



# FCC TEST REPORT (15.247)

**REPORT NO.:** RF130523E10

**MODEL NO.:** J20H076

**FCC ID:** MCLJ20H076

**RECEIVED:** May 23, 2013

**TESTED:** May 29 to June 05, 2013

**ISSUED:** July 15, 2013

**APPLICANT:** Hon Hai PRECISION IND.CO.,LTD

**ADDRESS:** 5F-1, Hsin-An Road, Hsinchu, Science Industrial Park, Taiwan, R.O.C.

**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
RF130523E10	Original release	July 15, 2013




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## 1. CERTIFICATION

**PRODUCT:** 802.11abgn wireless module  
**BRAND NAME:** FOXCONN  
**MODEL NO.:** J20H076  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**APPLICANT:** Hon Hai PRECISION IND.CO.,LTD  
**TESTED:** May 29 to June 05, 2013  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10-2009

The above equipment (Model: J20H076) 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 :**  , **DATE:** July 15, 2013  
( Lori Chung, Specialist )

**APPROVED BY :**  , **DATE:** July 15, 2013  
( May Chen, Manager )



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## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

### For 2.4GHz, 2400 ~ 2483.5MHz Band

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 -16.55dB at 0.19297MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.8dB 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 output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is Murata not a standard connector.

### For 5GHz, 5725~5850MHz Band

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 -17.43dB at 0.19687MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB at 11510.00MHz.
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 output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is Murata not a standard connector.

**NOTE:** The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.35GHz, 5.47~5.6GHz & 5.65~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz and 5.725~5.850GHz. For the 5.15~5.35GHz, 5.47~5.6GHz & 5.65~5.725GHz RF parameters was recorded in another test report.



## 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)	5.46 dB
Radiated emissions (1GHz -6GHz)	3.73 dB
Radiated emissions (6GHz -18GHz)	3.90 dB
Radiated emissions (18GHz -40GHz)	4.11 dB



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### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	802.11abgn wireless module
<b>MODEL NO.</b>	J20H076
<b>POWER SUPPLY</b>	DC 3.3V $\pm$ 10% 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 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps
<b>OPERATING FREQUENCY</b>	<b>For 15.407</b> 802.11a: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5~5.58GHz & 5.66~5.7GHz
	<b>For 15.247</b> 802.11b & 802.11g: 2.412 ~ 2.462GHz 802.11a: 5.745 ~ 5.825GHz
<b>NUMBER OF CHANNEL</b>	<b>For 15.407</b> 16 for 802.11a, 802.11n (HT20) 7 for 802.11n (HT40)
	<b>For 15.247(2.4GHz)</b> 11 for 802.11b, 802.11g, 802.11n (HT20)
	<b>For 15.247(5GHz)</b> 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
<b>MAXIMUM OUTPUT POWER</b>	<b>For 15.407</b> 802.11a: 235.624mW 802.11n (HT20): 232.582mW 802.11n (HT40): 140.116mW
	<b>For 15.247 (2.4GHz)</b> 802.11b: 549.898mW 802.11g: 657.863mW 802.11n (HT20): 634.394mW
	<b>For 15.247 (5GHz)</b> 802.11a: 327.243mW 802.11n (HT20): 363.291mW 802.11n (HT40): 361.083mW
<b>ANTENNA TYPE</b>	Please see NOTE
<b>DATA CABLE</b>	NA



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<b>I/O PORTS</b>	Refer to user's manual
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

1. There are 2.4GHz and 5GHz WLAN technology used for the EUT. The test report of EUT listed as below table:

Function	Report No.
WLAN	RF130523E10 (15.247) RF130523E10-1(15.407) RF130523E10-2(DFS)

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

Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain (dBi)	Connector	Frequency range (MHz to MHz)
Chain (0)	NA	NA	PCB	3.10	Murata	2400~2483.5
				4.51		5150~5350
				4.75		5470~5725
				4.80		5725~5845
Chain (1)	NA	NA	PCB	3.18	Murata	2400~2483.5
				4.54		5150~5350
				4.78		5470~5725
				4.98		5725~5845

3. The EUT is 2 \* 2 MIMO without 802.11n beam forming function.

MODULATION MODE	TX/RX FUNCTION
<b>802.11a</b>	2TX/2RX
<b>802.11b</b>	2TX/2RX
<b>802.11g</b>	2TX/2RX
<b>802.11n (HT20)</b>	2TX/2RX
<b>802.11n (HT40)</b>	2TX/2RX

4. 2.4GHz and 5GHz technology cannot transmit at same time.
5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
6. 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

### Operated in 2400 ~ 2483.5MHz band:

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20):

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		

### Operated in 5725 ~ 5850MHz band:

5 channels are provided for 802.11a, 802.11n (HT20):

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

2 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz





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### **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
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT40)	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.

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
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5



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**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
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	25deg. C, 68%RH	120Vac, 60Hz	Jyunchun Lin
RE<1G	22deg. C, 72%RH	120Vac, 60Hz	Robert Cheng
RE <sup>3</sup> 1G	24deg. C, 71%RH	120Vac, 60Hz	Robert Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

### 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)**

**558074 D01 DTS Meas Guidance v03r01**

**662911 D01 Multiple Transmitter Output v01 r02**

ANSI C63.10-2009

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



### 3.4 DESCRIPTION OF SUPPORT UNITS

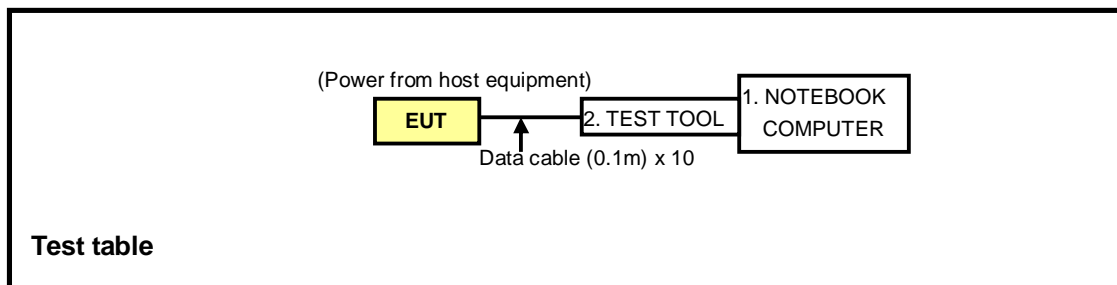
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER (For Conducted emission test)	HP	HSTNN-146C	NA	NA
	NOTEBOOK COMPUTER (For Other test items)	DELL	PP32LA	FSLB32S	FCC DoC
2	TEST TOOL	Hon Hai	94.0187 REV.0 HF GP	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	Data cable (0.1m)

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 (FOR 2.4GHz, 2400 ~ 2483.5MHz Band)

### 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
Test Receiver	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 08, 2012	June 07, 2013
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: May 29, 2013



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#### 4.1.3 TEST PROCEDURES

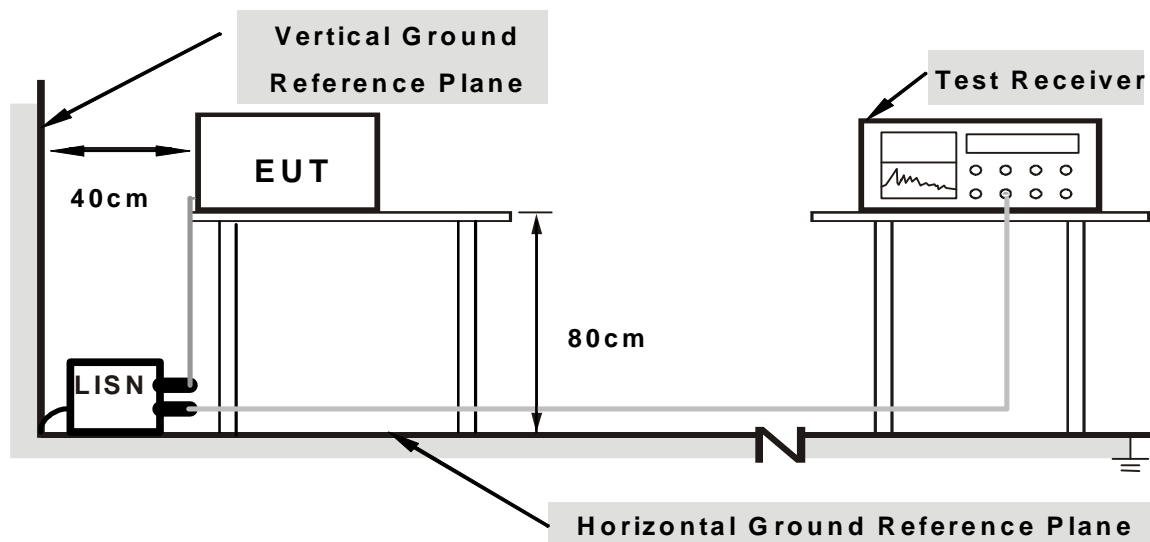
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
- b. The two LISNs provide 50 ohm/ 50uH of coupling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

**NOTE:** The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



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

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

#### 4.1.6 EUT OPERATING CONDITIONS

1. Turn on the power of EUT.
2. The communication partner run test program “artgui.exe V2.3” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

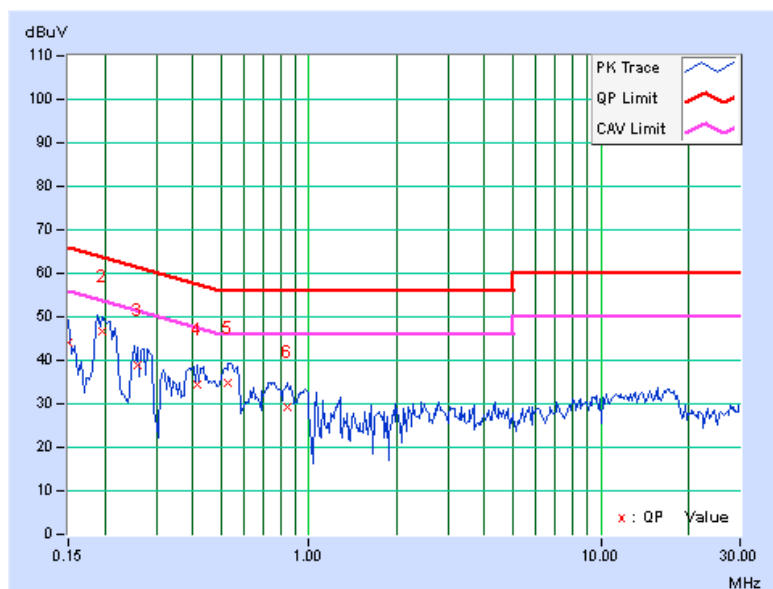
### 4.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP) / Average (AV)
--------------	----------	--------------------------	--------------------------------

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	0.15000	0.12	44.03	24.29	44.15	24.41	66.00	56.00	-21.85	-31.59
2	0.19687	0.14	46.43	33.41	46.57	33.55	63.74	53.74	-17.17	-20.19
3	0.25938	0.15	38.73	25.26	38.88	25.41	61.45	51.45	-22.57	-26.04
4	0.41563	0.18	34.08	20.93	34.26	21.11	57.54	47.54	-23.27	-26.42
5	0.52891	0.19	34.45	20.88	34.64	21.07	56.00	46.00	-21.36	-24.93
6	0.84922	0.21	29.11	16.91	29.32	17.12	56.00	46.00	-26.68	-28.88

**REMARKS:**

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

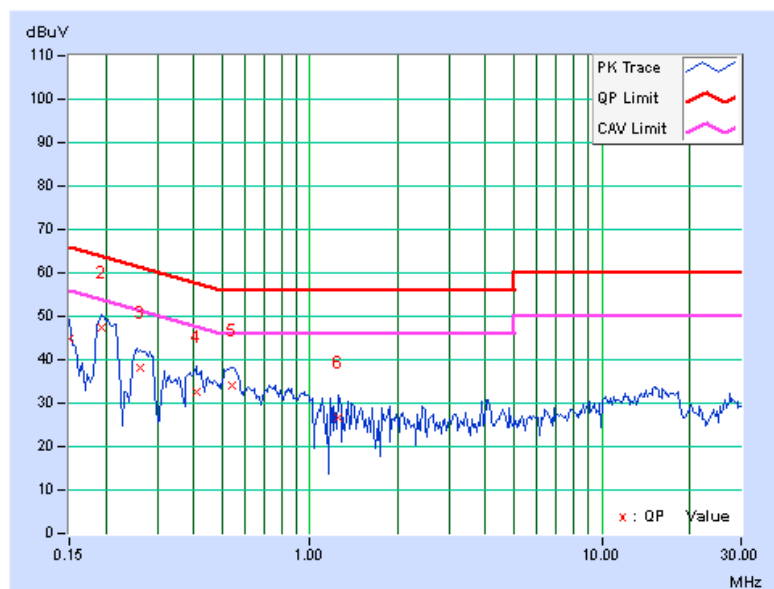


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.10	44.60	24.76	44.70	24.86	66.00	56.00	-21.30	-31.14
<b>2</b>	<b>0.19297</b>	<b>0.12</b>	<b>47.24</b>	<b>33.85</b>	<b>47.36</b>	<b>33.97</b>	<b>63.91</b>	<b>53.91</b>	<b>-16.55</b>	<b>-19.94</b>
3	0.26328	0.14	37.98	25.60	38.12	25.74	61.33	51.33	-23.21	-25.59
4	0.40781	0.17	32.54	20.02	32.71	20.19	57.69	47.69	-24.98	-27.50
5	0.54453	0.18	33.98	20.37	34.16	20.55	56.00	46.00	-21.84	-25.45
6	1.25781	0.22	26.36	14.79	26.58	15.01	56.00	46.00	-29.42	-30.99

**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 test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	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: May 29, 2013





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**For Above 1GHz test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 26, 2012	June 25, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	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: June 05, 2013

#### 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 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 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.

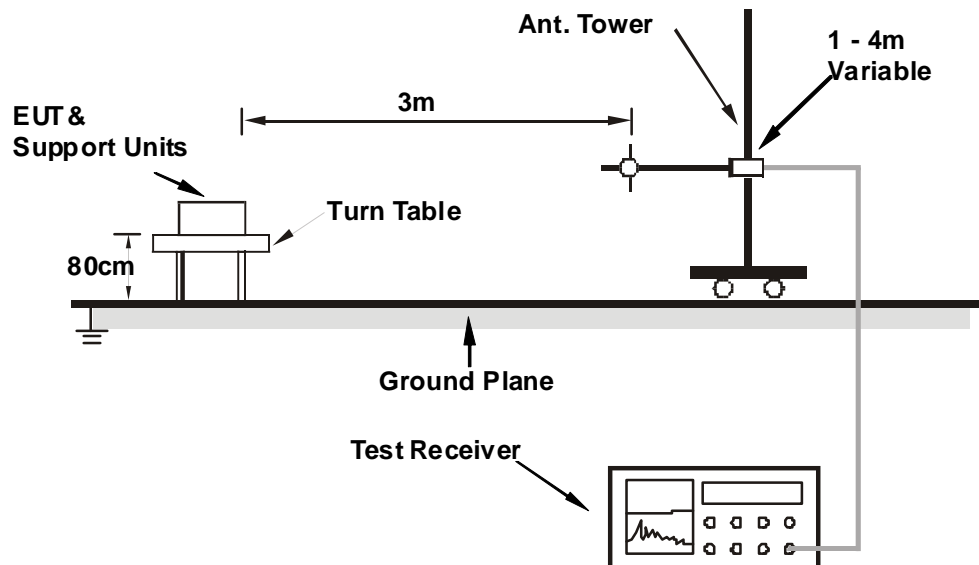
#### NOTE:

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	180.06	20.3 QP	43.5	-23.2	1.00 H	360	34.93	-14.65
2	240.00	32.8 QP	46.0	-13.2	1.31 H	186	47.35	-14.52
3	437.59	33.7 QP	46.0	-12.3	2.00 H	304	42.34	-8.67
4	600.02	30.1 QP	46.0	-15.9	1.50 H	307	35.46	-5.38
5	649.98	29.7 QP	46.0	-16.4	1.00 H	235	34.19	-4.54
6	750.03	30.7 QP	46.0	-15.3	1.00 H	289	33.30	-2.57
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	118.85	26.2 QP	43.5	-17.4	2.00 V	209	41.34	-15.19
2	240.05	22.5 QP	46.0	-23.5	2.00 V	261	37.03	-14.52
3	385.12	35.0 QP	46.0	-11.0	2.00 V	73	45.23	-10.23
4	480.03	30.9 QP	46.0	-15.1	2.00 V	360	38.98	-8.07
5	720.35	31.8 QP	46.0	-14.2	2.00 V	124	35.57	-3.79
6	940.64	29.4 QP	46.0	-16.6	1.50 V	315	28.98	0.46

#### REMARKS:

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



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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	61.1 PK	74.0	-12.9	1.39 H	120	62.29	-1.19
2	2390.00	52.6 AV	54.0	-1.4	1.39 H	120	53.79	-1.19
3	*2412.00	111.1 PK			1.39 H	120	112.19	-1.09
4	*2412.00	109.1 AV			1.39 H	120	110.19	-1.09
5	4824.00	52.5 PK	74.0	-21.5	1.21 H	131	44.91	7.59
6	4824.00	46.4 AV	54.0	-7.6	1.21 H	131	38.81	7.59

#### 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	59.6 PK	74.0	-14.4	1.06 V	149	60.79	-1.19
2	2390.00	46.0 AV	54.0	-8.0	1.06 V	149	47.19	-1.19
3	*2412.00	98.3 PK			1.03 V	157	99.39	-1.09
4	*2412.00	95.7 AV			1.03 V	157	96.79	-1.09
5	4824.00	49.5 PK	74.0	-24.5	1.05 V	269	41.91	7.59
6	4824.00	40.9 AV	54.0	-13.1	1.05 V	269	33.31	7.59

#### REMARKS:

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



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<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	2390.00	58.3 PK	74.0	-15.7	1.15 H	144	59.49	-1.19
2	2390.00	50.8 AV	54.0	-3.2	1.15 H	144	51.99	-1.19
3	*2437.00	113.7 PK			1.35 H	120	114.69	-0.99
4	*2437.00	111.9 AV			1.35 H	120	112.89	-0.99
5	2483.50	60.3 PK	74.0	-13.7	1.34 H	119	61.10	-0.80
6	2483.50	52.4 AV	54.0	-1.6	1.34 H	119	53.20	-0.80
7	4874.00	54.2 PK	74.0	-19.8	1.00 H	84	46.43	7.77
8	4874.00	49.3 AV	54.0	-4.7	1.00 H	84	41.53	7.77
9	7311.00	55.7 PK	74.0	-18.3	1.00 H	295	40.21	15.49
10	7311.00	44.5 AV	54.0	-9.5	1.00 H	295	29.01	15.49

**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	59.6 PK	74.0	-14.4	1.02 V	162	60.79	-1.19
2	2390.00	45.9 AV	54.0	-8.1	1.02 V	162	47.09	-1.19
3	*2437.00	100.5 PK			1.00 V	143	101.49	-0.99
4	*2437.00	98.6 AV			1.00 V	143	99.59	-0.99
5	2483.50	59.0 PK	74.0	-15.0	1.01 V	138	59.80	-0.80
6	2483.50	45.6 AV	54.0	-8.4	1.01 V	138	46.40	-0.80
7	4874.00	51.3 PK	74.0	-22.7	1.12 V	274	43.53	7.77
8	4874.00	43.6 AV	54.0	-10.4	1.12 V	274	35.83	7.77
9	7311.00	57.8 PK	74.0	-16.2	1.02 V	101	42.31	15.49
10	7311.00	46.7 AV	54.0	-7.3	1.02 V	101	31.21	15.49

**REMARKS:**

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



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<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	111.2 PK			1.34 H	119	112.09	-0.89
2	*2462.00	109.3 AV			1.34 H	119	110.19	-0.89
3	2483.50	60.3 PK	74.0	-13.7	1.33 H	119	61.10	-0.80
4	2483.50	52.5 AV	54.0	-1.5	1.33 H	119	53.30	-0.80
5	4924.00	52.7 PK	74.0	-21.3	1.18 H	136	44.76	7.94
6	4924.00	47.4 AV	54.0	-6.6	1.18 H	136	39.46	7.94
7	7386.00	55.4 PK	74.0	-18.6	1.00 H	322	39.89	15.51
8	7386.00	44.6 AV	54.0	-9.4	1.00 H	322	29.09	15.51

**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	98.2 PK			1.00 V	142	99.09	-0.89
2	*2462.00	95.9 AV			1.00 V	142	96.79	-0.89
3	2483.50	59.9 PK	74.0	-14.1	1.00 V	142	60.70	-0.80
4	2483.50	46.3 AV	54.0	-7.7	1.00 V	142	47.10	-0.80
5	4924.00	49.8 PK	74.0	-24.2	1.10 V	275	41.86	7.94
6	4924.00	41.2 AV	54.0	-12.8	1.10 V	275	33.26	7.94
7	7386.00	55.8 PK	74.0	-18.2	1.01 V	98	40.29	15.51
8	7386.00	44.5 AV	54.0	-9.5	1.01 V	98	28.99	15.51

**REMARKS:**

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



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802.11g

<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	71.2 PK	74.0	-2.8	1.40 H	120	72.39	-1.19
2	2390.00	52.8 AV	54.0	-1.2	1.40 H	120	53.99	-1.19
3	*2412.00	109.6 PK			1.41 H	119	110.69	-1.09
4	*2412.00	101.2 AV			1.41 H	119	102.29	-1.09
5	4824.00	49.6 PK	74.0	-24.4	1.27 H	81	42.01	7.59
6	4824.00	37.9 AV	54.0	-16.1	1.27 H	81	30.31	7.59

**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	61.9 PK	74.0	-12.1	1.27 V	215	63.09	-1.19
2	2390.00	48.3 AV	54.0	-5.7	1.27 V	215	49.49	-1.19
3	*2412.00	100.4 PK			1.28 V	216	101.49	-1.09
4	*2412.00	89.8 AV			1.28 V	216	90.89	-1.09
5	4824.00	50.0 PK	74.0	-24.0	1.07 V	92	42.41	7.59
6	4824.00	37.6 AV	54.0	-16.4	1.07 V	92	30.01	7.59

**REMARKS:**

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





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<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	2390.00	70.3 PK	74.0	-3.7	1.14 H	132	71.49	-1.19
2	2390.00	50.1 AV	54.0	-3.9	1.14 H	132	51.29	-1.19
3	*2437.00	114.4 PK			1.35 H	120	115.39	-0.99
4	*2437.00	105.8 AV			1.35 H	120	106.79	-0.99
5	2483.50	72.9 PK	74.0	-1.1	1.34 H	122	73.70	-0.80
6	2483.50	51.6 AV	54.0	-2.4	1.34 H	122	52.40	-0.80
7	4874.00	50.7 PK	74.0	-23.3	1.28 H	84	42.93	7.77
8	4874.00	39.6 AV	54.0	-14.4	1.28 H	84	31.83	7.77
9	7311.00	54.5 PK	74.0	-19.5	1.00 H	145	39.01	15.49
10	7311.00	43.0 AV	54.0	-11.0	1.00 H	145	27.51	15.49

**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	61.2 PK	74.0	-12.8	1.28 V	209	62.39	-1.19
2	2390.00	45.9 AV	54.0	-8.1	1.28 V	209	47.09	-1.19
3	*2437.00	102.3 PK			1.24 V	218	103.29	-0.99
4	*2437.00	94.4 AV			1.24 V	218	95.39	-0.99
5	2483.50	63.6 PK	74.0	-10.4	1.25 V	201	64.40	-0.80
6	2483.50	47.1 AV	54.0	-6.9	1.25 V	201	47.90	-0.80
7	4874.00	49.8 PK	74.0	-24.2	1.02 V	128	42.03	7.77
8	4874.00	38.4 AV	54.0	-15.6	1.02 V	128	30.63	7.77
9	7311.00	54.2 PK	74.0	-19.8	1.01 V	169	38.71	15.49
10	7311.00	43.2 AV	54.0	-10.8	1.01 V	169	27.71	15.49

**REMARKS:**

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

<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	108.1 PK			1.35 H	119	108.99	-0.89
2	*2462.00	100.1 AV			1.35 H	119	100.99	-0.89
3	2483.50	72.7 PK	74.0	-1.3	1.36 H	120	73.50	-0.80
4	2483.50	52.1 AV	54.0	-1.9	1.36 H	120	52.90	-0.80
5	4924.00	50.3 PK	74.0	-23.7	1.25 H	92	42.36	7.94
6	4924.00	38.6 AV	54.0	-15.4	1.25 H	92	30.66	7.94
7	7386.00	54.3 PK	74.0	-19.7	1.00 H	122	38.79	15.51
8	7386.00	42.9 AV	54.0	-11.1	1.00 H	122	27.39	15.51

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	98.9 PK			1.31 V	221	99.79	-0.89
2	*2462.00	88.7 AV			1.31 V	221	89.59	-0.89
3	2483.50	62.1 PK	74.0	-11.9	1.25 V	226	62.90	-0.80
4	2483.50	48.3 AV	54.0	-5.7	1.25 V	226	49.10	-0.80
5	4924.00	50.3 PK	74.0	-23.7	1.10 V	113	42.36	7.94
6	4924.00	37.9 AV	54.0	-16.1	1.10 V	113	29.96	7.94
7	7386.00	54.3 PK	74.0	-19.7	1.02 V	147	38.79	15.51
8	7386.00	43.0 AV	54.0	-11.0	1.02 V	147	27.49	15.51

**REMARKS:**

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

**802.11n (HT20)**

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

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	73.2 PK	74.0	-0.8	1.42 H	121	74.39	-1.19
2	2390.00	53.1 AV	54.0	-0.9	1.42 H	121	54.29	-1.19
3	*2412.00	108.2 PK			1.42 H	122	109.29	-1.09
4	*2412.00	98.3 AV			1.42 H	122	99.39	-1.09
5	4824.00	50.4 PK	74.0	-23.6	1.65 H	90	42.81	7.59
6	4824.00	38.4 AV	54.0	-15.6	1.65 H	90	30.81	7.59
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
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	60.6 PK	74.0	-13.4	1.29 V	231	61.79	-1.19
2	2390.00	48.1 AV	54.0	-5.9	1.29 V	231	49.29	-1.19
3	*2412.00	98.1 PK			1.29 V	230	99.19	-1.09
4	*2412.00	88.1 AV			1.29 V	230	89.19	-1.09
5	4824.00	50.2 PK	74.0	-23.8	1.10 V	94	42.61	7.59
6	4824.00	38.0 AV	54.0	-16.0	1.10 V	94	30.41	7.59

**REMARKS:**

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



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<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	2390.00	70.3 PK	74.0	-3.7	1.13 H	136	71.49	-1.19
2	2390.00	47.6 AV	54.0	-6.4	1.13 H	136	48.79	-1.19
3	*2437.00	115.1 PK			1.35 H	120	116.09	-0.99
4	*2437.00	105.5 AV			1.35 H	120	106.49	-0.99
5	2483.50	72.1 PK	74.0	-1.9	1.36 H	119	72.90	-0.80
6	2483.50	49.8 AV	54.0	-4.2	1.36 H	119	50.60	-0.80
7	4874.00	51.0 PK	74.0	-23.0	1.66 H	89	43.23	7.77
8	4874.00	39.2 AV	54.0	-14.8	1.66 H	89	31.43	7.77
9	7311.00	54.3 PK	74.0	-19.7	1.00 H	132	38.81	15.49
10	7311.00	43.1 AV	54.0	-10.9	1.00 H	132	27.61	15.49

**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	58.3 PK	74.0	-15.7	1.30 V	218	59.49	-1.19
2	2390.00	46.1 AV	54.0	-7.9	1.30 V	218	47.29	-1.19
3	*2437.00	105.3 PK			1.29 V	235	106.29	-0.99
4	*2437.00	95.3 AV			1.29 V	235	96.29	-0.99
5	2483.50	58.1 PK	74.0	-15.9	1.31 V	231	58.90	-0.80
6	2483.50	46.4 AV	54.0	-7.6	1.31 V	231	47.20	-0.80
7	4874.00	49.8 PK	74.0	-24.2	1.05 V	117	42.03	7.77
8	4874.00	38.4 AV	54.0	-15.6	1.05 V	117	30.63	7.77
9	7311.00	54.0 PK	74.0	-20.0	1.00 V	167	38.51	15.49
10	7311.00	43.0 AV	54.0	-11.0	1.00 V	167	27.51	15.49

**REMARKS:**

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



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<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	107.9 PK			1.37 H	120	108.79	-0.89
2	*2462.00	98.1 AV			1.37 H	120	98.99	-0.89
3	2483.50	73.0 PK	74.0	-1.0	1.37 H	120	73.80	-0.80
4	2483.50	50.8 AV	54.0	-3.2	1.37 H	120	51.60	-0.80
5	4924.00	50.3 PK	74.0	-23.7	1.60 H	86	42.36	7.94
6	4924.00	38.5 AV	54.0	-15.5	1.60 H	86	30.56	7.94
7	7386.00	54.1 PK	74.0	-19.9	1.05 H	132	38.59	15.51
8	7386.00	42.8 AV	54.0	-11.2	1.05 H	132	27.29	15.51

**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	98.4 PK			1.34 V	216	99.29	-0.89
2	*2462.00	88.4 AV			1.34 V	216	89.29	-0.89
3	2483.50	61.0 PK	74.0	-13.0	1.28 V	238	61.80	-0.80
4	2483.50	48.4 AV	54.0	-5.6	1.28 V	238	49.20	-0.80
5	4924.00	50.5 PK	74.0	-23.5	1.10 V	105	42.56	7.94
6	4924.00	38.3 AV	54.0	-15.7	1.10 V	105	30.36	7.94
7	7386.00	53.8 PK	74.0	-20.2	1.00 V	162	38.29	15.51
8	7386.00	42.7 AV	54.0	-11.3	1.00 V	162	27.19	15.51

**REMARKS:**

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

### 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	FSP40	100037	Nov. 01, 2012	Oct. 31, 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. Tested date : May 30, 2013

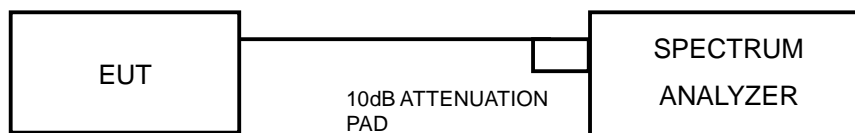
#### 4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100kHz
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	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
1	2412	10.45	10.55	0.5	PASS
6	2437	10.69	10.74	0.5	PASS
11	2462	10.40	10.49	0.5	PASS

#### 802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
1	2412	16.42	16.43	0.5	PASS
6	2437	16.40	16.40	0.5	PASS
11	2462	16.44	16.44	0.5	PASS

#### 802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
1	2412	17.64	17.67	0.5	PASS
6	2437	17.36	17.60	0.5	PASS
11	2462	17.64	17.64	0.5	PASS

## 4.4 CONDUCTED OUTPUT POWER MEASUREMENT

### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

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

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

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

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

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

### 4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

- Note:**
- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  - Tested date : May 30, 2013

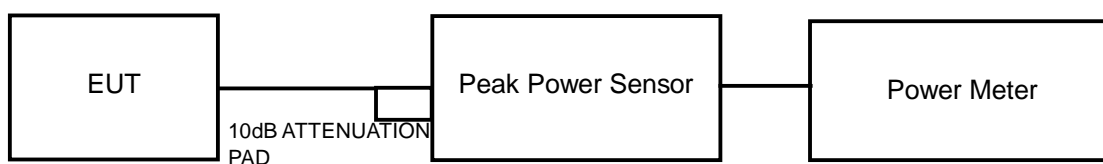
### 4.4.3 TEST PROCEDURES

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







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#### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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#### 4.4.7 TEST RESULTS

##### 802.11b

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	17.56	17.14	108.777	20.37	30	PASS
6	2437	24.71	24.05	549.898	27.40	30	PASS
11	2462	20.57	19.81	209.744	23.22	30	PASS

##### 802.11g

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	18.82	18.31	143.972	21.58	30	PASS
6	2437	25.47	24.85	657.863	28.18	30	PASS
11	2462	21.26	20.31	241.059	23.82	30	PASS

##### 802.11n (HT20)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	18.92	17.97	140.644	21.48	30	PASS
6	2437	25.34	24.66	634.394	28.02	30	PASS
11	2462	20.51	18.94	190.803	22.81	30	PASS

## 4.5 Average Output Power

### 4.5.1 FOR REFERENCE.

### 4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

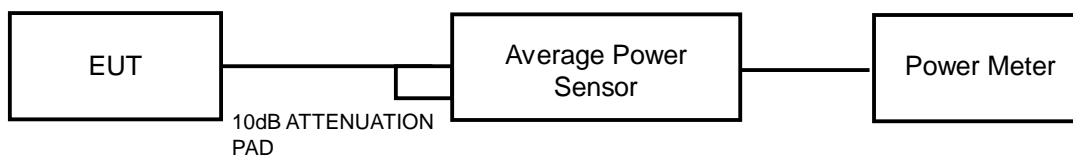
**Note:**

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 : May 30, 2013

### 4.5.3 TEST PROCEDURES

The average 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.

### 4.5.4 TEST SETUP



### 4.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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## 4.5.6 TEST RESULTS

### 802.11b

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	15.44	14.98	66.472	18.23
6	2437	23.03	22.47	377.513	25.77
11	2462	18.88	17.79	137.385	21.38

### 802.11g

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	10.98	10.52	23.803	13.77
6	2437	20.06	19.43	189.091	22.77
11	2462	13.27	12.28	38.136	15.81

### 802.11n (HT20)

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	10.57	10.06	21.541	13.33
6	2437	19.64	18.77	167.381	22.24
11	2462	12.72	10.94	31.124	14.93

## 4.6 POWER SPECTRAL DENSITY MEASUREMENT

### 4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 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. Tested date : May 30, 2013

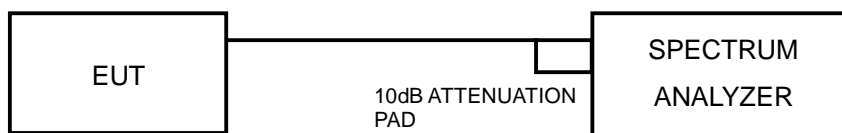
### 4.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 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 amplitude level.

### 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



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#### 4.6.7 TEST RESULTS

##### 802.11b

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-9.82	3.01	-6.81	7.85	PASS
	6	2437	-3.11	3.01	-0.10	7.85	PASS
	11	2462	-6.05	3.01	-3.04	7.85	PASS
1	1	2412	-10.35	3.01	-7.34	7.85	PASS
	6	2437	-2.00	3.01	1.01	7.85	PASS
	11	2462	-6.33	3.01	-3.32	7.85	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.15\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(6.15-6) = 7.85\text{dBm}$ .

##### 802.11g

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-15.38	3.01	-12.37	7.85	PASS
	6	2437	-5.81	3.01	-2.80	7.85	PASS
	11	2462	-13.95	3.01	-10.94	7.85	PASS
1	1	2412	-15.93	3.01	-12.92	7.85	PASS
	6	2437	-6.00	3.01	-2.99	7.85	PASS
	11	2462	-13.49	3.01	-10.48	7.85	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.15\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(6.15-6) = 7.85\text{dBm}$ .

##### 802.11n (HT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-15.84	3.01	-12.83	7.85	PASS
	6	2437	-7.05	3.01	-4.04	7.85	PASS
	11	2462	-13.83	3.01	-10.82	7.85	PASS
1	1	2412	-17.54	3.01	-14.53	7.85	PASS
	6	2437	-7.62	3.01	-4.61	7.85	PASS
	11	2462	-14.66	3.01	-11.65	7.85	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.15\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(6.15-6) = 7.85\text{dBm}$ .



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## 4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 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. Tested date : May 30, 2013

### 4.7.3 TEST PROCEDURE

#### Measurement Procedure - Reference Level

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.

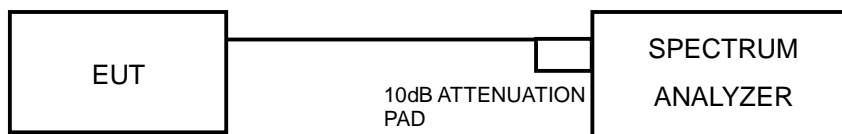
### Measurement Procedure –Unwanted Emission Level

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.

#### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.7.5 TEST SETUP



#### 4.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

#### 4.7.7 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



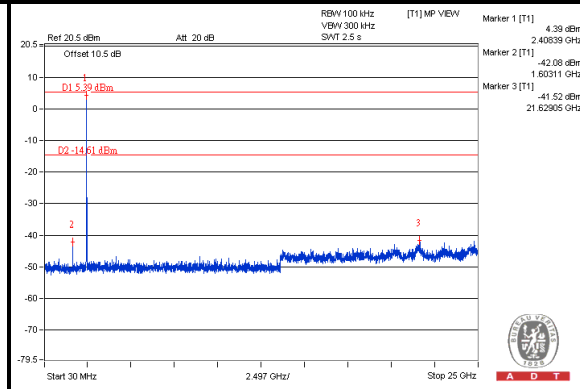
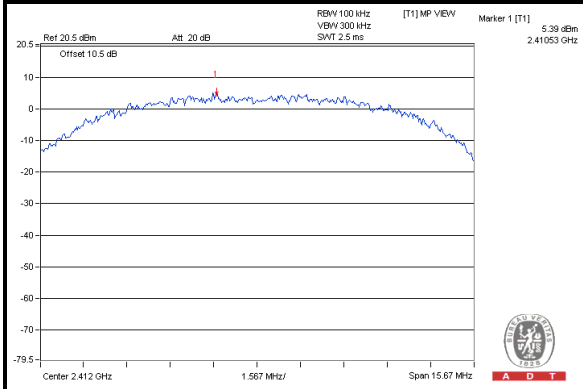


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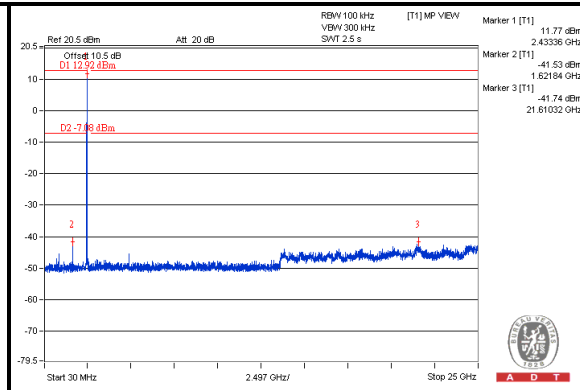
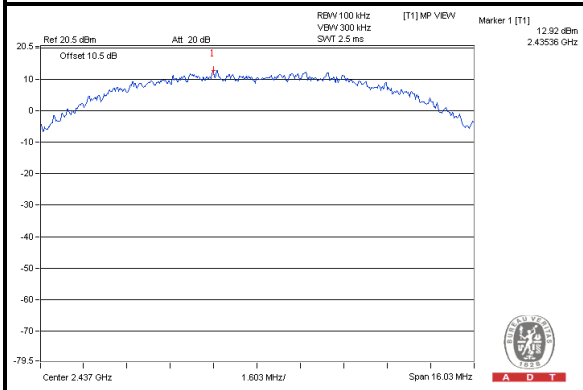
### 802.11b:

### For Chain(0)

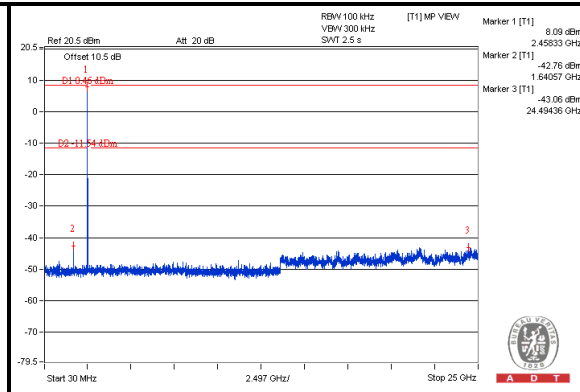
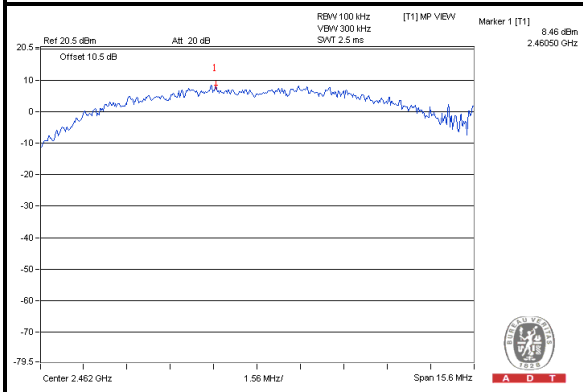
#### CH 1



#### CH 6



#### CH 11

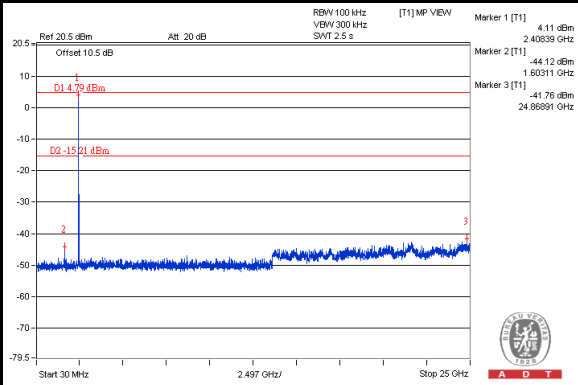
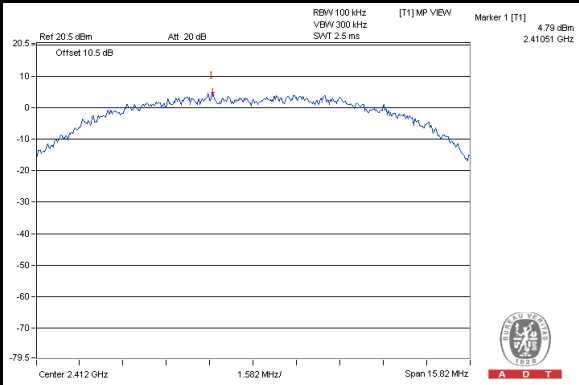




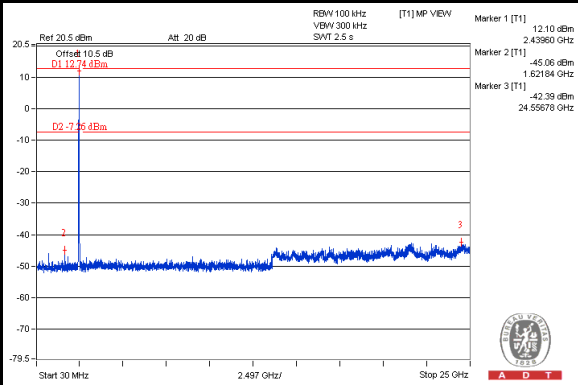
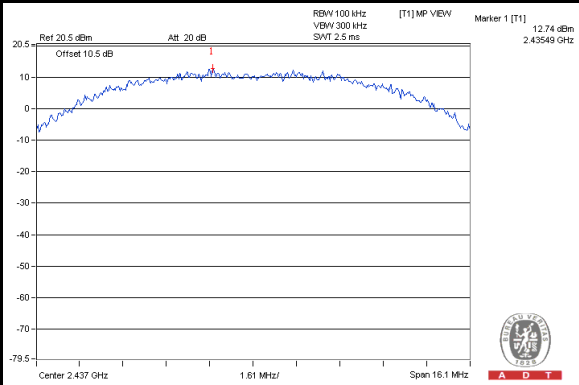
A D T

### For Chain(1)

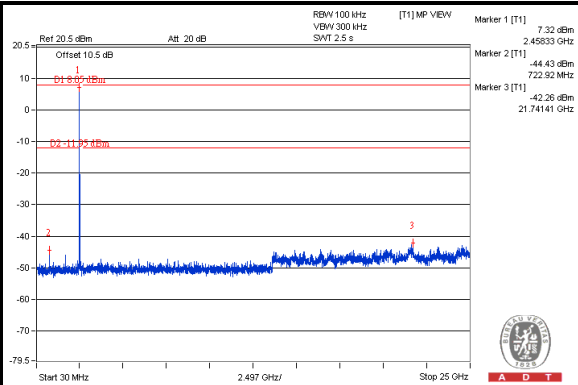
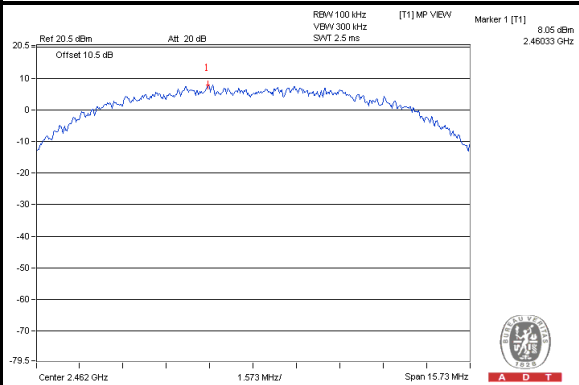
### CH 1



### CH 6



### CH 11



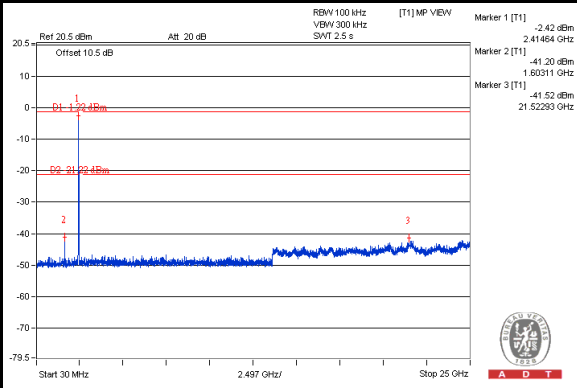
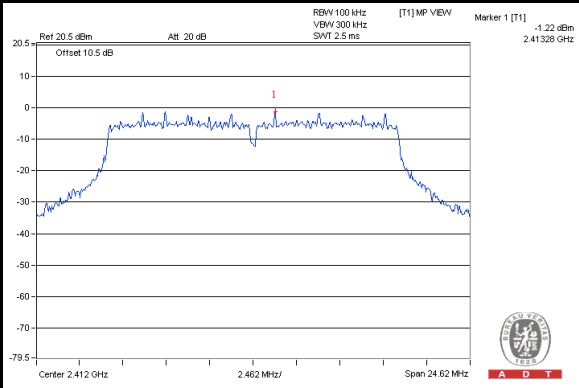


A D T

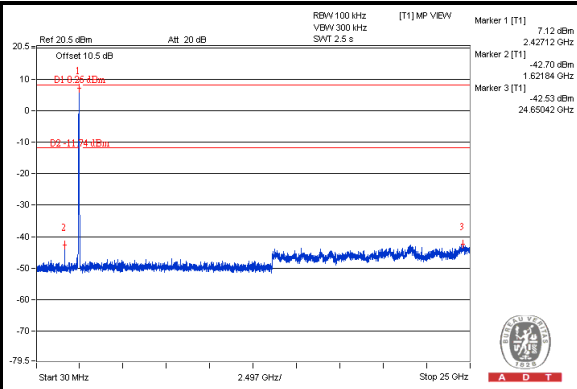
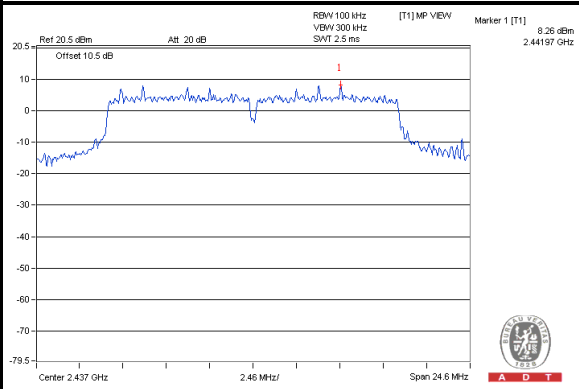
802.11g:

For Chain(0)

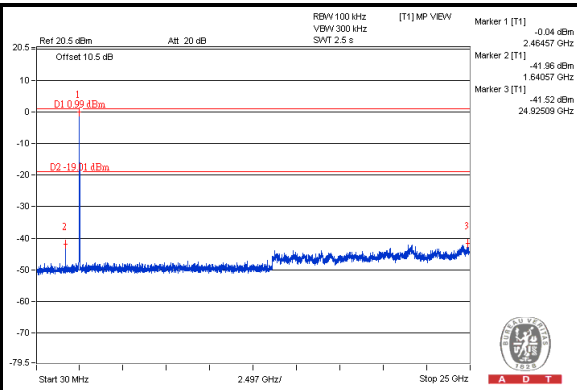
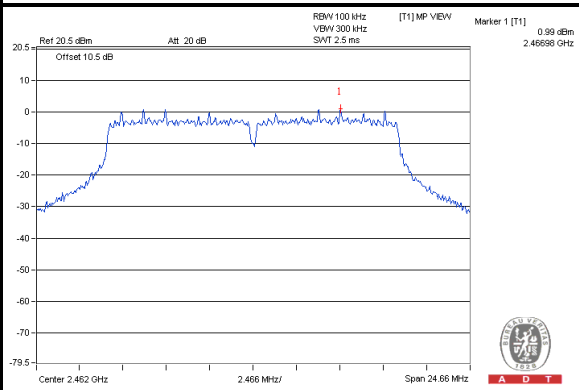
CH 1



CH 6



CH 11

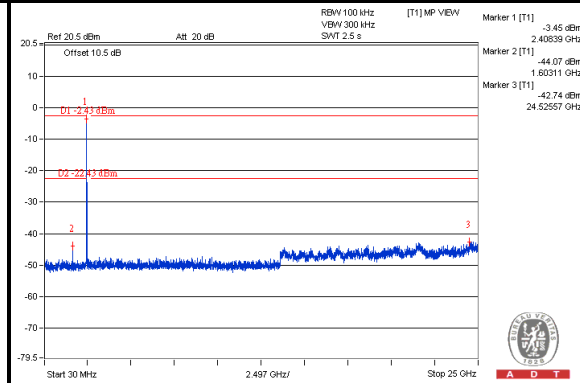
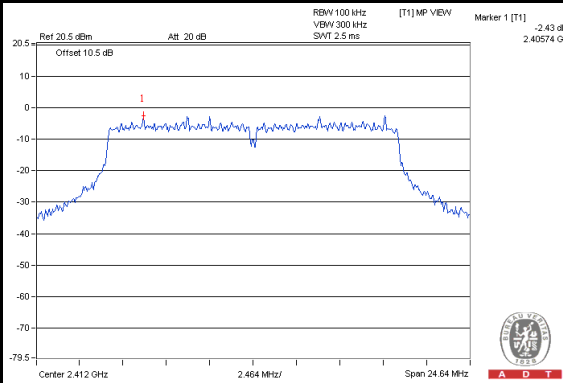




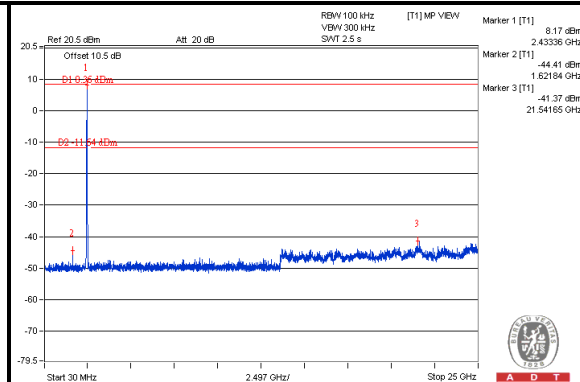
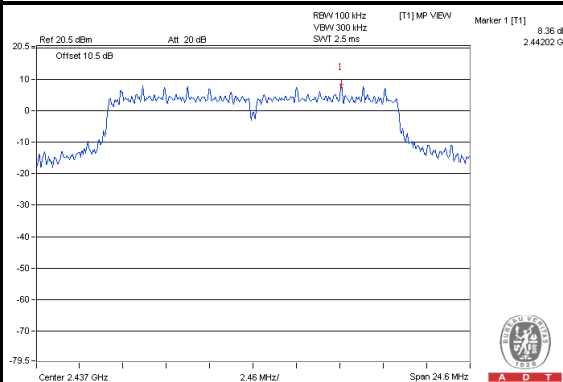
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### For Chain(1)

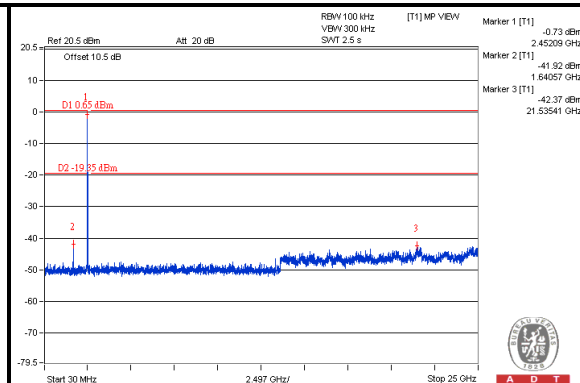
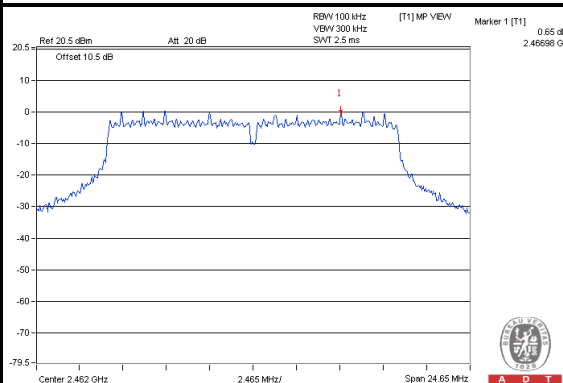
### CH 1



### CH 6



### CH 11



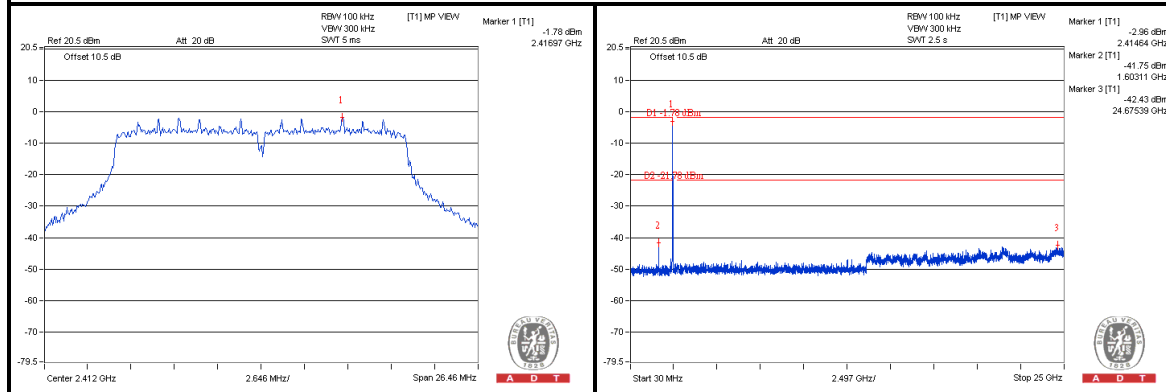


A D T

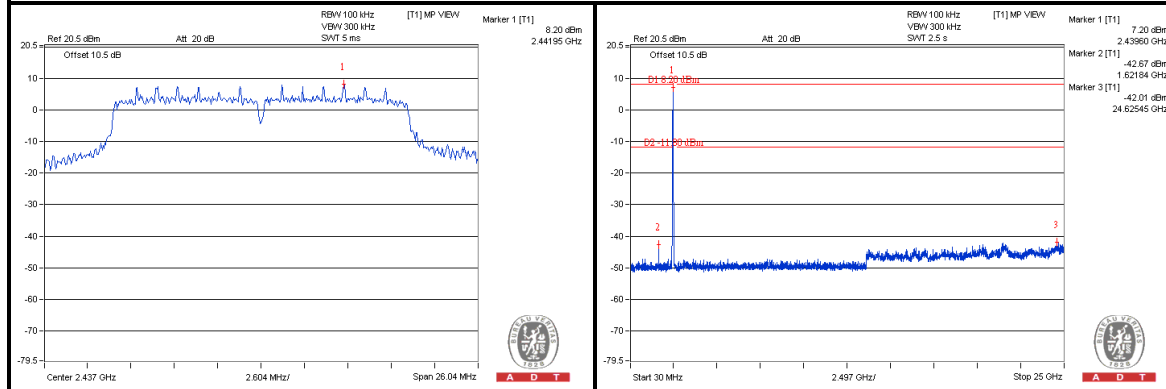
### 802.11n (HT20):

#### For Chain(0)

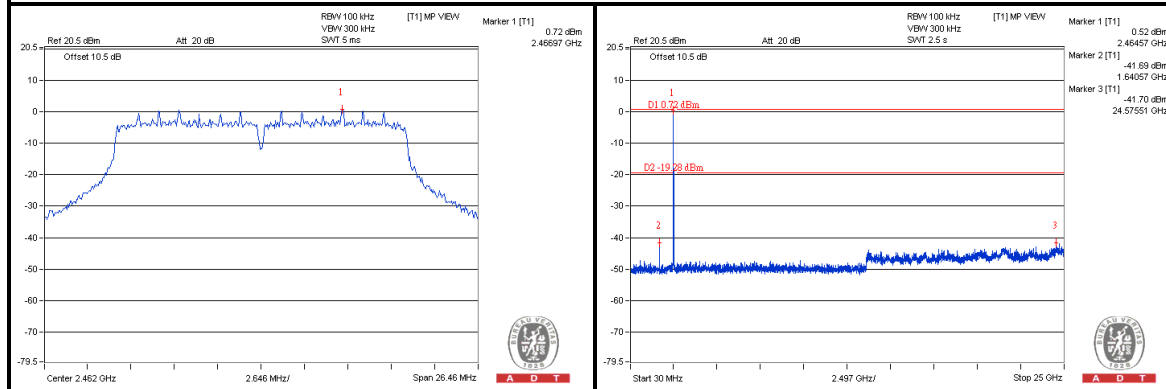
#### CH 1



#### CH 6



#### CH 11

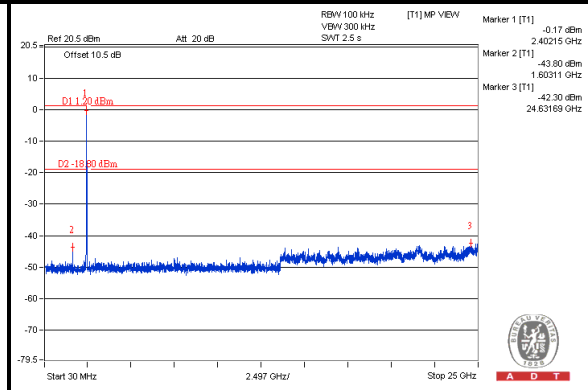
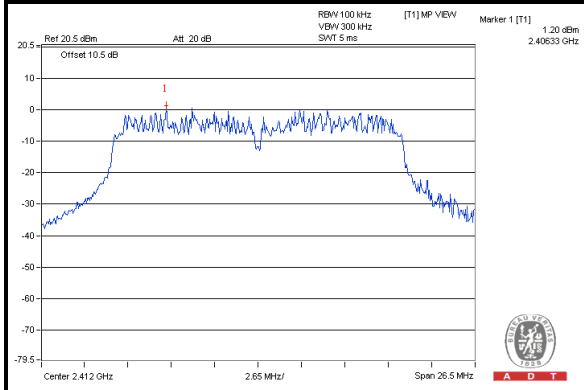




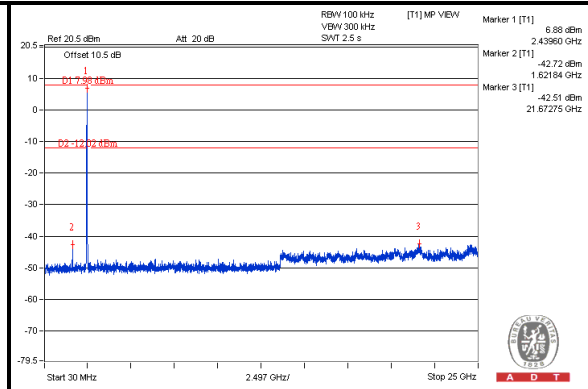
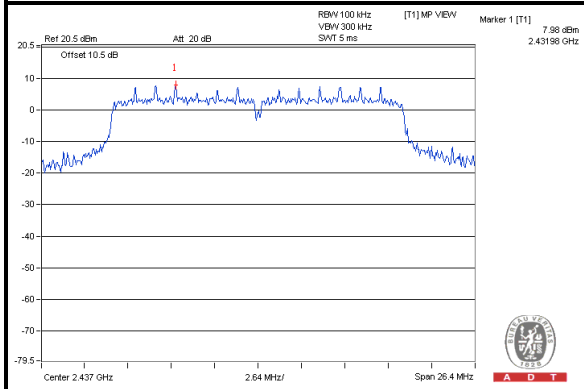
A D T

### For Chain(1)

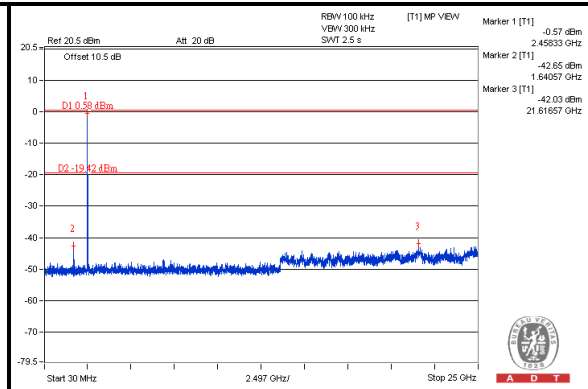
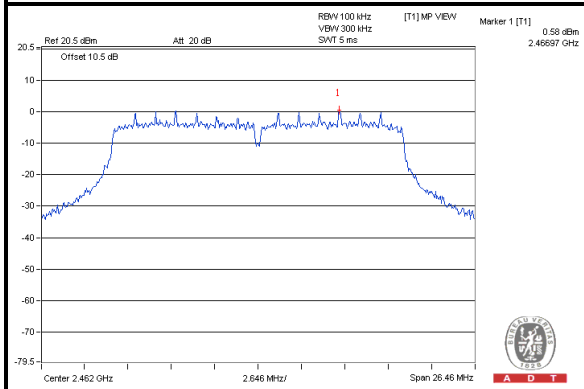
#### CH 1



#### CH 6



#### CH 11





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## 5. TEST TYPES AND RESULTS (FOR 5GHz, 5725~5850MHz 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.

#### 5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 08, 2012	June 07, 2013
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: May 29, 2013

### 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.
- b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

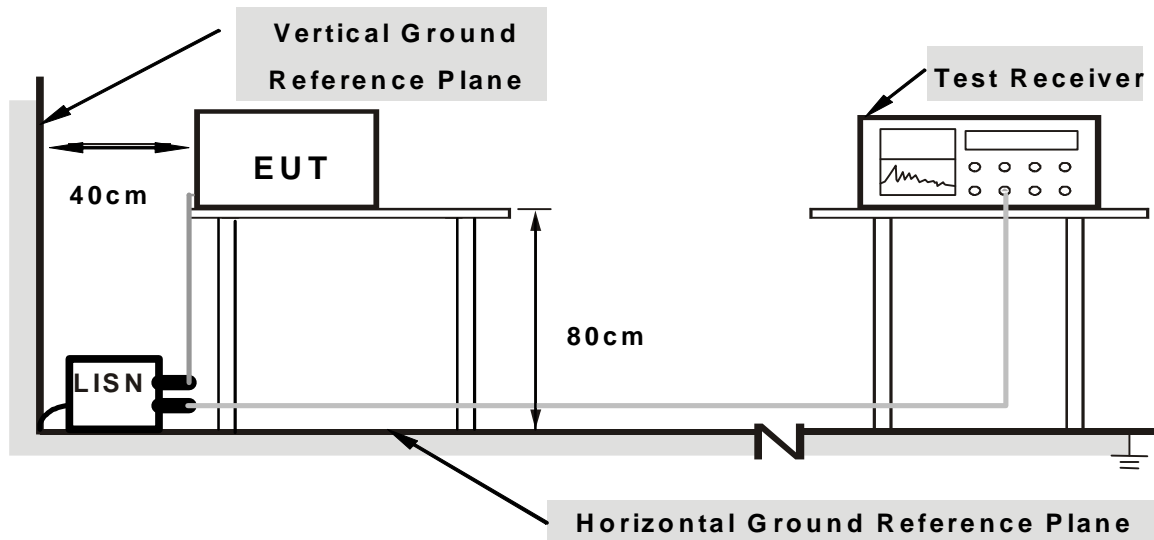
**NOTE:** The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation



### 5.1.5 TEST SETUP



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

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

### 5.1.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

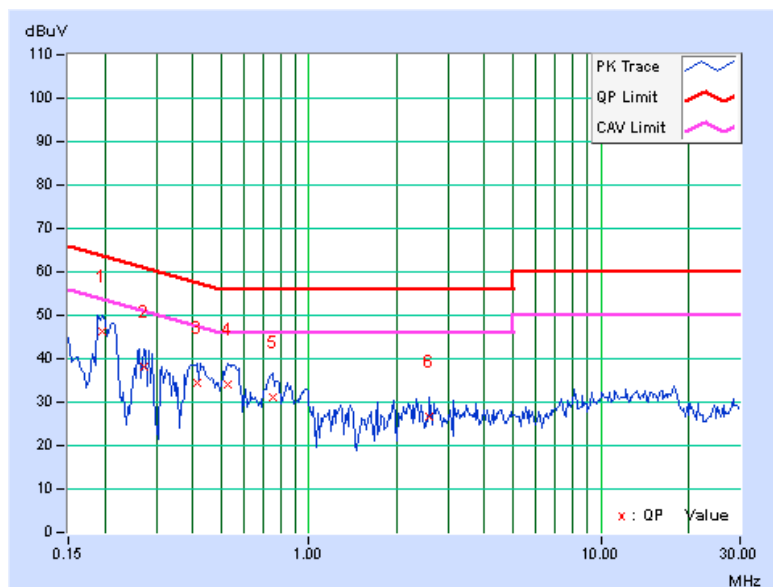
### 5.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP) / Average (AV)
--------------	----------	--------------------------	--------------------------------

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	0.19687	0.14	46.17	33.06	46.31	33.20	63.74
2	0.27109	0.15	37.84	23.70	37.99	23.85	61.08	51.08	-23.09	-27.23
3	0.41563	0.18	34.22	21.18	34.40	21.36	57.54	47.54	-23.13	-26.17
4	0.52891	0.19	34.01	20.40	34.20	20.59	56.00	46.00	-21.80	-25.41
5	0.75156	0.20	31.03	17.75	31.23	17.95	56.00	46.00	-24.77	-28.05
6	2.59766	0.30	26.52	15.36	26.82	15.66	56.00	46.00	-29.18	-30.34

#### 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

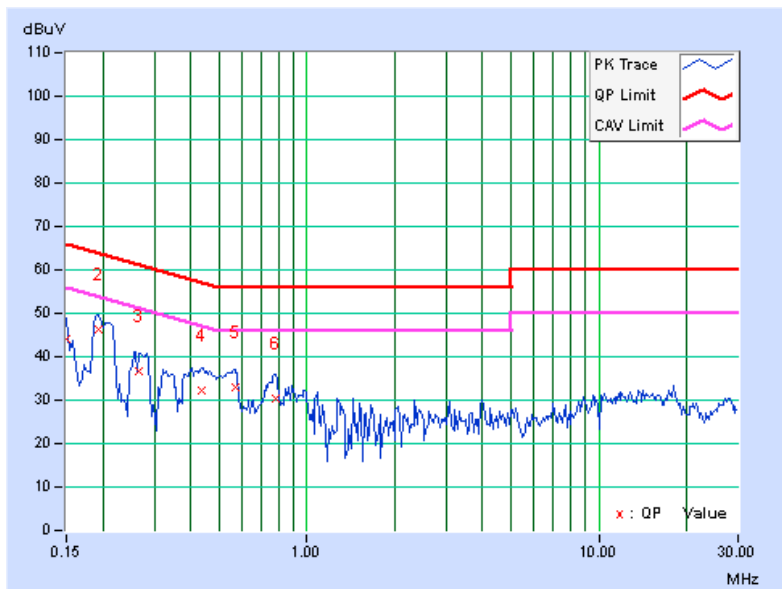


<b>PHASE</b>	Neutral (N)	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP) / Average (AV)
--------------	-------------	--------------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.10	43.83	24.07	43.93	24.17	66.00	56.00	-22.07	-31.83
2	0.19297	0.12	46.29	32.76	46.41	32.88	63.91	53.91	-17.50	-21.03
3	0.26719	0.14	36.67	23.60	36.81	23.74	61.20	51.20	-24.40	-27.47
4	0.43516	0.17	31.97	18.23	32.14	18.40	57.15	47.15	-25.01	-28.75
5	0.56797	0.18	32.89	21.77	33.07	21.95	56.00	46.00	-22.93	-24.05
6	0.77891	0.19	30.18	18.02	30.37	18.21	56.00	46.00	-25.63	-27.79

**REMARKS:**

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



## 5.2 RADIATED AND BANDEDGE EMISSION MEASUREMENT

### 5.2.1 LIMITS OF RADIATED AND BANDEDGE EMISSION 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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## 5.2.2 TEST INSTRUMENTS

### For Below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	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: May 29, 2013



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**For Above 1GHz test:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 26, 2012	June 25, 2013
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	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: June 05, 2013

### 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 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 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.

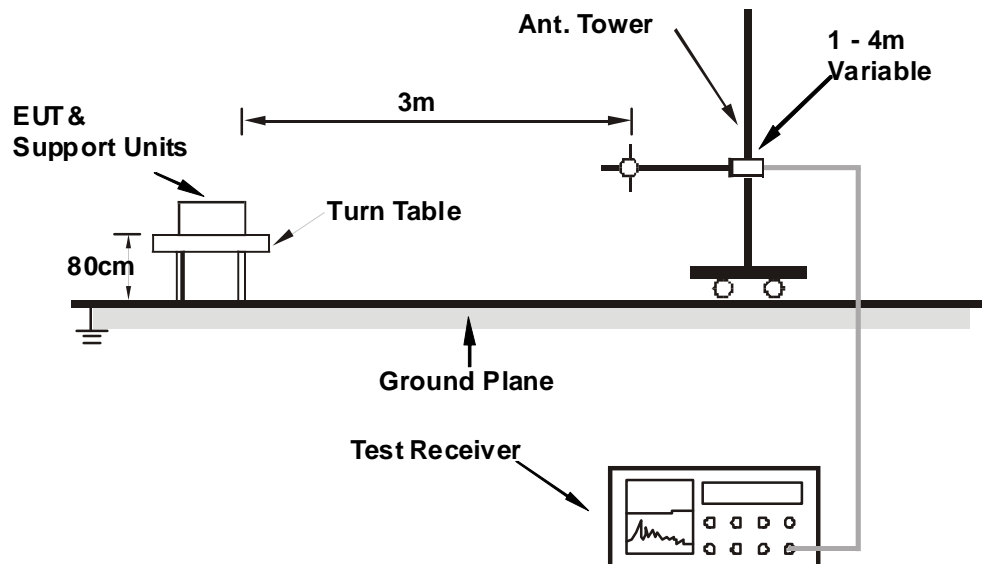
#### **NOTE:**

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.

### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.2.5 TEST SETUP



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

### 5.2.6 EUT OPERATING CONDITIONS

Same as the 4.1.6



## 5.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### 802.11n (HT20)

<b>CHANNEL</b>	TX Channel 149	<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	180.06	20.5 QP	43.5	-23.0	1.00 H	340	35.16	-14.65
2	240.00	32.4 QP	46.0	-13.6	1.31 H	306	46.90	-14.52
3	437.59	34.5 QP	46.0	-11.5	2.00 H	335	43.14	-8.67
4	600.02	31.2 QP	46.0	-14.8	1.50 H	277	36.56	-5.38
5	649.98	30.4 QP	46.0	-15.6	1.00 H	225	34.91	-4.54
6	750.03	31.4 QP	46.0	-14.6	1.00 H	269	33.93	-2.57

#### 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	118.85	27.2 QP	43.5	-16.3	2.00 V	319	42.35	-15.19
2	240.05	21.6 QP	46.0	-24.4	2.00 V	251	36.13	-14.52
3	385.12	34.0 QP	46.0	-12.0	2.00 V	53	44.27	-10.23
4	480.03	32.9 QP	46.0	-13.1	2.00 V	333	40.98	-8.07
5	720.35	30.8 QP	46.0	-15.2	2.00 V	144	34.57	-3.79
6	940.64	27.4 QP	46.0	-18.6	1.50 V	335	26.98	0.46

#### REMARKS:

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



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## ABOVE 1GHz DATA

## 802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		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	5460.00	60.2 PK	74.0	-13.8	1.63 H	213	50.55	9.65
2	5460.00	48.5 AV	54.0	-5.5	1.63 H	213	38.85	9.65
3	*5745.00	106.4 PK			1.60 H	300	95.98	10.42
4	*5745.00	97.2 AV			1.60 H	300	86.78	10.42
5	11490.00	64.6 PK	74.0	-9.4	1.41 H	44	47.34	17.26
6	11490.00	53.2 AV	54.0	-0.8	1.41 H	44	35.94	17.26

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	60.0 PK	74.0	-14.0	1.66 V	207	50.35	9.65
2	5460.00	48.4 AV	54.0	-5.6	1.66 V	207	38.75	9.65
3	*5745.00	110.9 PK			1.66 V	206	100.48	10.42
4	*5745.00	101.6 AV			1.66 V	206	91.18	10.42
5	11490.00	60.7 PK	74.0	-13.3	1.05 V	337	43.44	17.26
6	11490.00	49.3 AV	54.0	-4.7	1.05 V	337	32.04	17.26

## REMARKS:

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



<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5785.00	106.3 PK			1.56 H	291	95.81	10.49
2	*5785.00	97.1 AV			1.56 H	291	86.61	10.49
3	11570.00	64.7 PK	74.0	-9.3	1.50 H	41	47.41	17.29
4	11570.00	53.1 AV	54.0	-0.9	1.50 H	41	35.81	17.29

**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	109.7 PK			1.70 V	216	99.21	10.49
2	*5785.00	100.5 AV			1.70 V	216	90.01	10.49
3	11570.00	60.6 PK	74.0	-13.4	1.09 V	328	43.31	17.29
4	11570.00	49.5 AV	54.0	-4.5	1.09 V	328	32.21	17.29

**REMARKS:**

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

<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5825.00	105.2 PK			1.56 H	307	94.55	10.65
2	*5825.00	96.3 AV			1.56 H	307	85.65	10.65
3	11650.00	65.1 PK	74.0	-8.9	1.37 H	47	47.44	17.66
4	11650.00	53.4 AV	54.0	-0.6	1.37 H	47	35.74	17.66

**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	108.2 PK			1.66 V	229	97.55	10.65
2	*5825.00	99.8 AV			1.66 V	229	89.15	10.65
3	11650.00	60.3 PK	74.0	-13.7	1.06 V	326	42.64	17.66
4	11650.00	49.6 AV	54.0	-4.4	1.06 V	326	31.94	17.66

**REMARKS:**

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



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802.11n (HT20)

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5745.00	106.5 PK			1.54 H	313	96.08	10.42
2	*5745.00	97.3 AV			1.54 H	313	86.88	10.42
3	11490.00	65.5 PK	74.0	-8.5	1.42 H	46	48.24	17.26
4	11490.00	53.1 AV	54.0	-0.9	1.42 H	46	35.84	17.26

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	111.3 PK			1.66 V	211	100.88	10.42
2	*5745.00	101.8 AV			1.66 V	211	91.38	10.42
3	11490.00	60.3 PK	74.0	-13.7	1.06 V	323	43.04	17.26
4	11490.00	49.0 AV	54.0	-5.0	1.06 V	323	31.74	17.26

**REMARKS:**

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



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<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5785.00	105.6 PK			1.57 H	305	95.11	10.49
2	*5785.00	96.7 AV			1.57 H	305	86.21	10.49
3	11570.00	64.7 PK	74.0	-9.3	1.39 H	45	47.41	17.29
4	11570.00	53.4 AV	54.0	-0.6	1.39 H	45	36.11	17.29

**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	109.1 PK			1.70 V	217	98.61	10.49
2	*5785.00	100.1 AV			1.70 V	217	89.61	10.49
3	11570.00	60.4 PK	74.0	-13.6	1.08 V	328	43.11	17.29
4	11570.00	49.5 AV	54.0	-4.5	1.08 V	328	32.21	17.29

**REMARKS:**

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



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<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5825.00	105.5 PK			1.54 H	302	94.85	10.65
2	*5825.00	96.4 AV			1.54 H	302	85.75	10.65
3	11650.00	64.4 PK	74.0	-9.6	1.39 H	47	46.74	17.66
4	11650.00	53.4 AV	54.0	-0.6	1.39 H	47	35.74	17.66

**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	109.6 PK			1.67 V	210	98.95	10.65
2	*5825.00	100.7 AV			1.67 V	210	90.05	10.65
3	11650.00	60.6 PK	74.0	-13.4	1.05 V	333	42.94	17.66
4	11650.00	49.5 AV	54.0	-4.5	1.05 V	333	31.84	17.66

**REMARKS:**

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



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802.11n (HT40)

<b>CHANNEL</b>	TX Channel 151	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5755.00	104.3 PK			1.61 H	301	93.87	10.43
2	*5755.00	94.5 AV			1.61 H	301	84.07	10.43
3	11510.00	66.3 PK	74.0	-7.7	1.38 H	57	49.07	17.23
4	11510.00	53.5 AV	54.0	-0.5	1.38 H	57	36.27	17.23

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

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5755.00	106.5 PK			2.00 V	356	96.07	10.43
2	*5755.00	96.4 AV			2.00 V	356	85.97	10.43
3	11510.00	59.1 PK	74.0	-14.9	1.00 V	231	41.87	17.23
4	11510.00	47.5 AV	54.0	-6.5	1.00 V	231	30.27	17.23

**REMARKS:**

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





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<b>CHANNEL</b>	TX Channel 159	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5795.00	104.0 PK			1.56 H	287	93.50	10.50
2	*5795.00	94.4 AV			1.56 H	287	83.90	10.50
3	11590.00	64.2 PK	74.0	-9.8	1.37 H	50	46.89	17.31
4	11590.00	53.3 AV	54.0	-0.7	1.37 H	50	35.99	17.31

**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	106.2 PK			2.00 V	358	95.70	10.50
2	*5795.00	96.2 AV			2.00 V	358	85.70	10.50
3	11590.00	58.5 PK	74.0	-15.5	1.00 V	225	41.19	17.31
4	11590.00	47.1 AV	54.0	-6.9	1.00 V	225	29.79	17.31

**REMARKS:**

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

### 5.3 6dB BANDWIDTH MEASUREMENT

#### 5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 5.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 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. Tested date : May 30, 2013

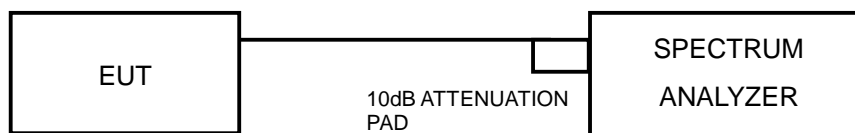
#### 5.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100kHz
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

#### 5.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 5.3.5 TEST SETUP



#### 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

#### 802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.33	16.37	0.5	PASS
157	5785	16.10	15.98	0.5	PASS
165	5825	16.07	16.07	0.5	PASS

#### 802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.32	16.96	0.5	PASS
157	5785	16.18	16.08	0.5	PASS
165	5825	16.31	15.75	0.5	PASS

#### 802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	35.80	35.21	0.5	PASS
159	5795	36.34	35.78	0.5	PASS

## 5.4 CONDUCTED OUTPUT POWER MEASUREMENT

### 5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

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

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

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

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

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

### 5.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

- Note:**
- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  - Tested date : May 30, 2013

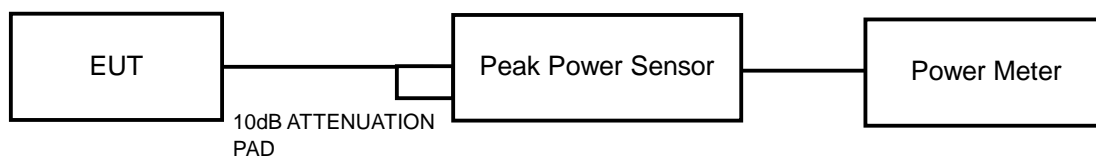
### 5.4.3 TEST PROCEDURES

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.

### 5.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.4.5 TEST SETUP



### 5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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## 5.4.7 TEST RESULTS

### 802.11a

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	22.32	21.31	305.815	24.85	30	PASS
157	5785	22.71	21.48	327.243	25.15	30	PASS
165	5825	22.45	21.33	311.623	24.94	30	PASS

### 802.11n (HT20)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
149	5745	23.01	22.13	363.291	25.60	30	PASS
157	5785	22.86	21.58	337.077	25.28	30	PASS
165	5825	22.66	21.52	326.408	25.14	30	PASS

### 802.11n (HT40)

CHAN.	FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
151	5755	22.55	21.21	312.017	24.94	30	PASS
159	5795	22.97	22.12	361.083	25.58	30	PASS

## 5.5 Average Output Power

### 5.5.1 FOR REFERENCE.

### 5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

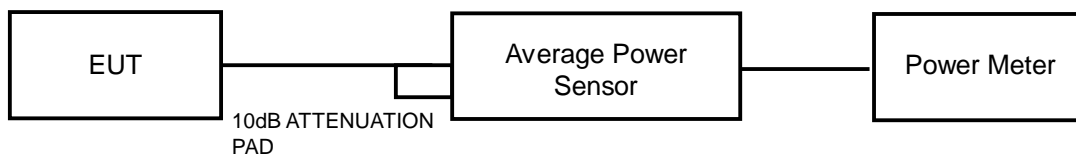
**Note:**

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 : May 30, 2013

### 5.5.3 TEST PROCEDURES

The average 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.

### 5.5.4 TEST SETUP



### 5.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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### 5.5.6 TEST RESULTS

#### 802.11a

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
149	5745	18.07	17.17	116.240	20.65
157	5785	17.91	17.22	114.525	20.59
165	5825	17.64	16.96	107.735	20.32

#### 802.11n (HT20)

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
149	5745	18.42	17.69	128.251	21.08
157	5785	17.92	17.56	118.960	20.75
165	5825	18.38	17.67	127.344	21.05

#### 802.11n (HT40)

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
151	5755	19.35	18.25	152.933	21.85
159	5795	20.14	18.93	181.439	22.59



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## 5.6 POWER SPECTRAL DENSITY MEASUREMENT

### 5.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP 40	100037	Nov. 01, 2012	Oct. 31, 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. Tested date : May 30, 2013

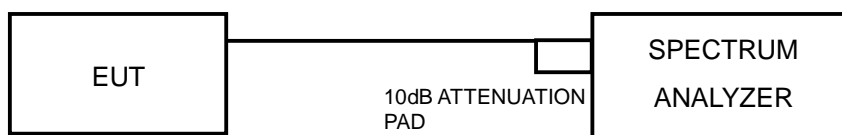
### 5.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 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 amplitude level.

### 5.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.6.5 TEST SETUP



### 5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6





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### 5.6.7 TEST RESULTS

#### 802.11a

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-7.37	3.01	-4.36	5.58	PASS
	157	5785	-6.47	3.01	-3.46	5.58	PASS
	165	5825	-7.55	3.01	-4.54	5.58	PASS
1	149	5745	-8.72	3.01	-5.71	5.58	PASS
	157	5785	-8.47	3.01	-5.46	5.58	PASS
	165	5825	-8.31	3.01	-5.30	5.58	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 8.42\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(8.42-6) = 5.58\text{dBm}$ .

#### 802.11n (HT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-6.18	3.01	-3.17	5.58	PASS
	157	5785	-6.42	3.01	-3.41	5.58	PASS
	165	5825	-6.03	3.01	-3.02	5.58	PASS
1	149	5745	-8.81	3.01	-5.80	5.58	PASS
	157	5785	-9.46	3.01	-6.45	5.58	PASS
	165	5825	-8.60	3.01	-5.59	5.58	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 8.42\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(8.42-6) = 5.58\text{dBm}$ .

#### 802.11n (HT40)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-8.01	3.01	-5.00	5.58	PASS
	159	5795	-7.20	3.01	-4.19	5.58	PASS
1	151	5755	-9.04	3.01	-6.03	5.58	PASS
	159	5795	-10.88	3.01	-7.87	5.58	PASS

**NOTE:** Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 8.42\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $8-(8.42-6) = 5.58\text{dBm}$ .



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## 5.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

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

### 5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 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. Tested date : May 30, 2013

### 5.7.3 TEST PROCEDURE

#### Measurement Procedure - Reference Level

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.

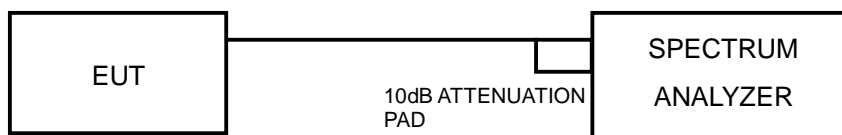
### Measurement Procedure –Unwanted Emission Level

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.

#### 5.7.4 DEVIATION FROM TEST STANDARD

No deviation

#### 5.7.5 TEST SETUP



#### 5.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

#### 5.7.7 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.

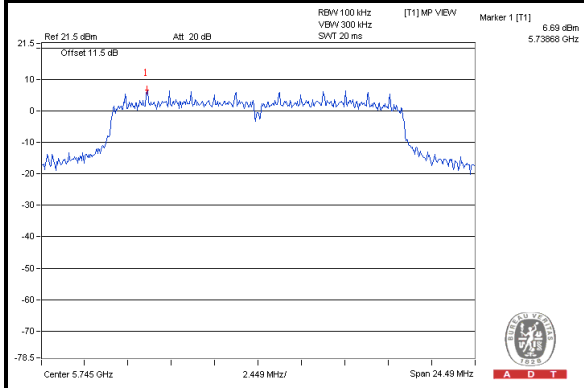


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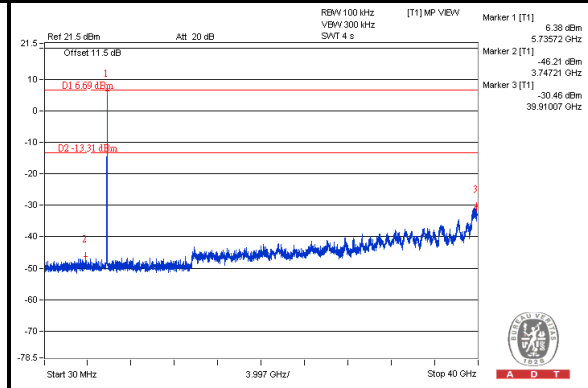
### 802.11a

### For Chain(0)

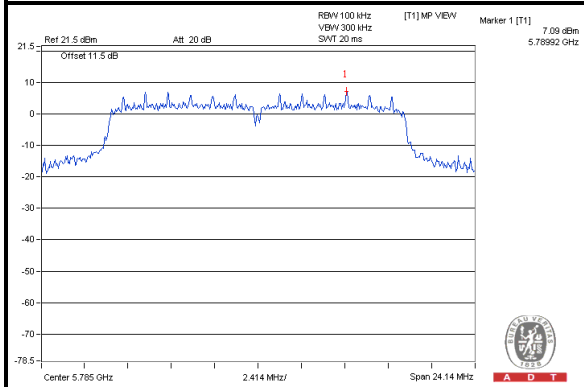
### CH 149



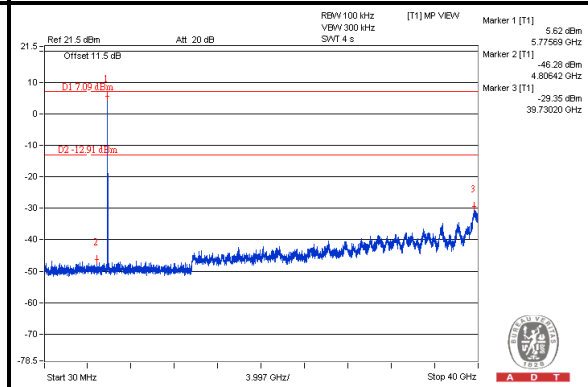
### CH 149



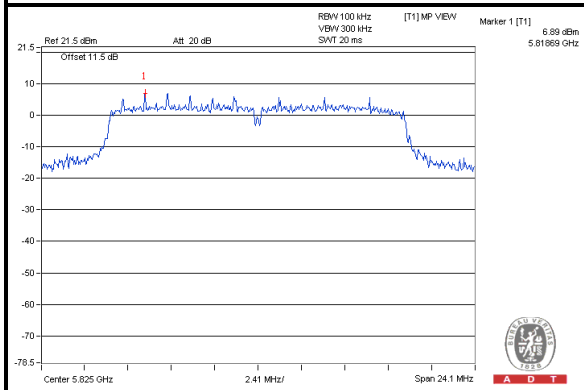
### CH 157



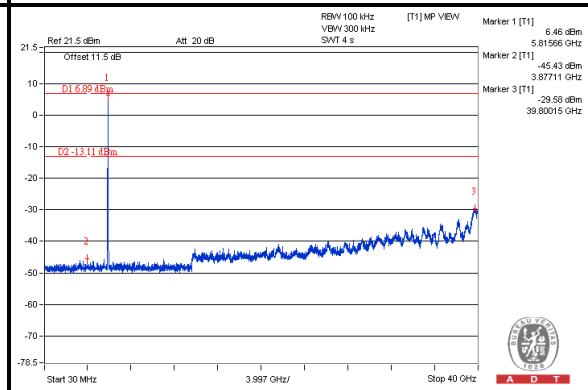
### CH 157



### CH 165



### CH 165

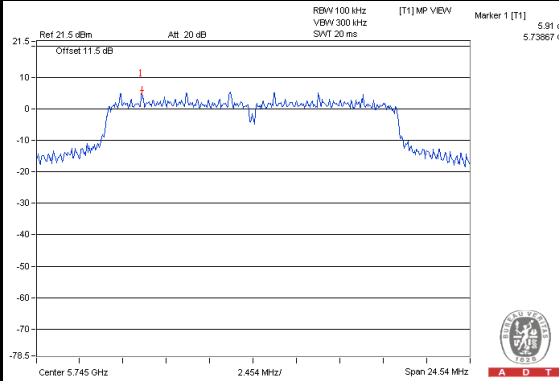




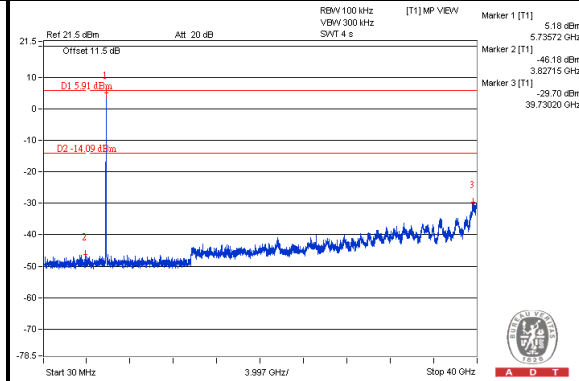
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### For Chain(1)

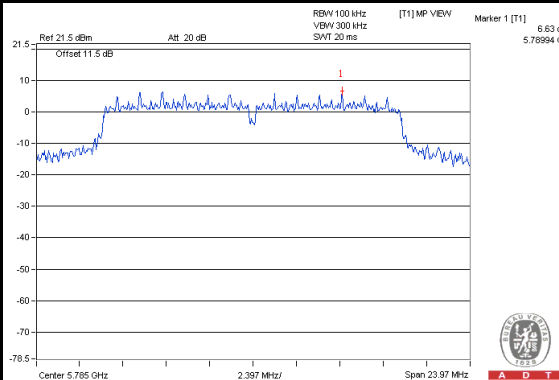
#### CH 149



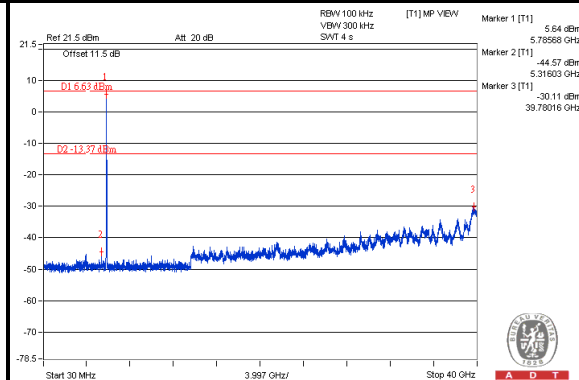
#### CH 149



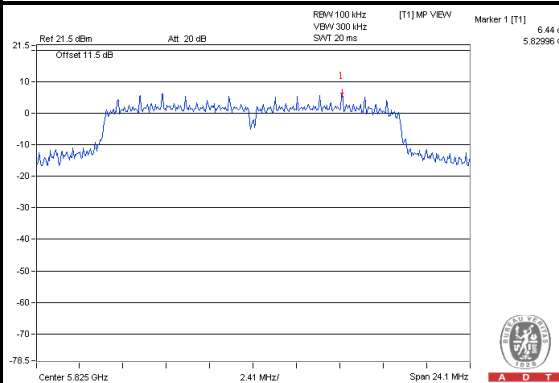
#### CH 157



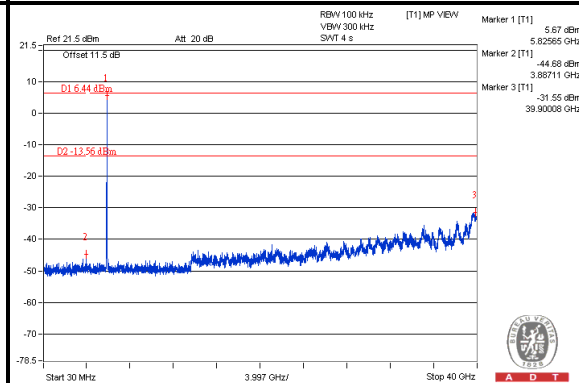
#### CH 157



#### CH 165



#### CH 165



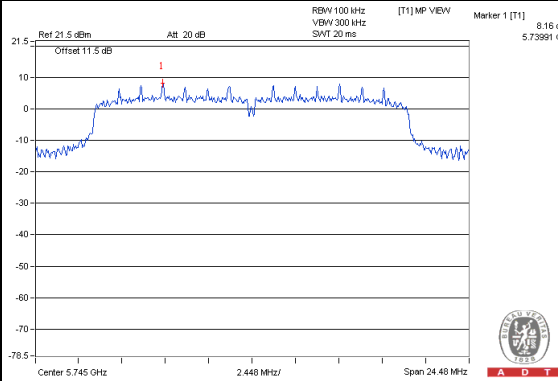


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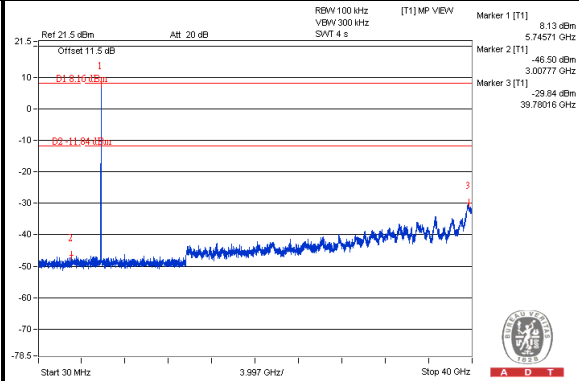
### 802.11n (HT20)

#### For Chain(0)

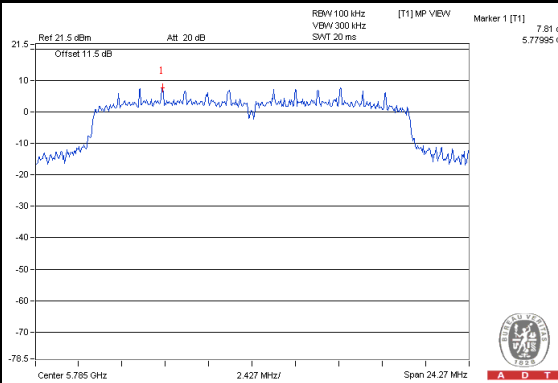
#### CH 149



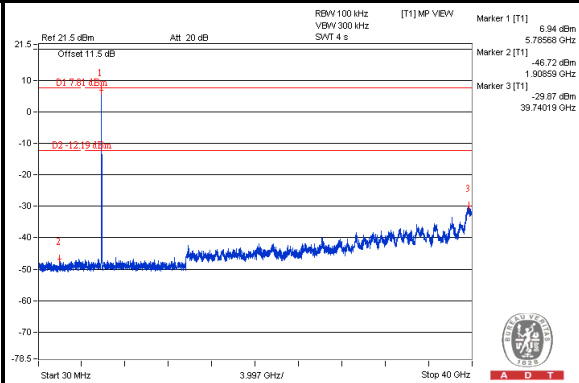
#### CH 149



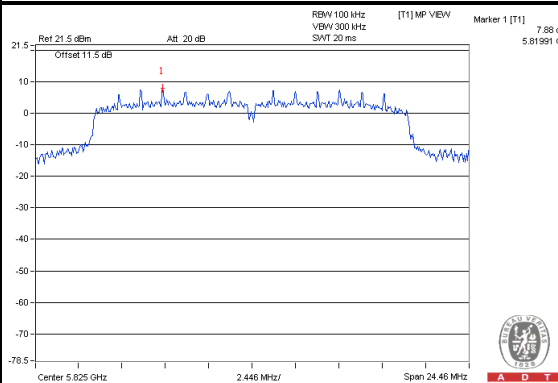
#### CH 157



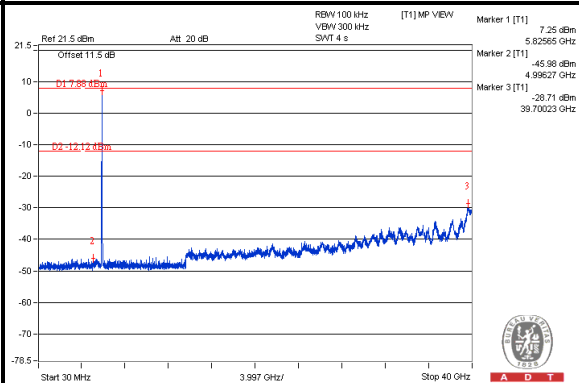
#### CH 157



#### CH 165



#### CH 165

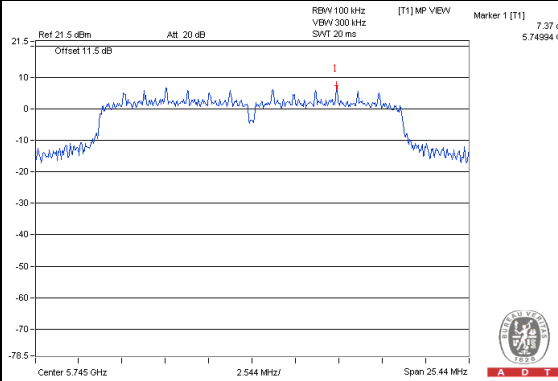




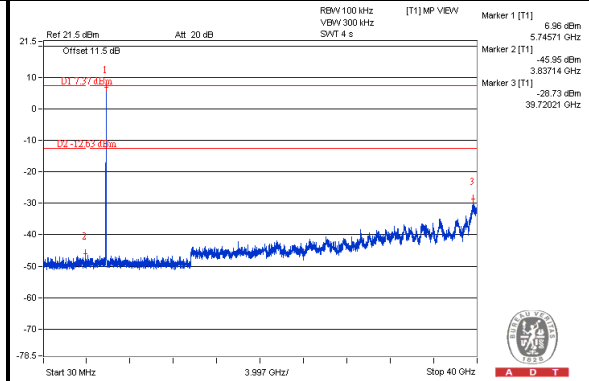
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### For Chain(1)

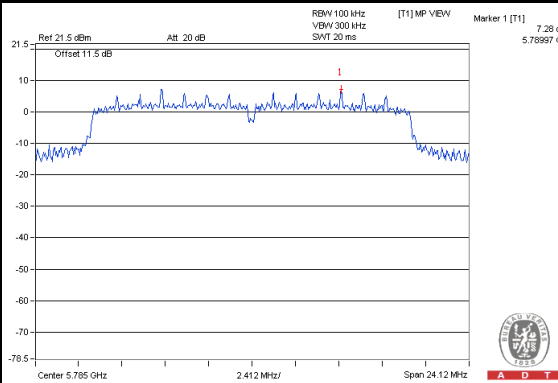
#### CH 149



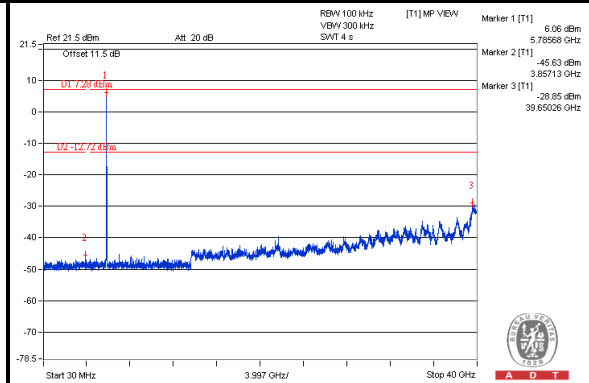
#### CH 149



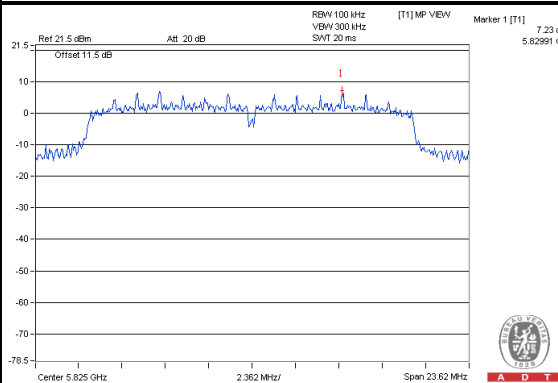
#### CH 157



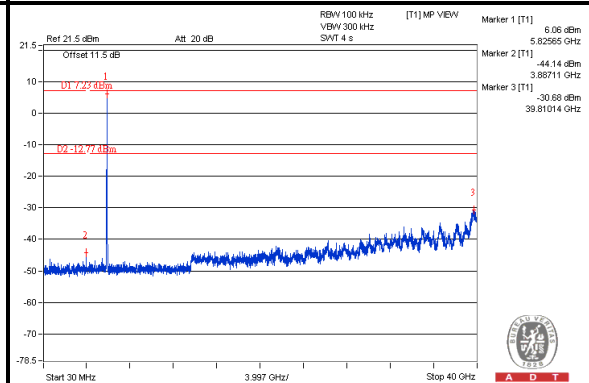
#### CH 157



#### CH 165



#### CH 165



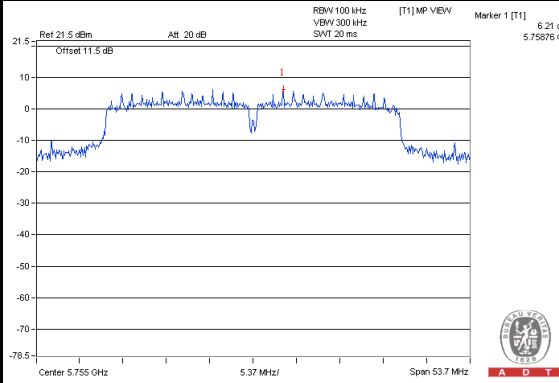


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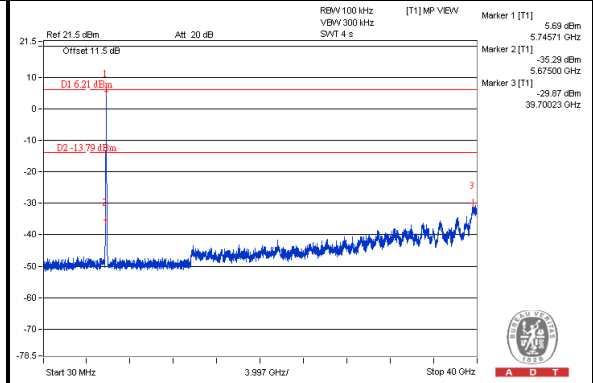
### 802.11n (HT40)

#### For Chain(0)

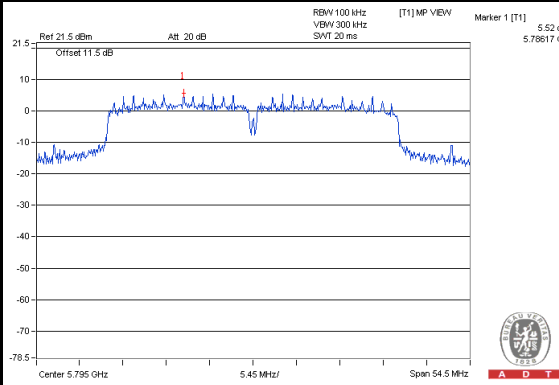
#### CH 151



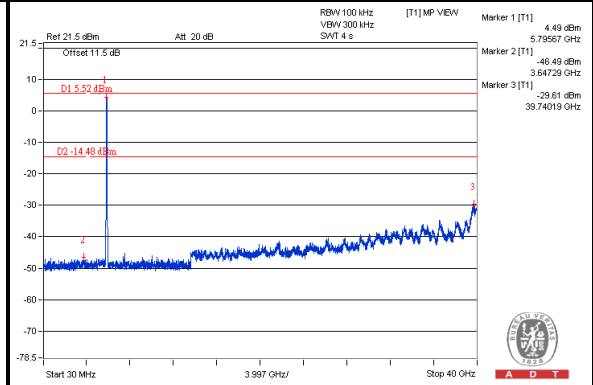
#### CH 151



#### CH 159



#### CH 159



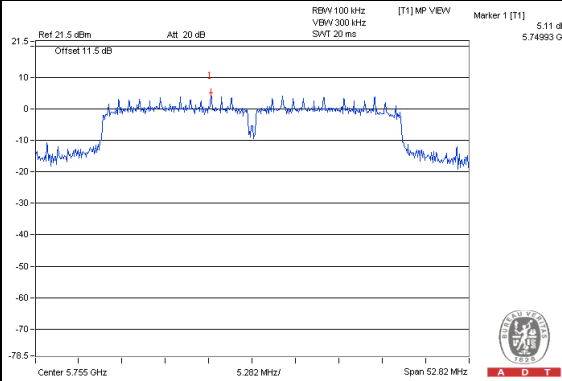




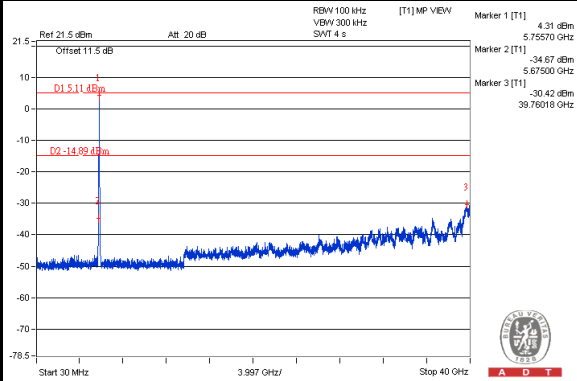
A D T

### For Chain(1)

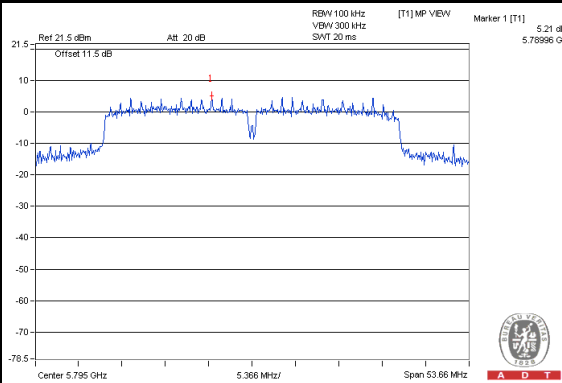
#### CH 151



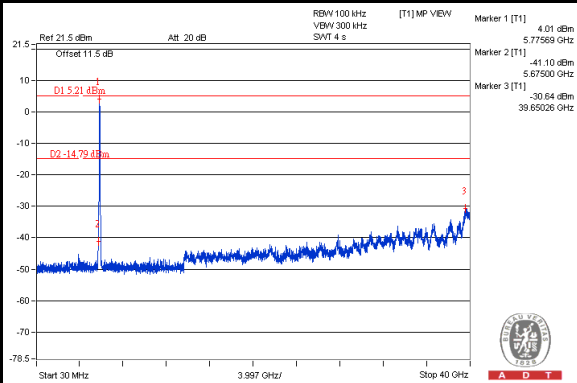
#### CH 151



#### CH 159



#### CH 159





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## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



## 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.

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.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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



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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 ---