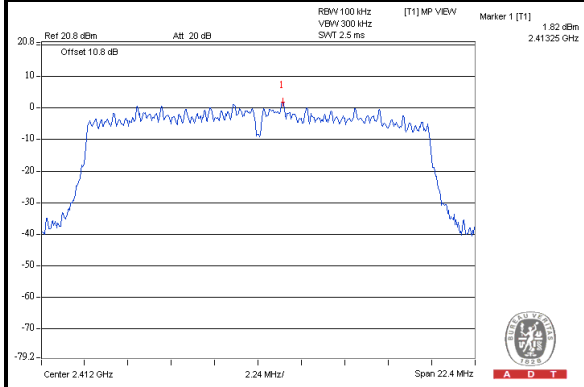




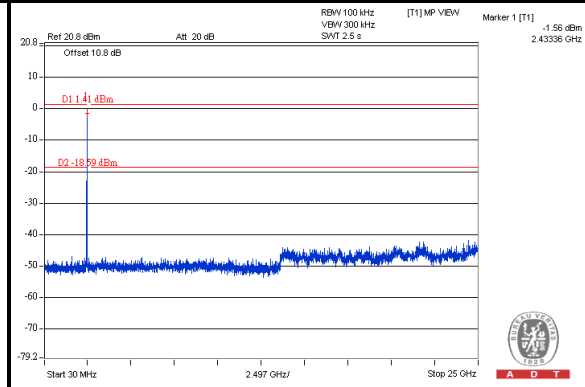
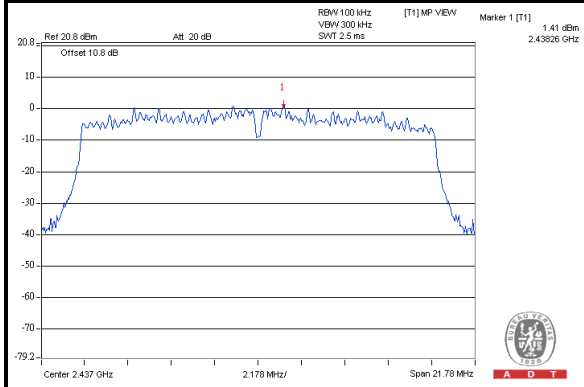
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### 802.11n (20MHz)

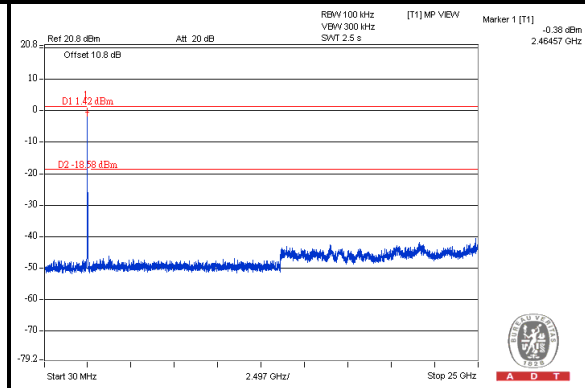
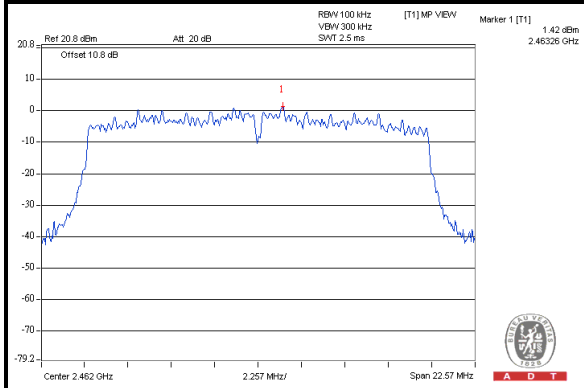
#### CH 1



#### CH 6



#### CH 11





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## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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





## 6. INFORMATION ON THE TESTING LABORATORIES

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

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: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

Tel: 886-3-3183232

Fax: 886-3-3270892

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

**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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## **7. 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 ---**